A FUTURE BOOK

AMIGA FORMAT

GET THE MOST OUT OF YOUR AMIGA

The ***Amiga Format*** Guide to yo[illegible]iga, packed with the most useful hints, tips and guides to all aspects of the Amiga scene

EDITED BY DAMIEN NOONAN

AMIGA FORMAT

GET THE MOST OUT OF YOUR AMIGA

The ***Amiga Format*** Guide to your Amiga.

Please Note: Any enquiries about the book should be directed to Future Publishing, The Old Barn, Brunel Precinct, Somerton, Somerset TA11 7BY, and **not** to Commodore under any circumstances.

GET THE MOST OUT OF YOUR AMIGA

Edited by Damien Noonan
Disks by Jason Holborn
Cover by Paul Morgan

Many thanks for their contributions to:
Phil South
Mark Smiddy
Maff Evans

Published by
Future Publishing Ltd
30 Monmouth Street, Bath BA1 2BW

Many thanks to all members of the *Amiga Format* team past and present: Bob, Andy, Jase, Trev, Sal, Jennie, Martin, Maff, Paul S, Ange, Marcus, Paul M, Trenton and Pat. Special thanks to Olivia. Thanks also to Stevie J for tolerance, Dirk, Chris, Pat and Ian for production, Fiona and Jane for the difficult bits, Burke, Drutt and Boney for entertainment, a fish for surreality, and Samson.

The world's most advanced home computer came from humble origins. It was conceived as the best games console ever, developed by a firm called Hi-Toro and was nearly put into production by Atari. The name, Spanish for girlfriend, was a code to keep the project secret when the developers were talking about it in bars. When it was launched at the Chicago CES in 1984, Andy Warhol and Debbie Harry showed off its capabilities. There was one catchphrase that said it all...

Only the Amiga Makes it Possible!

The phrase "Only the Amiga makes it possible" was coined to promote the launch of the first ever Amiga computer, the now-demised A1000, at the Consumer Entertainment Show in Chicago in June 1985. Debbie Harry was there, singing along to the sounds emanating from the machine and sitting as a model for Andy Warhol, who was there to demonstrate the graphic power of the Amiga and later continued to use the machine throughout his life. It was a glamorous start for a mere computer, but in many ways it was the only appropriate style in which to launch a machine with so much potential.

It is the sort of phrase that can come back to haunt a machine. The computer industry is not forgiving of errors and the buying public is unwilling to put its faith in the empty promise of a new, untested dream. The Amiga has taken time to mature and to reach its full potential.

It is now five years and more since the Amiga appeared but at last it can truly be said that its day has come. The Amiga 500 was born, putting all the power of the A1000 and more into a compact home computer. It has taken time even for the A500 to become affordable and to become the machine at which software developers and retailers direct most of their efforts, but now it is in that luxurious position. Over Christmas 1989 the Amiga 500 was bought in greater quantities than any other home computer. And in 1990 it is set fair to do even better.

Amiga owners are lucky to own a machine that really does make it possible – superior in graphics, in sound, in speed and also in upgrade potential to any other. But it is a complex machine, not always easy to use – which is where this book comes in. But before we start making life easier, let's take a closer look at the Amiga's history.

Way back in the dim and distant past, back in the mists of time – or in 1984, actually – Commodore had no plans to launch a 16-bit computer. Indeed the great 16-bit revolution, the phase when home computers finally lost the cheap and cheerful image that was dominated by Sinclair's calculator-like Spectrum, had still not loomed over the distant horizon.

Commodore Business Machines had grown up originally from a firm making cash registers, electronic typewriters and eventually, with the new microchip technology of the Seventies, the world's first hand-held calculator. In 1974 CBM acquired a firm called Micro Office Systems whose founders had worked with microchip manufacturers Motorola. Only a year later, in 1985, the MOS boys had come up with a whole new ball game in the shape of the 6502 chip. This chip would act as the Central Processing Unit for a whole new series of computers, including the world's first PC.

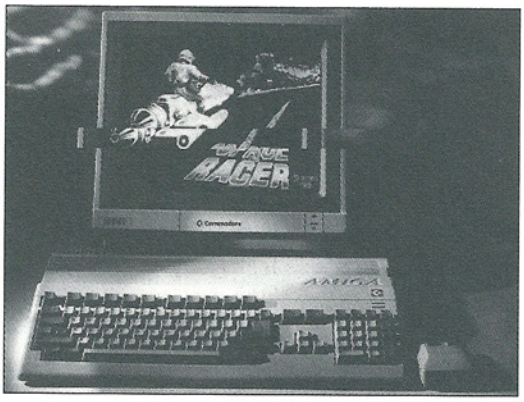
The first ever Personal Computer was the Commodore PET, the Personal Electronic Transactor, launched to an expectant world at the Chicago CES in 1977. It was styled in the 'futuristic' rounded plastic casing so typical of the 1970s and equipped with a massive 4K in its original 4000 incarnation. It may have been ugly and slow, but nevertheless it was a breakthrough – the first real personal computer.

Seven years on, the world of computers had moved forwards at an alarming rate. Not just the machines, either. *Space Invaders* had come and gone, and with it a new market in home computers for playing games on had been born. It had even given rise to magazines to cater for the taste of the more obsessive game-players. No doubt, the world would never be quite the same.

In 1984, Commodore's pride and joy was the C64, possibly the most advanced 8-bit computer built to this day. It had a sophisticated capacity for both graphics and sound and was selling in huge quantities. Technology, though, was steaming ahead at a great pace. Chip manufacturers were now producing 16-bit chips around which computers of great speed with television-like colour displays could be built at a reasonable price. But as yet, Commodore were not up with the race.

The Amiga 1000 – the original.

Meanwhile, in America... and this is where the story really starts. As the home computer boom kicked off in the early Eighties it was accompanied by a rise in interest in computer game consoles. These had developed from a toy marketed by Atari that played a rather bizarre form of tennis in black-and-white to become a domestic form of the arcade machine. Consoles, and in particular the Atari VCS cartridge machine, had become popular in the extreme. But the home computer was making serious inroads into this market and Atari were suffering.



The Amiga A500 – powerful machine for the people.

Atari's response was to throw a lot of money into a big game, licenced from a big film, to pick up the ailing fortunes of their machine. The film they picked was *ET*. This had just been a huge hit for Steven Spielberg and seemed sure to be the salvation of the firm. It failed. Round about this time Jack Tramiel, one of the leading influences at Commodore, was squeezed out of CBM for reasons that are not often discussed. His response was to buy out Atari, not only solving their financial problems but also setting the scene for one of the great confrontations and rivalries of modern business.

It would be some years yet before 16-bit home computing was even to be discussed, but at that time, deep in the heart of sunny California, a gnarly bunch of dudes called Hi-Toro were working on a console to beat all games consoles. Arcade games were beginning to get pretty damned sophisticated and so the firm decided to exploit new technology at the same rapid rate as the arcade manufacturers. In itself this was a pretty ambitious move, because the profit margins and scale of production of a viable home computer were not necessarily going to rival the sort of cash the arcade firms in Japan were raking in.

These were days of relative prosperity in Silicon Valley, though, so the three guys that made up Hi-Toro decided to invest their $7 million dollars in the project. Before they got too far down the road they changed their company name to Amiga, Spanish for girlfriend, because someone finally noticed Hi-Toro looked silly. And besides, alphabetically and marketing-wise it was as well to have a name beginning with A.

The name of the company was sorted, but they still had problems coming up with a name for the actual machine. After going through the usual varieties of fruit, nuts, birds, flowers and elements, they settled on the name Lorraine. Okay, so they could change it later, but at least for now no-one would know what they were discussing over the phone or in bars.

At the core of Amiga's team were Jay Miner and Dave Morse. Jay was a chip designer, and before Amiga he designed the chips in the VCS and Atari 800

The Amiga 2000 – a serious machine for power users.

computers, plus a variety of medical and scientific projects. Dave Morse started with Tonka Toys and joined to market Lorraine to an expectant American public. After Jay and Dave came the charismatic RJ Mical, the software engineer. RJ had been working on games with *Defender* creators Williams. RJ was headhunted by Amiga to design Intuition, part of the programming environment of the Amiga: indeed the bit that handled the Workbench.

To keep the real project secret they made a range of joysticks, rather like Konix and their games machine in recent times, and used the revenue from them as a bit of support for the Lorraine. The joysticks Amiga made were all weird and Californian: like the Joyboard, for example. This was a board with contacts at each corner which the player stood on, for playing surfing and skateboarding games, etc. The Joyboard wasn't a success, but it lives on today in the Guru Meditation messages.

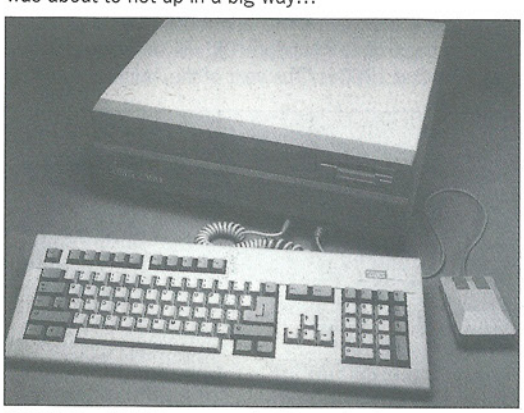
The story goes that one of the popular games at Amiga was to sit cross-legged on the Joyboard and run a special feedback program which tested how mellow you were by how still you sat. Meditating on the Joyboard was a popular way to relax after the prototype Amiga crashed, and so the errors were named accordingly.

About this time it was becoming apparent that the console was out the window and the do-it-all computer to beat the Apple Macintosh and PC was the way to go. Unbeknown to the Amiga management, a lot of 'options' had been added in development, like a disk drive, printer ports and a keyboard. The prototype, called Zorro, running on the Sage 68000 machines, was no games console. The circuit boards, later to be compressed onto the three custom chips Paula, Agnus and Denise, became more and more complex as the project wore on. It had somehow mutated into a viable computer.

Amiga had problems from the start. In order to interest companies in a machine, you had to have one to show them one. And you couldn't afford to build one until you got someone interested. Dave Morse remortgaged his house to get the firm through some sticky spots. They took out stands at computer shows to secretly show the machine to software houses, and had all the hardware blow up days before. But against the odds, the machine wowed enough people at the Chicago CES show in June 1984 to keep the project going. But they had to find a serious sponsor, who would either help them or (and this was the way it turned out) buy the machine out. Everyone was approached, including Sony, Hewlett Packard, Philips, even Apple Computers! No one was interested. Finally Atari showed an interest.

Jack Tramiel had a score to settle with Commodore and so tried to use Amiga as his secret weapon. He paid their debts and let them negotiate the price of shares in Amiga. The pressure was on: but at the last minute, when Tramiel was about to buy them out and use them as a stick to beat Commodore with, Commodore themselves called Dave Morse and bought them first.

Rather than eating Amiga whole, as Atari wanted to, CBM set aside a new company inside itself, Commodore-Amiga, to house the machine. It was around then that the machine took on the name of its creators. Commodore put millions into its development and the machine grew into a slim console with a detached keyboard, on top of which sat the stereo monitor. It began to look like a seriously viable machine of the Nineties. The launch of the Amiga A1000 finally came, as we have said, on that star-studded day in June of 1985. But it would still be a long time before the Amiga *really* arrived – and in the meantime, the war over the 16-bit home computer scene was about to hot up in a big way...



The Amiga 2500 – a move to the major league.

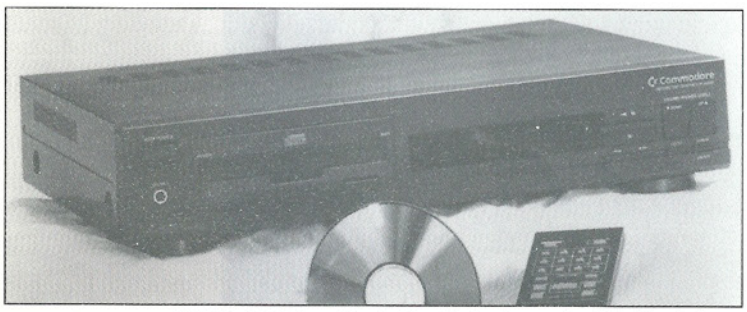
The A1000 never quite managed to catch the popular imagination. At around £1,000 it was considered very expensive, it was none too simple to use and it took a while for software developers to catch on to its potential – although firms like Activision, Electronic Arts and Microillusions led the way in a brave style.

Instead, the Amiga became a huge cult machine, its users extremely keen and dedicated if few and far between. They would write demos and programs to show off the machine's powers and their own prowess – and they would swop them on a nationwide basis via a network of bulletin boards and enthusiasts' groups. From this grew up the demos and Public Domain scene of today, as well as giving the machine a huge kudos.

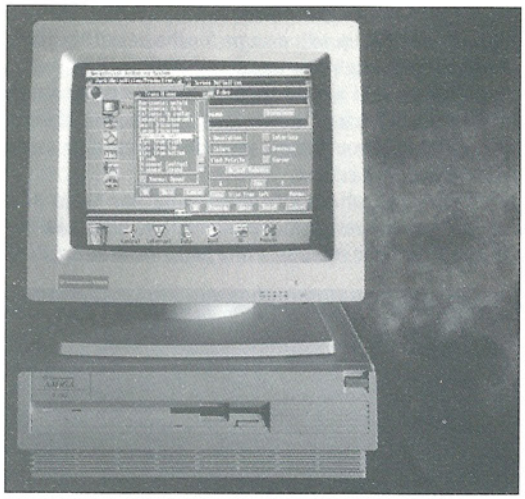
But the best was yet to come. By 1986, the race was finally on to produce a properly viable 16-bit home computer and the two teams way out in front were, of course, Commodore and Atari. In the end Atari stole much of the thunder simply because their ST was the first of the two machines to hit the market. For a long time the ST retained its lead in terms of poularity and, as a natural consquence, in terms of software support.

Commodore's competitor was, of course, the Amiga A500. In its early days it certainly suffered at the hands of the cheaper ST and much pressure was put on Commodore to drop the price of their machine – but they resolutely refused to do so, claiming that eventually the market would catch up with them and that their machine was setting standards for the others to follow. Finally they would seem to have been proven correct.

The A500 is now beginning to enjoy a real dominance in the home computer market. Software publishers are now producing more titles for it than any other machine, it is selling in greater quantities and the shelves in software shops reflect the fact. In the year to June 1989, 80-85,000 Amigas had been sold in the UK. In the three months after that, another 30,000 joined the growing band of users. Over Christmas of last year, the Batpack and Class of the 90s deals proved so successful that early in 1990 Commodore announced the sale of the 200,000th Amiga 500 in this country. As this growth continues, it becomes more and more likely that Steve Franklin, boss of Commodore UK will be correct in his prediction that 1990 is "The year of the Amiga".



CDTV – based on the Amiga, but a huge step into the future.



The A3000 – a step into the world of Multimedia.

As for the future – the future is a serious matter, as Lord Byron once said when he was drunk. The only question now is what next? The Amiga has already proven its adaptability. People who buy it don't just want to play games, process words, or mess about with programming in Basic. The Amiga 2000 has given serious credibility to the Amiga as a workstation for desktop publishing, desktop video, animation or graphic art. It is used by musicians in studios and at live performances. It plays its part in the production of television programmes and full-colour magazines. It is sleek and sophisticated at the same time as being affordable. So what next?

Well, there are two key words for the future. The first is Multimedia. In May of 1990 the Amiga 3000 was finally launched after much speculation. This is a really serious competitor in the workstation market, especially as it features UNIX compatibility, and is powered by a Motorola 68030 chip backed up by a 68881 or 68882 maths co-processor and capable of running at a blisteringly fast 25Mhz. It will also feature the new version of Workbench, the Amiga user interface. Workbench 2 will provide a more sophisticated and more powerful WIMP system interface than ever before. And the purpose of all this power? Multimedia – a form of computer use in which data storage, data access, graphics, text and sound all combine to produce forms of entertainment and information-giving as they have never been seen before.

The other key word? Well, two words actually – Compact Disc. The advent of CD storage devices has long promised to revolutionise the world of home computers, providing massive amounts of data for graphics and sound at the same time as cutting access times considerably. Commodore have bravely stepped in where others fear to tread and the new Amiga is not an Amiga at all – it is the CDTV, a black box reminiscent of a video recorder which, if Commodore judge correctly, will bring the ideal computer into people's homes without ever seeming to be a computer at all...

Part One
Creativity Guides

So what do you use yours for?

The Amiga is used in so many ways. Even people who buy an Amiga mainly because it is capable of playing stunning games seem to realise quickly that it is capable of so much more.

The idea of this section of the magazine is to introduce all the different areas that you should be aware of if you aren't making use of your Amiga's capabilities – and at the same time to point you in the right direction for progress if you have started off along the path.

Somewhere in Scotland, an Amiga is being used to print out huge posters. In London and in Canada, Amigas are used to produce full-colour magazines. The Civil Aviation Authority will soon be using Amigas to train their Air Traffic controllers. Before long, the Ministry of Defence might be using Amigas to train tank drivers. In London again, a hospital is teaching Amigas to read heart scanners and at the Museum of the Moving Image on the South Bank the Amiga is producing fine art.

So what do you use yours for? In a survey of readers of *Amiga Format* magazine it was discovered that 51% see the main use of their Amiga as being for games, 35% would consider it to be creativity and a substantial minority of 14% mainly use it for business. These are interesting figures in themselves – but they would *seem* to imply that most people *just* want to play games.

This is as far off being the truth as saying that the Amiga Batpack only contains games. In with this bundle of the Amiga 500, a pack that sells in such great quantities that no other computer can compete, there is also included, in amongst classic games like *Batman* and *New Zealand Story*, a copy of Electronic Arts' *Deluxe Paint II*. 'I know,' I hear you cry. 'I've bought it, I know it's there. So why is he going on about it?'

Well, this one program almost exactly sums up the point. Even if you did only buy a Batpack for the Amiga and the games, you will no doubt have become fascinated by the power of this paint package and, if I'm very much mistaken, you will have spent a good deal of time tinkering with it. And you will perhaps have realised that *Deluxe Paint* is one of the best art packages on any computer anywhere, that it's a whole lot of fun just to tinker with, but is also loaded with potential for getting down to some serious creativity. And that this can be just as much fun as, and in many ways much more rewarding than, just playing games.

And that's what this part of the book is all about. It aims to encourage you to explore the fun and fulfilment you can gain from creativity software – and to help you become more expert in any of the areas that appeal.

Word Processing

One of the basic functions of computers nowadays is to remove the drudgery of typewriters or the humble ball-point pen by allowing us to use word processors. With the capacity to make corrections as you go along or afterwards, to check your spelling, to print as many copies of a document as are needed in a nice, legible way, it's no wonder these gadgets caught on. What follows is:

Where would we be without that most wondrous piece of software, the Word Processor? Imagine a time when all text had to either be written by hand or punched straight onto paper using a typewriter. Seems fine for a while, but what happens if you make a mistake? You have to start again, of course! You could resort to the old correction fluid, but let's face it, Tippex isn't a patch on the trusty 'Delete' key!

Word Processing is one of those universal applications where, like it or not, the Amiga has to compete with machines as diverse as 16K Spectrums and the latest '030-based Sun Workstations. For many computer users, a computer without a decent word processor is like a Ferrari without wheels. But what should you be looking for in your ideal partner... er, or should I say word processor?

Choosing a word processor isn't as clear-cut as it always used to be. The conventional definition of a word processor was merely a program that allowed the on-screen manipulation of text: but these days, machines such as the Amiga have spawned a new breed of word processor, the Word Publisher - or that's what those PR people like to call them, at any rate! This new breed of word processor goes far beyond the conventional definition to include many features previously only to be found within powerful desktop publishing packages. Only with the advent of low-cost WIMP-based systems has the Word Publisher been possible.

While all those rather nice windows and icons supposedly make a package easier to use for the novice, they can often have the reverse effect when applied to basic word processing. Not only that, but the continual process of having to swap between keyboard and mouse can slow down your work rate considerably. Word processing just seems to be the one exception where the simplicity of a package is often its strength.

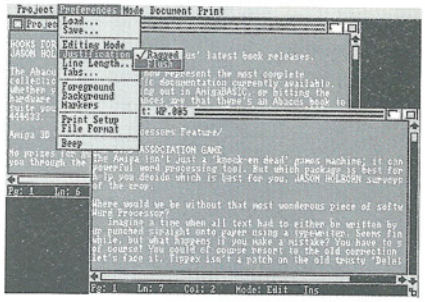
Before choosing your word processor, the first thing you must decide is whether it's a straight word processor you're after or the more presentation-based Word Publisher. If the main use for your word processor will be to produce letters to the bank manager, bulk documents etc, then you're not going to need a package that allows you to drop flowers and other clip-art all over the page. If, on the other hand, presentation is all-important to you, then a Word Publisher may well be just the one to go for As ever, decide what you need before you buy.

SCRIBBLE! PLATINUM £49.95 - HB Marketing (0753 686000)

Scribble! has been around for almost as long as the Amiga itself, but remains one of the most powerful word-processing systems available. *Scribble! Platinum* now includes limited graphics support and runs in a custom screen, leaving the Workbench less cluttered.

Where word-processing features are concerned, *Scribble!* has them all. It also provides comprehensive mail merge facilities, a 104,000-word spell checker (including both scientific and technical dictionaries) and a 470,000-word thesaurus. While screen update is generally fast, it can slow down considerably when scrolling through a large document.

A popular choice for straight word processing due to its simple, no-fuss design and powerful editing facilities. There are better, but a relatively low price makes *Scribble!* highly desirable.

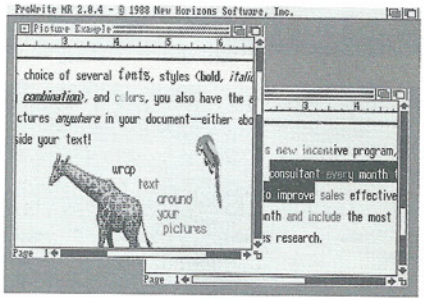


PROWRITE 2.5 £89.95 - HB Marketing (0753 686000)

Even though it has been available for a couple of years, the program still stands up well against the competition. *ProWrite* is completely integrated into the Amiga windowing environment and is without doubt one of the most attractive-looking word processors available. The program boasts a full WYSIWYG display, 95,000-word spell checker and DTP-like control over imported pictures (but no Thesaurus).

Any IFF picture can be loaded in and pasted onto the page. Once a picture has been pasted down, it can be cropped and resized to suit your needs. Just as in a DTP package, text can also be made to run around a picture.

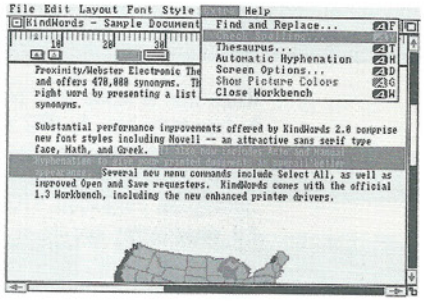
ProWrite includes all the standard editing features, but the screen update can be rather slow when working on large files. *Pen Pal,* though dearer, still beats *ProWrite* in every department.



KINDWORDS 2 £49.95 - Disc Company (010 331 4553 1053)

Still relatively new, but one of the most popular Amiga word processors due to various bundling deals which have gone down well with Amiga owners. Currently being sold in the Amiga Starter Kit (£69.95) and the Amiga Home Office Kit (£149.95).

Another in the flourishing breed of 'Word Publishers' that allow the importation of IFF graphics. Unfortunately, only 16 colours are used regardless of the format of the original and, rather disappointingly, text cannot be run around a graphic. Employs its own 'Superfonts' system which supposedly provides better quality results when printing. Has a 100,000-word spell checker and 470,000-word Thesaurus. Screen update is a tad slow and the user interface is a bit quirky, but recent bundling deals make *KindWords 2* good value for money.



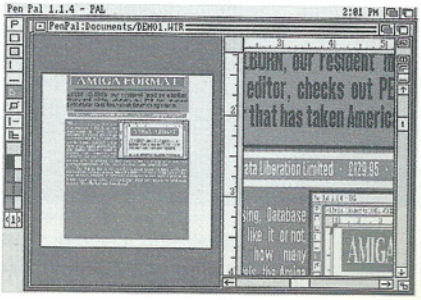
PEN PAL £129.95 - Data Liberation Ltd (0983 405600)

A relative newcomer and one of the new breed of Word Publishers. Features easy-to-use interface along with on-screen help to make life easy.

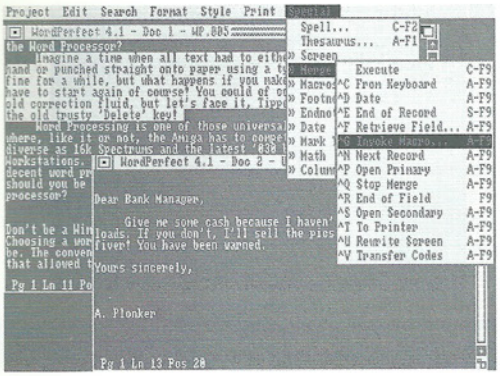
Pen Pal allows full importing, sizing and cropping of graphics from any IFF source and text can be run around pictures. Included are a number of drawing tools to help with boxes, lines and the like for drawing up forms or improving the look of a page. Will even let you check forms with sample data.

No Thesaurus, but *Pen Pal* has a spell-check dictionary of over 100,000 words as well as a user dictionary for you to save your own words into. Statistics include not only word counts, but also other details like average number of words in a sentence or even the reading age of your writing!

Very much a superlative and highly-polished program, with many complex features: but the beginner may be happier with something simpler.



WORD PERFECT £230 - Sentinel Software (0932 231164)

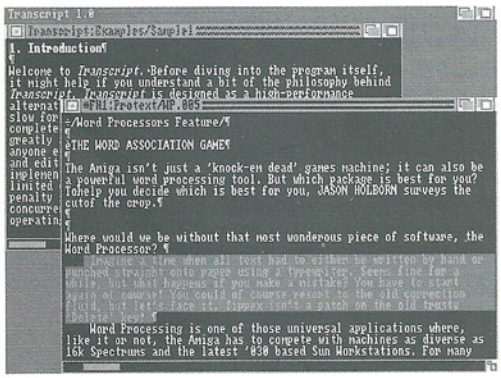


If you ever want to impress your word-processing pals with name dropping, just try saying 'I use *Word Perfect*' occasionally. *Word Perfect* is one of the big names within the industry and you'll find nearly every credible business machine, especially the PC, running it in one form or another.

Word Perfect Amiga comes on four disks and is bundled with a weighty 500-page manual. As far as straight word processing is concerned, *Word Perfect* does it all: it has massive dictionaries for the spell checker and thesaurus and is packed with editing features. Although the program supports Intuition windows and pull-down menus, the program still retains the same feel as its PC parent. If you use *Word Perfect* on your PC at work then this'll be a good thing, otherwise you could end up feeling rather lost.

Word Perfect will undoubtedly fulfil even the most demanding of word processing applications, but the program is a shade overpriced for what it offers. What you're really paying for might be the *Word Perfect* name!

TRANSCRIPT £39.95 - HB Marketing (0753 686000)



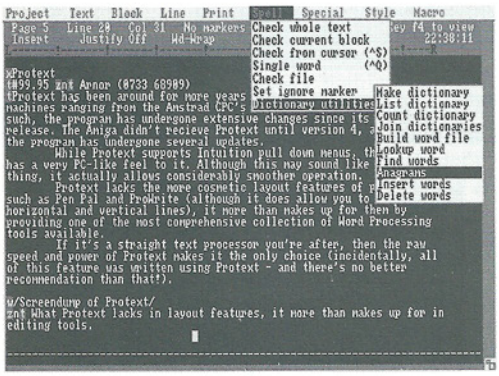
Transcript is one of the most recent (and cheapest) additions to the word processing ranks. The program was produced by Gold Disk in Canada, the company that brought you the powerful *Professional Page* DTP package. With a pedigree such as that, you'd be right to expect a lot from *Transcript*.

The program is a straight text editor that sacrifices many of the more cosmetic features of the competition in return for raw speed. Unfortunately, this does tend to make the program look rather unprofessional, but as we all know, performance is the most important aspect of any program. *Transcript* boasts a 90,000-word spell checker, a unique auto indexing option and full mail merge facilities.

Many of the standard text processing commands within *Transcript*, such as justification etc, are carried out using embedded codes. While these codes are powerful, you cannot (in the case of justification) see the results until the text is printed.

Simplicity and speed are undoubtedly *Transcript*'s greatest assets. If you want to use your word processor to produce very large bulk text files then *Transcript* is the solution: otherwise, you may feel rather limited.

PROTEXT £99.95 - Arnor (0733 68909)



Protext has been around for more years than I care to remember on machines ranging from the Amstrad CPC to the IBM compatibles. As such, the program has undergone extensive changes since its original release. The Amiga didn't receive *Protext* until Version 4, and already the program has undergone several updates.

While *Protext* supports Intuition pull-down menus, the program has a very PC-like feel to it. Although this may sound like a bad thing, it actually allows considerably smoother operation.

Protext lacks the more cosmetic layout features of programs such as *PenPal* and *ProWrite* (although it does allow you to draw horizontal and vertical lines), but it more than makes up for them by providing one of the most comprehensive collection of word processing tools available.

If it's a straight text processor you're after, then the raw speed and power of *Protext* make it the only choice – and there's no higher recommendation that could be given to any program than that!

DeskTop Publishing

From parish newsletters to full-colour glossy magazines, DeskTop Publishing, or DTP, is used to give that professional look to printed documents. Amiga DTP is, in fact, used by several national magazines. The main idea of DTP is to produce a representation of the finished page on screen, including text in finished typefaces and pictures cut and sized to fit. The only limitations are imposed by the quality of the printers you use – but from doing it better than you do already, you will soon realise it's only a short step to doing it perfectly. What follows is:

Traditional publishing involves producing text as type-written 'hardcopy', keying it into a typesetting machine and printing it out as 'galleys', just columns of set type in strips. Typeset galleys are then literally cut up and stuck down with glue, together with pictures, to make artwork from which pages may be printed.

In theory at least, DeskTop Publishing takes much of the pain and expense out of producing final artwork from which pages may be printed. Text can be keyed into the computer and manipulated, producing most, if not all, of the effects achievable on expensive typesetting equipment. Pictures can be drawn on the machine itself or scanned in and then edited, retouched and placed on a page held in memory. Once words and pictures have been combined in a layout the whole document can be saved as a file. Print out the file, and you have final artwork from which a printer can do his job, or from which you can make photocopies to distribute.

Setting up a DeskTop Publishing workstation around your Amiga could easily involve spending £10,000 on extra hardware and the software to drive it. Fortunately, for most purposes a few hundred pounds is all that's needed to get going, even if you're starting on an A500.

The first thing to sit down and think about is how much work you want to do on your DTP kit, and what sort of quality you really need. To flash up a simple newsletter that appears once a month, you might get away with a word processor and avoid DTP packages altogether. Similarly, if the odd poster is all you require, an art package might solve the problem, without recourse to page make-up software.

With a basic A500, a nine-pin dot-matrix printer and around £100 of DTP software, quite serious work can be undertaken. The next step up involves investing in a 24-pin dot-matrix printer, or even an inkjet printer, as well as a Megabyte memory upgrade and one of the more expensive DTP packages.

Remember, however, that there's no need to splash out on expensive output devices to obtain really high quality, high-definition output: step forward PostScript, a page-description language that is device-independent. Providing your DTP package can produce PostScript files from your pages, it will be possible to use a friend's laserprinter, or pay a bureau to produce laserprinted (usually a resolution of 300 dpi) or image-set (1200 dpi and up) pages from your disk. Seriously good.

A hard disk drive is probably next in line as a DTP system upgrade, as it makes life easier. Add on several thousand pounds for the convenience of a PostScript printer sitting next to your Amiga, and you have a professional-quality DTP workstation at a fraction of the price of a Mac or PC compatible system with the same power.

Once the plunge has been taken, the potential for spending money is enormous. A hand-held scanner could be added to the system for a few hundred pounds more, or even a high-quality flatbed or photographic scanner for a few thousand pounds could be tagged on. Throw in a top-quality art package such as *DPaint III*, invest in a large-screen display and you have a system that few professional outfits equipped with Macs or PCs could find fault with. People are producing entire magazines on Amiga systems, but few corporate-type people seem to realise that it can be done effectively. PCs and Macs - with their high price tags - dominate 'Professional Publishing', as really serious DTP is called these days. Anyway, here's a look at the software.

CITY DESK £130 + VAT - Precision Software (081 330 7166)

Uses a somewhat quirky system. In many ways the way of working mirrors traditional handling of galleys in physical paste-up: text is placed on the page, lifted and replaced, or lifted, re-typeset and replaced. Style information is embedded as command codes in the text file and is automatically carried into *City Desk* when a file is imported. Text can be edited for content and typographical style once on the page.

A simplistic graphic editor is part of the *City Desk* package, and it boasts basic drawing, rotating and fill tools with which quick sketchettes may be created or imported IFF files tarted up. Graphics can be cropped and sized on the page.

City Desk is, without doubt, a powerful page creation package, but the user interface leaves a great deal to be desired. In some respects, you are expected to 'program' layouts rather than design them and make fluid modifications as work progresses. Only saints will avoid hurling the manual across the room several times during the learning process. If long documents that stick to a basic style are what you need to produce, however, *City Desk* is worth getting to grips with.

SHAKESPEARE £99 - Cloudhall Ltd (0604 231211)

The only budget DTP package that allows colour to be carried through to hard copy. Providing you have access to a colour printer, type, tints and images can be produced in glorious hues. But it doesn't produce colour separations and PostScript output is greyscale only.

In use, *Shakespeare* is perfectly friendly, if a little idiosyncratic. Once the basic format of a document - or 'issue' - has been set, frames are drawn on the page. Text and graphics, known as 'articles', are placed in frames and manipulated.

Unlike most DTP packages, *Shakespeare* doesn't offer a magnify function. An optional page preview display gives an overall impression of a page, but all work is carried out at full size. *Shakespeare* imports colour graphics in IFF format, but can't cope with HAM. It is a powerful tool, supported by a clear and informative manual, but let down by its inability to import format information with text.

While graphics can be cropped and sized, once imported they can't be edited and there are no drawing tools. Printer set-up could prove fiddly. Brilliant for anyone with a colour printer, *Shakespeare* is best suited to single page work, and isn't top choice for mono.

PUBLISHER'S CHOICE £99.95 - HB Marketing (0753 686000)

Without doubt, this package is the best DTP deal available on the Amiga. Not only do you get a copy of *PageSetter V1.2*, but the full-featured word processor *KindWords* is included, along with clip art, headline fonts and *LaserScript*, a utility that allows output on Post Script printers.

PageSetter itself is effectively three functions in one: text editor, graphics editor and page layout device. Following the analogy of a page on a desk, *PageSetter* allows text and graphics to be cut and 'parked' outside the page. Thus elements can be placed on the desk while a layout is being revised. Flipping to the text or graphics editor takes you away from the layout desk into separate workscreens. The text editor can load text from a variety of word processors. It would be perfectly comfortable to write all your text inside this editor. The graphics editor would make a respectable, if simplistic, stand-alone package. All that's needed to create, size or crop graphics is present.

The pack offers all you need to get started and is accompanied by an excellent manual that makes the learning curve painless. *PageSetter V1.2* is an elegant and powerful package and, in the company of its boxmates, must be the best low-cost Amiga DTP option available.

PAGESETTER 2 £99.95 - HB Marketing (0753 686000)

The updated version of the *Pagesetter* program included in the Publisher's Choice bundle. *Pagesetter* was, incidentally, the first ever Amiga DTP program and comes from Gold Disk in the States, a highly-respected firm who produce some of the best productivity software around.

Pagesetter 2 has been completely rewritten, using many of the systems from its more expensive big brother *Professional Page* (see over the page for full details). The text editor is no longer a separate function, as text can now be typed straight onto the page with full cut, copy and paste functions and search-and-replace.

The new version can make use of structured fonts, which means their resolution is only restricted by the quality of your printer. Similarly, the extensive drawing tools available are also structured and so will be smooth and clean of line, not suffering from bitmap 'jaggies'.

Pagesetter 2 does allow the full importing of graphics into the page - all IFF modes including HAM are supported - but the program has no colour support, so pictures are displayed and printed in greyscales (shades of grey). The graphics editor, too, has gone, so pictures cannot be touched up from within the program.

Layout follows the most common principles in DTP, using frames or boxes into which text and pictures are placed. Frames work in a series of layers, so can be placed on top of one another to achieve the desired effect. Frames containing text can be linked or 'chained' together. Sadly, each document can only have one page, so longer documents must be worked on a page at a time.

Pagesetter 2 is an extremely competent program which, despite its faults, still manages to be easily the best of the low-price packages. Owners of Version 1 can upgrade for £40.

Moving up to Colour DTP...

The basic theory behind the techniques used to print colour magazines such as *Amiga Format* is straightforward enough, and applies to most full colour printing. By mixing three coloured printing inks in different combinations it is theoretically possible to make any colour you want and put it on a page. Cyan, Magenta and Yellow are the inks you need, and in the trade they are referred to as 'Process' colours. (Similarly, using Red, Green and Blue light it is possible to create and display any colour in the world - that's how a colour monitor or TV screen works.)

There's one little refinement to the basic concept of mixing Process inks. Even though the theory about combining Cyan, Magenta and Yellow to produce any colour you like holds true, the black achieved by mising the three colours isn't very convincing when it is printed. Quite early on, printers discovered that a much better finished result could be achieved if they deviated just a little bit from the pure theory of colour: most full colour printing involves using a fourth Process ink - Black.

Printers make room for some Black ink by removing just a little bit of Cyan, doing away with just a touch of Magenta and getting rid of the tiniest amount of Yellow. They also use their Black ink to print black areas of an image and to generally crispen up the appearance of the printed picture. While there are complicated algorithms in use for generating the black component of an image, doing it right involves the use of little magic...

When it comes to printing a colour page, four different printing plates are needed, and the paper has to come into contact with each of them in turn so that the Cyan, Magenta, Yellow and Black inks can be applied. It's a tricky job getting the four Process colour images to align perfectly with one another, but that's the printer's job. As a publisher, it's your job to provide the printer with four pieces of film for each page so the printing plates for Cyan, Magenta, Yellow and Black can be made.

In order to capture an image or a phtograph, separate it into the four Process colours and output it to film ready to be incorporated into the films for your page, a repro house will use a scanner. They will have paid a quarter of a million pounds or more for their scanner, which explains two things: first, why repro houses have to charge you serious money, and secondly, why an Amiga, Macintosh or PC-based DTP system can't match the perfect results of the repro man.

With colour DTP it's possible to save money by doing some of the repro house's work - producing sets of film that have the tints and colour text, then leaving the colour separation of pictures to the man with the £1/4M scanner. If acceptable rather than perfect results are your goal, or if a video camera or desktop scanner means you can afford to use colour, then full colour DTP is for you. It won't be perfect, but Amiga graphics, for instance, will look brilliant when printed.

Whatever your motivation, the Amiga offers the cheapest route into full-colour DTP work, and an Amiga can match the power of a vastly more expensive PC and Macintosh systems. A full run-down of the main full colour-separated Amiga DTP system follows over...

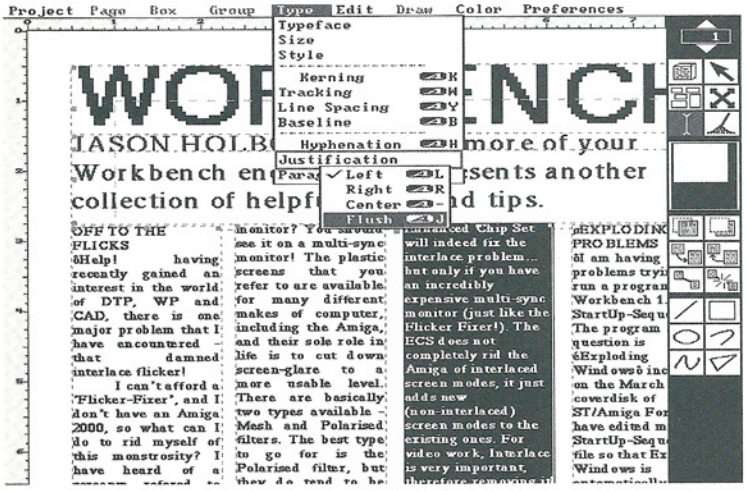
PROFESSIONAL PAGE £129.95 - HB Marketing (0753 686000)

Gold Disk have been at the leading edge of Amiga DTP for some while now and the software has a pedigree: it has been in use for a couple of years, and the refinements in the latest version take account of requests and suggestions from users.

In many respects, *Professional Page* mirrors the method of working adopted by *PageMaker*, the classic DTP program that got the ball rolling on the PC and Macintosh. The basic concept models the traditional working methods of the past-up artist. Documents are assembled as if they were physically placed on a designer's table, so the frames that are used to hold text or images can be picked up, moved off the page and 'parked' on the tabletop until they are needed.

Everything you might need to control layout and typography is offered via the pull-down menus and toolbox icons, with no omissions. While hyphenation is controllable you are expected to check your spelling at the word processor stage rather than in the document.

The work area can be viewed in five magnifications, including actual size and 200%, and a cunning page preview gadget in the toolbox shows a schematic of the entire page when it is too large to fit on the Amiga screen. Move a cursor over this tiny representation and you can jump to any area of the page without having to scroll around hunting blindly. By default, the display is in interlace mode (recommendations are made in the manual as to less flickery monitors), but it can be toggled to the more stable Amiga resolution...



Frames, or boxes as the manual prefers to call them, can be linked together in chains so that a story can flow through several locations on a page or in a document. To make life easier when your nose is firmly against the layout board, two tools allow you to move automatically from the current location to either the previous text box in the chain or the next one.

A set of six basic drawing tools are kept handy by the side of your paste-up desk, and a basic selection of line and fill types are offered, which can easily be set to virtually any colour. Version 1.2 now supports Gold Disk's *Professional Draw* package, and also handles high resolution bitmap graphics, so there's plenty of scope for getting sophisticated images onto your pages.

In essence, *Professional Page* is a powerful and quietly competent DTP package with a friendly interface. It is typographically excellent, but what makes *Professional Page* a stunning DTP product - and not just a stunning Amiga product, but one that stands up very well to top of the range PC and Macintosh packages - is the degree of control it offers over colour separations.

The Print to PostScript submenu offers all the options you need to consider when preparing output for a laserprinter, remote typesetting bureau or for subsequent import by another PostScript-compatible program. When preparing full colour separations you can specify the resolution of the screen used to create the dots, and can also control the angle at which the screens are output to film. Mono, three colour and four colour separations can be made and you even have control over undercolour removal and grey component replacement (which has to do with the 'magic' process whereby real Black is introduced as a fourth colour into an image which could theoretically be printed using only Cyan, Magenta and Yellow). Colour PostScript is also supported.

Gold Disk have designed and written *Professional Page* to be an integral part of integrated, Amiga-based publishing operations. As such, it fits into a range of publishing products produced by Gold Disk themselves and other Amiga suppliers. Put simply, *Professional Page* is currently *the* package for high-quality DTP. However, it needs a Meg to run and two drives are recommended.

Graphics

There is no machine that can quite match the Amiga for powerful graphics coupled with an ease of use that brings this power to your fingertips. You only have to look at the graphics in games for proof - and even these are usually created using one of the popular graphics programs. In the following few pages we take a look at all aspects of Amiga graphics: straightforward paint programs, HAM painting with which 4,096 colours can be used, Computer-Aided Design, 3D modelling, ray-tracing and animation.

Introduction

There really is only one place to start – and that's a place familiar to nearly all Amiga owners nowadays. If you bought your Amiga in any of the recent A500 bundles from Commodore, such as the Batman Pack, the Flight of Fantasy pack or the new Screen Gems pack for Christmas 1990 you will have acquiored a copy of Electronic Arts' *Deluxe Paint II* with your machine. If your Amiga is older, you will no doubt have been unable to own it for long without being tempted to buy *Deluxe Paint*. It really is one of the best graphics programs on any computer ever, allowing access to the graphic power of the home machine which is more talented in this particular area than any other. Most games writers use it to draw the graphics for their games and, because it uses a standard file format common to all Amiga products – IFF (Interchangeable File Format) – to store pictures, they can be transferred between programs and even into your own programs with ease. *Deluxe Paint* has done more for the Amiga than any other product – after tinkering with it, so many people who bought an Amiga just to play games on have realised that there is a whole lot more to their computer than games. It has opened the door for many people to the other uses of the Amiga, generally known under the generic headings of 'productivity' or just plain 'creativity'. Get creative!

A word about Screen Displays...

The Amiga, as I'm sure you must know by now, has a wide range of graphic power available to it. It has a total colour palette of 4,096 colours and a number of different screen modes or display modes. Before we go any further, it might be a good idea to explore these a little.

The basics can be explored by playing around a little in *Deluxe Paint*. On the opening screen you have options for three screen resolutions – low, medium and high, often referred to as low-res, med res and hi-res. Normally in these screen modes a maximum of 36 out of the Amiga's 4096 total can be displayed at one time.

The next two steps up are both a bit of a cheat. The first is Extra Half-brite (EHB) which allows up to 64 colours on screen at one time. In actual fact these are the same 32 plus another set of half the brightness of the original set, but it gives a workable extra 32 shades. The other cheat is Interlace mode, which imitates a screen of twice the resolution by flickering between two slightly offset screens. The idea was that this should be used with a screen that retains each image slightly longer, but of course nobody has these.

The final display mode is HAM. This cheats completely, calculating each colour on-screen by comparison with the one next to it. It is very clever, though, and allows all 4096 colours to be used.

Simple Bitmap Paint Packages

The display on a computer monitor is, in effect, an array of tiny lights arranged in horizontal and vertical rows. Each light can be any one of a range of hues and shades, or off: so almost any image can be composed on the screen by varying these colours. The lights (or PIXELs – PICture ELements) are each controlled by the state of one byte in the computer's screen memory map: so the display is called bitmapped.

All graphics programs use the bitmap to display representations of their final output, but paint programs operate by manipulating this map in a vast range of ways to transform the screen directly, usually almost immediately. This technique could be called screen painting. Recent developments include surface, texture and contour mapping where a section of the 2D bitmap is 'bent' and re-mapped onto a representation of a 3D surface, with a range of shading to give the effect of texture and contours.

DELUXE PAINT III
£79.95 Electronic Arts 0753 49442

Undoubtedly the ultimate system for use in all the normal Amiga screen modes. Other than animation (covered later), the main new features are: the use of Extra Half-Brite supporting 64 colours, especially useful for shadows and highlights: overscan painting, so that the size of the picture can be much larger than the size of the screen: wrap brush mode for pseudo-surface mapping: tint brush mode giving colour and transparency effects: much better font support: generally much faster operation, especially of perspective effects.

PHOTON PAINT 2
£89.95 Software Business 0480 496497

Has become one of the primary tools for screen painting in the Amiga's quirky 'omnicolour' mode, HAM. It also now provides animation support though nowhere near as comprehensive as that of *DPIII*. (Even just a simple VCR-type controller for ANIMs would have been very useful.) Nevertheless, the rest of the new features are excellent developments and enhancements of the original tools, consistent with the general trend of graphics software. New on the menu are: true contour mapping using a ray-tracing algorithm: colour transformation modes allowing a huge range of foreground and background colourisation effects: stencil to to protect selected areas of the screen: rub-through from an alternate picture: pantograph: and many more useful features.

DIGIPAINT 3
£69.95 Precision 071 330 7166

Serious competition for *Photon Paint* in the HAM department, but the two programs are very closely matched. The original *DigiPaint* was probably the first ever paint package to give truly realistic results. The latest version is quirky in its omission of some basic tools such as airbrush, stencils, fills and free rotation, but these effects can very often be achieved another way and the results obtained are generally very good. Features of *DigiPaint 3* include very effective 3D texture mapping, a transparency control, easily-understood modes (colourize, lighten, darken, texture map, blur etc) and smooth auto-scrolling across super bitmaps of up to 1024 pixels square.

Two other recent programs of interest are **Express Paint 3** and **Spritz,** (£29.95 Best UK 0698 889990) both written in the same distinctively quirky but feature-packed syle by Stephen Vermeulen. Of the two, *Spritz* has become the best-known in the UK. It goes its own way to providing most of the tools that an Amiga screenpainter would expect, and a few more: like multiple level undo, fancy borders and an icon editor. *Express Paint 3* is considerably more powerful, especially in terms of page size as it uses a 'virtual page' system that allows picture sizes only limited by total memory. Other advanced features include flood-fill areas with imported text, and postscript output. **Zoetrope** (PAL version: ISM tel 0983 864674) also features a wide range of painting tools, but its stongest feature is most probably 2D animation (see below).

Three Dimensions: From CAD to Ray-tracing

Strictly speaking, all computer graphics is Computer Aided Design (CAD) but the term has been hijacked by the technical drawing fraternity to describe the specialised, highly accurate, structured method that they require for output to pen plotters. The use of the term has become increasingly confused by the use of structured drawing methods to construct models for 3D animation (itself closely allied to 3D CAD), and more recently, for drawings used by DTP illustration systems.

Structured Drawing is used by all these applications for similar reasons – mostly because the output device is capable of a much higher resolution than the screen display. Technical drawing CAD is usually output to a pen plotter that can draw smooth curves with extremely fine pens on almost any size of paper; the most expensive plotters use rolls of A0 width paper that can produce drawings 10 metres long or more. CAD systems produce structured objects that can be grouped together and used repeatedly, often changing the scale and proportions with each re-use. Vast technical drawings of complete aircraft or complex buildings can be built up accurately from basic objects.

Using a computer, the traditional 'front', 'end', and 'plan' elevations of technical drawing are translated into x, y and z planes and coordinates. Flat planes can be combined to produce full 3D views of components and buildings, observed from any angle.

Exactly this process is also used by graphic designers to produce 3D models for animation, the now infamour ray-tracing used for TV station 'idents' and adverts. The Amiga now has at least 10 3D modelling systems of varying complexity and power. None of these is a true 3D CAD system but some are getting close. Recent developments include helical spin (to form springs and threads), surface patches, and conversion of bitmapped shapes to structured outlines.

X-CAD DESIGNER
£99.95 Cadvision International 01 603 3313

CAD has always been a bit of a weak area on the Amiga with no real professional system making its mark. *X-CAD Designer* seems to have changed all that. Providing a huge range of options, it is a very versatile package. Data can be entered either as a series of menu driven drawing commands or as text commands from the keyboard. Frequently-issued commands can be transfered to an on-screen 'palette' so that a user-defined list can be built up. These commands can be quite complex sets of instructions (in effect they are Macros), so sophisticated transformations can be applied at will. Many other facilities are provided including the ability to load and save files in the industry standard DXF format used by the huge MS-DOS CAD system, *AutoCAD*. *X-CAD Designer* can be upgraded to *X-CAD Professional*, more powerful and expensive but using a similar interface.

ULTRADESIGN
£299 Marcam 071 258 3454

Not really a 3D program but slipping in here beacuse it works on a structured system and for comparison with *X-CAD*. This is a more recent competitor to *X-CAD Designer* and the standard PC-based programs like *AutoCAD*. Although not as easy and intuitive to use as the former, it does have a number of redeeming qualities which make it worth investigating. Includes all the standard drawing tools for structured objects as well as a number of hatched fills and a useful seek option for controlling pointer placing precisely. Modules allow great control over high-resolution printing and the use of files in *AutoCAD* DXF, HPGL, DXY and *IntroCAD* formats. On the whole more likely to be one for the serious professional rather than the home user.

SCULPT-ANIMATE 4D PROFESSIONAL
£368.00 Byte By Byte

Probably the most powerful 3D modelling system for the Amiga. It uses the same basic interface as all the *Sculpt* series, three windows corresponding to x, y and z or up/down, east/west and north/south. The commonly used gadgets are small icons around the windows, other

tools are on menus. *SA4D* has many new modelling tools including helical spins, and the ability to build and store macros. Rendering and animation are discussed below.

MODELLER 3D
£69.95 Aegis/Precision 071 330 7166

The best stand-alone 3D modeller. Again the traditional three windows are used for the three elevations, but a fourth is added to view the complete solid model. All of the normal sculpting tools are provided including lathe (spin a profile) and extrude, plus geometric primitives, layering etc. *Modeller 3D* is not a 3D CAD system but it is probably the closest thing we have yet on the Amiga.

TURBO SILVER
£119.95 Software Business 0480 496497

A 3D modelling, rendering and animation package with the most sophisticated set of surface mapping facilities in any program so far for the Amiga. It has been poorly marketed in Europe, but that is set to change.

It has a good logical interface and the usual set of modelling tools (though a good deal of manual work moving individual points is required to produce subtle shapes other than pure extrude or spun). Animation relies on 'paths' to move each object, but hierarchies can be set up and objects can be set to automatically rotate and/or align themselves with the path.

When rendering, each object (or face) can be any HAM colour and smoothed. It can also be a light source or a shaded object, matt or glossy, wrapped in an IFF picture or a coded texture with user definable parameters, or even fuzzy in the misty distance or sharp in close-up. If it is a light source and has an IFF picture attached to it, the picture will be projected like a slide transparency. Its orientation can be rotated around any axis. Specular reflections can be controlled by varying their size and hardness. In effect this controls how shiny or matt the surface looks, distinguishing between rubber, glossy plastic, painted metal and other subtle variations. At present the 'plug-in' coded textures include: brick, check, grid, marble, wood, angular and disturb, but only the bricks and checks are available in Europe. The power of *Turbo Silver* speaks for itself.

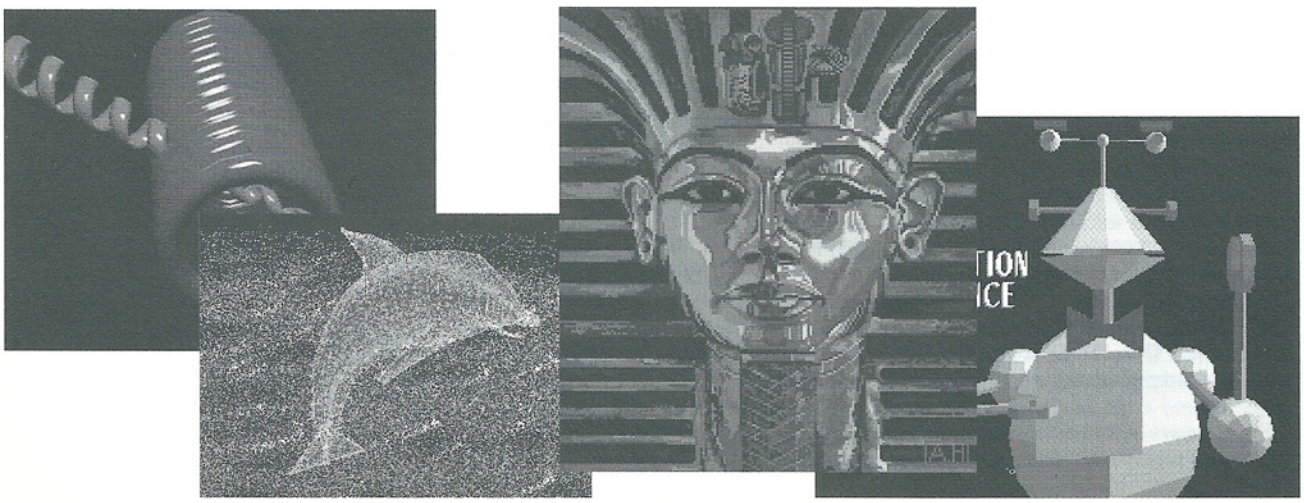
FORMS IN FLIGHT II
£79.00 MicroMagic

A recently developed technique in professional computer modelling is the use of surface patches. Normal modelling methods tend to look rather mechanical so organic shapes are difficult to produce; surface patches allow complex multiple curves to be created from a few curved lines. *FiFII* uses surface patches as its primary modelling tool. This enables objects with multiple curves to be created with ease. Unfortunately it has a clumsy menu driven interface, and a complicated single-window view of the object.

PROFESSIONAL DRAW 2
£199 Gold Disk/HB Marketing 0753 686000

One of the great strengths of Apple Macintosh software has always been the range of programs that integrate bitmap and structured drawing styles. The high resolution of laser printed images has meant that structure illustrations are as important as bitmapped ones. On the Amiga the emphasis has been very much more towards bitmap drawing, structured systems seeming much less glamorous. Gold Disk released *ProDraw* in an attempt to reverse this trend.

Certainly, as a first attempt *ProDraw* goes a long way towards providing a proper structured illustration system for DTP users. The new upgrade is faster and supports postscript EPSF files, dithered postscript fills and autotracing of bitmapped images (turning edges into structured line drawings.)



Animation in 2D and 3D

Traditional character animation depends on the eye being deceived into thinking that a rapidly-changing sequence of still pictures is actually one object that is moving. Slight changes of position and orientation between frames are read by the eye as smooth movement providing the display rate of the frames is about 10 frames per second. The same effect can be achieved on a computer in several ways, using bitmap objects or 'sprites', using structured objects and by page flipping.

One great advantage of bitmap screen painting is that sections of the bitmap can be selected and moved around in memory very quickly. On screen this gives the impression that a piece of the picture has been cut out and moved across the face of the image, like a real object. Game animation uses the same technique by storing a series of similar bitmap 'objects' in memory and moving them into the screen bitmap in sequence, 'flipping' rapidly between them. By moving the cuts across the screen at the same time as 'flipping' the sequence, an animated character called a sprite is created. By defining motion paths and timing heirarchies, sprites can be used to create animated sequences.

Just Flipped

Pageflipping is the nearest computer equivalent to traditional 'cel' animation (in which each frame is painted on CELLuloid). In effect it is a scaled up version of sprite flipping for a whole page. The moving object is pasted down on each successive page with the required offset or transformation. The finished animation is played by 'flipping' the pages rapidly.

Because each screen takes up a relatively large part of memory yet only a small part is actually changing, several compression techniques have been developed. The most common is called Delta Compression. The first frame is saved complete, then for each successive frame, only those pixels that have changed colours are saved. (Delta is commonly used in science to denote a parameter that has changed.)

Recent developments include perspective transformations, where the flat sprite bitmap is twisted and moved into the picture in 3D, and AnimPainting, where a sprite is picked up as a 'cut' or brush and painted repeatedly onto a series of screens.

Economy of Structure

A simple geometric object such as a square or disc can be defined by its structure; the position of opposite corners for instance, or the position of the centre and length of radius. On computer, this sort of structured object can be very economical of memory compared to the detailed description of every pixel for a bitmapped object. Provided it is fairly simple it is also easy to transform the structure or move it so this process can be the basis of an animation method.

Bitmap objects and structured objects are used in many computer applications (DTP, CAD, etc.) that require blocks of graphics and text to be moved flexibly about the screen. This is known as an object-orientated system.

More complex structured objects can also be transformed across a series of frames by a method known as TWEENING. The position of all the control points or vertices of the structure are defined for the first and the last frames of the sequence. The offset for each point from first to last frame is calculated and divided by the number of frames. This provides the offset for each frame allowing the position and shape of each of the inbeTWEEN frames to be calculated and rendered.

Movie Magic

In attempting to make the process of 2D animation on the Amiga flexible and easy to control a wide range of systems have been developed without, until recently, any standard system being adopted. Although not really establishing a standard, the two most successful recent systems, *Zoetrope* and *Deluxe Paint III,* are based on screen painting and pageflipping, using a number of sophisticated tools to produce smooth and complex choreographies.

ZOETROPE
ISM 0983 864674

Arguably the most powerful animation tool so far devised for the Amiga. It is only limited by being low resolution, non-HAM and until recently only NTSC. ISM of Southampton are now marketing a PAL version. As a paint program *Zoetrope* is limited to about the level of the original *Deluxe Paint* – though even that is pretty good. It provides a huge range of special effects and transformations including ripple, shatter, crystalise and defocus, as well as many useful control tools such as a VCR type frame controller and 'blueing' (showing a blue 'ghost' outline of the previous frame).

DELUXE PAINT III

Provides a unique means of controlling animations because it is so familiar to almost all Amiga artists. Dan Silva has managed to intergrate animation into the

system in an almost seamless way that is easy to learn and quickly feels like a completely natural part of the painting process. In particular his introduction of the concept of ANIMBRUSHES and ANIMPAINTING is revolutionary. Using these techniques it is possible to forget about separate frames and just 'paint' the animation onto the screen (until the memory runs out – *DPIII* is the best excuse for buying more memory!) Added to that, all the normal drawing tools work with Animbrushes, so animated objects can be sent along complex curves or into the screen).

The only real problem with both *Zoetrope* and *DPIII* is that some degree of artistic ability is required. Careful positioning of brushes is essential as there is no undo facility, once a whole set of frames have been painted to. With frequent saving this is not a particular problem, but it helps to know what you want to do and what the finished result might look like.

Those who can do little more than draw the curtains can still have lots of fun, especially with all the clip-art provided by Electronic Arts with *DPaint*. Nevertheless some other packages are probably easier to get quick and reasonably polished results from.

MOVIESETTER
£69.95 HB Marketing 0459 686000

Claims to use a WYSIWYG approach that takes much of the heartache out of animation. In practice it operates very much like an animated desktop publishing system, or more specifically, like its sister program from Gold Disk, *Comicsetter*.

MovieSetter is limited – like most bitmap object animators – by memory, or the lack of it. Nevertheless, provided you have got a good supply of clip art and sound effects, some excellent results can be obtained. The great advantage of this is method of animation is that it is object orientated. Each component – or set to use the *MovieSetter* jargon – can be repositioned at will and re-used in other scenes and movies.

There are still very few 2D animation systems that support HAM. This is not surprising considering the memory that it uses. Microillusions are producing a series of programs that together will make an extremely powerful, full colour animation system. So far the **Photon Video** series includes *Photon Paint 2*, mentioned above, *Photon Video: Cel Animator, Photon Video: Transport Controller* and *Photon Video: Edit Decision List Processor*. More information on all of these can be found in the Video section of this book.

Although several 2D animation systems use 3D transformations of bitmap objects, this is really only 2.5D animation because the objects only ever have two dimensions. True 3D animation can move, rotate and transform real looking objects through real looking space. Light sources can be set and controlled. Surfaces can have texture and shading across them. Objects can be transparent, reflective, metallic or even glowing; one shape can transform fluently into another – chicken flowing back into egg, gun metamorphosing into flower. All this can only happen if the modelling system is flexible and powerful. As well as modelling tools to sculpt the object (see above), the object editor must be able to position light sources, camera and target, define motion paths for objects and break down complex animated structures into hierarchies (joint, finger, hand, arm etc).

At present only three systems offer any real control of all of the parameters involved in creating a complex and realistic 3D animation, Martin Hash's *Animator* series, *VideoScape 3D* and *SculptAnimate 4D Professional*, though there are at least ten 3D animation systems in total. (Most offer good modelling and rendering but poor animation facilities.)

HASH ANIMATOR
Amiga Centre Scotland 031 557 4242

A unique and somewhat quirky system of animation that is just too complex to describe here. It is not vastly popular but can certainly deliver.

VIDEOSCAPE 3D
£143.75 Aegis/Precision 031 330 7166

The original Amiga 3D animation system. Despite version 2 the basic system has not changed much. The learning curve is quite long and steep because, like most other Aegis products, the interface used is rather un-ergonomic and difficult to learn. Nevertheless many fantastic sequences have been created using the system so it can't be all bad! Version 2 supports HAM, so smooth shading of objects and reflective 'chrome' effects are now possible. hierarchies and smooth complex camera motions are provided too.

SCULPT-ANIMATE 4D

A favourite of many. The interface seems to be very intuitive and visual, and the modelling tools can also be used to create complex motion paths. All objects and parts can be namedd (and therefore selected and moved) individually. The names are recorded as part of a hierarchy. Two types of animation are used: key frame (with inbetweening) and global (using motion paths). This provides great flexibility. Seven rendering modes allow any balance of image quality to rendering speed. The biggest problem is probably the format used to compress the animations which is not compatible with the Aegis/Sparta ANIM format that has now become almost the standard format for Amiga animations.

The choice between *Animator, Videoscape* and *SA4D* is really very much a personal one as they are all so powerful, but they are also so different and it takes such a great commitment to learn them that it is difficult to switch at a later date.

Digitisers

There's only one way to get photo-realistic graphics and that's to use the Amiga version of a camera – a video digitiser.

An Introduction to Digitisers...

Even if you're a very skilled graphic artist, you've little chance of producing near-photographic quality images on your Amiga using conventional graphic techniques. The Amiga's HAM (hold-and-modify) graphic mode means 4096 colours can be displayed simultaneously, and over-scan means that a resolution of up to 768 by 480 is possible. While the power to create stunning images is offered by Commodore's machine, the feat is well beyond anything living.

So where do those sensational 4096-colour picture come from? You know the ones – they're life-like, detailed, almost real. They're the sort of images you could never produce using a traditional art package.

In seconds a device called a video digitiser can snapshot an image from the outside world and convert it into something that can be displayed on the Amiga's screen. The images produced with a video digitiser or image grabber are known simply as digitised pictures. There's nothing special about these pictures, if you exclude the fact that they look so realistic: they're no different from other Amiga screen formats.

There's nothing mysterious about the way images are grabbed: a video camera or video recorder does the seeing and sends pictures to the digitising hardware. The hardware converts the incoming signals into something recognisable by the Amiga: that is, numbers. Ultimately these numbers appear as pixels on the screen. Depending on the sophistication of the hardware in use, digitised images may appear in monochrome, grey scales or colour. And the time to generate these images varies from several minutes to tenths of a second.

Once an image is in the Amiga's memory, all manner of editing can take place. It is, after all, just a screen picture. Most conventional art packages will let you load these pictures and hack about with them. And what next? You could write demos using digitised screens: many already exist in the public domain. Or you could use these near-perfect graphics in games.

But enough of this idle chatter! You want to know what a digitiser can do for you. Read on...

VIDEON

£249 Newtronic/Power Computing 0234 273000

Videon cannot grab colour or monochrome images from any old composite video source. Video camera and still subject, yes. Video recorder, no. Videon is not a real-time digitiser, a picture having to be built up over at least 30 seconds, so there's no way it can grab a recognisable image from a video recorder. Sure, you can hit the pause button on the VCR, but unless you've got equipment costing double your Amiga setup, you're going to get horrible tear lines across the screen.

Videon plugs into the parallel and monitor sockets of the Amiga, but also accepts the monitor socket directly. A 15V power pack provides the gas. A couple of knobs on the grabber's front panel let you switch the screen display to Amiga output or video output. Three dials allow you to alter the contrast, brightness and colour level of the incoming signal.

All Amiga modes are supported including high resolution, interlace, halfbrite, HAM and overscan. Two digitising speeds are offered: fast and slow scan. These produce, roughly, passable and good results respectively. Fast scan takes from 30 to 60 seconds to produce a picture, and is expensive memory-wise. Slow scan... well, it's slow all right, but no extra memory is required for any of the modes as the image is built up directly on screen.

Six different effects can be applied to an image:

- Pixel produces a mosaic effect. Each pixel can be magnified from two to six times.
- Solar brightens the picture to produce an over-exposed photograph result. The quantity of over-exposure is determined by you.
- Multipic fills the screen with reduced images. The number of pictures allowed ranges from four to thirty-six.
- Zoom magnifies a given area of the grabbed image by a pre-determined amount.
- Threshold changes the brightness of particular areas. The brightness level is selectable.
- Negative changes the picture into its negative.

An excellent feature offered by Videon is surface mapping. Essentially the software lets you wrap a digitised image around a solid shape. The resulting 3D image can look astounding. Six types of solid, ranging from a pyramid to a cylinder, are offered. The solid can be rotated on any of its axes, have its dimensions altered, and be magnified or reduced. Wonderful.

Videon's software is by far the best, perhaps not in terms of features, but for easy guruless operation it is superb. There are no awkward requestor boxes and no crashes when memory runs out. But Videon is seriously let down in one area: its manual. The manual really is naff – worse even than SuperPic's. And that's going some. There is arguably more information on the packaging than there is in this dismal eight-page affair.

DIGI-VIEW GOLD

£149.95 NewTek/HB Marketing 0753 686000

Whoever would have thought that NewTek could have fitted all the components of a video digitiser in a box smaller than a cigarette packet? It's extraordinary. And it's still commonly held to be the best digitiser around.

Digi-View is a combination of hardware and software that enables you to transfer high-quality colour or monochrome images from a video camera to your Amiga. Colour images are captured using a colour separation process. A colour filter wheel (supplied) is mounted in front of a video camera's lens. Three snaps of the same image must be taken, one through each of the red, green and blue filters. Meanwhile, the subject must be stationary. Digi-View works with either a monochrome or colour video camera. However, a monochrome camera produces better results.

As long as you have a good camera, decent lighting and a motionless subject, the images possible are of very high quality. The software employs dithering techniques to enhance HAM images – the results can be staggering. No hardware controls are needed – all effects that are needed are achieved using the software.

The whole range of Amiga screen resolutions are supported, including overscan and HAM, and even better the newest version, Digi-View 4, includes new Dynamic Hi-Res and Dynamic HAM modes, the latter of which is able to display all 4096 possible colours on screen at the same time – an incredible feat of technological trickery.

Digi-View also now includes a free copy of the original *Digi-Paint*, which makes it extremely good value. It does, however, require at least a megabyte to work and needs two megs for the new dynamic modes. A very good product indeed, highly recommended, and capable of producing better-quality images than any of the others if you don't mind waiting a while.

SUPERPIC

£599 JCL/Precision 071 330 7166

It costs a lot... it also does one hell of a job and comes with stacks of features. How's this for starters: real-time colour and mono digitising (that's one frame every 50th of a second or one interlaced frame every 25th of a second); 192K frame buffer expandable to 512K; a screen display that automatically shrinks to available memory; edge detection and image manipulation tools; time lapse image capturing; brightness, contrast, colour and hue controls; monitor view switchable between Amiga, TV/Video and framestore; built-in genlock allowing Amiga graphics to be overlaid on video.

SuperPic has leads which plug into the parallel and monitor ports of the Amiga; a socket on the digitiser accepts the monitor cable which usually slots into the Amiga's monitor port. Finally, power is supplied via a 15V power pack.

Because SuperPic offers real-time digitising, anything offering 75ohm composite video output can be plugged in: video camera, video recorder or even TV with the appropriate digital output.

The size of screen to be digitised is determined by the software. You have full control and can grab from a few pixels square to well beyond recognised overscan resolutions. There's little point in going beyond the Amiga monitor display dimensions: it only wastes memory. Colour or monochrome grabs can be made in 16, 32, HAM and HAM plus modes. High resolution and interlace modes are supported, but you can't take full-screen grabs because the frame-store only comes with enough memnory to store a non-interlaced colour picture. You can, however, fit extra 32K static RAMs.

Along with standard features, the SuperPic software provides some excellent editing tools for grabbed monochrome images. The tools include expanding or contracting the contrast range, adding or subtracting a constant from pixel values, removing extreme high and low pixel values, switching values beyond a certain range to full black and white, reducing the number of bit planes used to store a picture, and re-distributing the pixel intensities to occupy the full range.

A multi-capture option in SuperPic lets you take numerous grabs from a static image and produce one

picture from the average of all grabbed frames. The reason for this is to remove noise.

Most irksome is the fact that the software often hangs for no reason – well there is a reason, and it's probably related to memory fragmentation. Like too much Amiga software it is possible to sidestep the problems. But it's really not good enough.

While nothing comes close to SuperPic's abilities, the manual is poor. Note that it is also available in a form without the genlcok facility, but with a UHF TV signal output. This version is known as Colourpic, features all the same specifications, and costs £499.

FRAME GRABBER 256

£575 Progressive Peripherals/Marcam 071 258 3454

Like Superpic, this one is expensive because it grabs full-colour images in real time. Incoming signals are stored in a buffer and when you ask it to grab, the unit takes only 1/50th of a second to do its stuff, or 1/25th for an interlaced image (because two frames must be stored and combined). Before display, the software optimises the palette and enhances the image, a process that takes a couple of seconds.

Input can be any PAL video signal and both the intensity and saturation of the input signal can be altered using knobs on the front of the box. Images can be produced in any Amiga screen mode, including Overscan and EHB, in anything from two to 4096 colours.

The software provides all sorts of image control, including a capacity to average out a number of grabs to produce a purer image. Like VIDI, simple animations can be constructed from a sequence of frames. All in all, FrameGrabber produces extremely high-quality results, although like Superpic the price does make it a somewhat professional-end piece of kit.

VIDI AMIGA

£99.95 Rombo Productions 0506 414631

Undoubtedly the best value digitiser on the market. And quick too: frames are grabbed in a 50th of a second (real-time) and screen update occurs every quarter of a second. Because it is real-time, a variety of video sources including camera and recorder can be used.

All available memory is used in the Amiga for multiple framestores. A sequence of frames can be grabbed automatically and then animated. For instance, 22 frames are possible on a 1Mb machine. Brightness and contrast can be altered as the picture is grabbed via controls on the interface. In addition, the brightness and vertical framing of the picture can be controlled directly from within the software.

A window can be defined on screen allowing the area within or without the window to be digitised. The basic Vidi displays grabs using grey scales – and only in 320 by 200 16-colour mode. A PAL Vidi, with a resolution of 320 by 256, is available for £15 extra.

VIDI CHROME

£19.95 Rombo Productions 0506 414631

The colour version of Vidi Amiga comes as a software-based update to the original mono version. This, too, is very good value and the results can be excellent – if the images are not as good as Digi-View, you have to remember that Vidi can grab real-time in mono. In colour, Vidi works on the three-pass RGB system, so it is no longer a real-time process. All in all, a good buy if you don't want to splash out on all the extra memory you would need for Digi-View.

Getting the Best Results

CAMERA

If you have the choice, always go for a black and white camera for image-grabbing. Black and white cameras tend to have a higher resolution than their colour counterparts and they're a good deal cheaper. A good mono camera is the Panasonic WV140, or the slightly more expensive NWV1500. Prices vary from dealer to dealer: typical cost £200 and £270 respectively.

LIGHTING

The more light the better, although too much can have adverse effects. The best for the job are usually fluorescent lamps as these simulate daylight convincingly. Spot lights are also useful. Three or four shining on the object to be grabbed will produce the best results. If too much light is used, however, you may get Moire patterns appearing in the grab. Conversely, too little light may result in grainy grabs. Always position the lighting to reduce the effects of glare or reflection on the object to be digitised.

MOTION

With Digi-View and Videon it is vital that the camera and object remain still through the digitising process. Wavy lines or an out-of-focus look are sure signs that something has moved. If possible, make sure the camera is securely fastened to a tripod or copy stand. A good way to check that nothing is moving in the area between camera and subject is to fill a glass with water and watch carefully for ripples on the surface.

Vidi, SuperPic and Marcam's FrameGrabber are real-time digitisers so it doesn't matter if the subject is moving. That said, if you need to take pictures of rapidly moving objects learn to track the object with the camera, a process known as 'panning'. The object will come out clearly while the background will distort.

COLOUR

Some cameras produce grainier pictures than others. Lowering the sharpness control will reduce the grain. This also remove the 'confetti' or haze from 4096-colour pictures. When using 32 colours or less, it is a good idea to raise the sharpness level as this increases dithering and smooths out colour bands that sometimes appear.

If you are digitising a picture into 32 colours or less, try to have a plain background behind the subject. A single-colour background will not detract from the main object, and it gives the illusion that more colours are available in the area of interest.

CLEANING UP

Digitising software often lacks facilities for tidying up pictures or modifying them in any way. As all digitisers produce IFF screen images, almost any art package will suffice. Look out for graphics packages that offer image stretching, shrinking, twisting and mapping. You won't always want to use pictures the shape or size you grabged them in.

DigiPaint 3 (£69.95 from Precision on 081-330 7166) is a good choice when it comes to HAM painting. Features include 3D texture mapping, transparency control, lighten, darken, blur, text rendering, patterned or random dithering, and 68020 support. Other commendable art packages include *Deluxe Paint 3* (£79.95 from Electronic Arts on 0753 48442), *Photon Paint 2* (£89.95 from The Software Business on 0480 496497).

Scanners

There is an alternative to a digitiser if you want to grab pictures from something flat, like a photograph. The scanner does not grab a whole image at one go like a video camera - instead, as the name implies, it scans across the image reading it in a line at a time. Scanners can give very high-quality pictures which are particularly useful for DTP...

Yes indeed, the video camera and digitiser is not the only way of getting images into your graphics packages, demo slideshows or desktop publishing program. A scanner is just as capable of getting artwork or photographs onto your Amiga screen - and in many ways might be a better-quality solution.

What at first may seem a disadvantage of the scanner is that it can only grab from a flat object like a drawing or a photograph. But just in the same way as you can grab digitised images from any old place simply by carrying your video camera around with you and then digitising your images in from a video player, you do have an alternative with scanners. It may be a little old-fashioned, relying as it does on chemistry rather than electronics, but it's cheap and easy to get hold of. Yes, of course, we're talking photography.

So, once you've got hold of the image you want to scan - be it a photocopy of the painting you sent in to Tony Hart's TV art gallery or a photograph of your new car - what are the options for getting that image translated into an on-screen display?

First of all, scanners come in two types. Both types work in very much the same way. The image must first be laid flat, and then a beam of light is scanned from side to side of the image, slowly moving along from the top to the bottom until the whole image is covered. The more expensive kind of scanner is the flatbed scanner. This is rather like a photocopier - you lay the image on top and close the lid and it does the job automatically. The cheaper option is the hand-held version which you must position over the image yourself.

There is also an interesting low-budget imitation of the flatbed scanner theme, a gadget which you can attach to the printing head of your printer. The image you wish to scan is fed into the printer instead of paper and the head whizzes backwards and forwards in its usual manner, but taking an image off the paper instead of putting one on.

The next consideration is whether or not you want colour scans. If you do, think twice - colour scanners are all of the flatbed type and are extremely expensive. Unless you have a very large budget and a particularly good reason for wanting colour scans this area is best avoided since at a decent price you can do the same things with a video digitiser.

The great strength of scanners is really monochrome work, where good quality is available at a reasonable price. The major use tends to be in DTP work, where a scanned black-and-white photograph can be incorporated into the finished page make-up with all the tricks of 'half-tones' that are usually done by photographic means.

The idea behind a half-tone is simple enough. Just as with photographs in newspapers, the picture is broken up into lots of little dots. The effect of this is to prevent all the detail being lost when the picture is printed. Rather than the various shades of grey in the picture being turned into blobby messes, they stay as greys.

It is important not to mix up the concept of half-tones or dot-screening as it is sometimes known with the resolution of the scan, usually quoted in dots per inch or DPI. The higher this figure is, the greater is the quality of the scan. Remember, though, that the resolution of your printer will limit the final output quality.

Cameron Handy Scanners

Cameron's Handy Scanner is available in two different versions. The cheper of the two is the budget 'Type 2' which has a fixed resolution of 200dpi and offers only straightforward two-tone black-and-white scanning, with no range of greys, so it is best when used for line artwork or text. The area to be scanned can be up to 64mm. The price of this one is around £230.

The 'Type 10' offers three scan resolutions - 200, 300 and 400 dots per inch - along with a wider scan width of 105mm. It also can emulate up to 16 greyscales by applying one of three kinds of dithering to the mono scan, but is basically two-tone. Price around £299.

Cameron Personal Scanner

The Personal A4 scanner can emulate four levels of grey by applying dithering routines and offers a full A4 210 by 297mm image area. Mono only, but still costing around £700. Resolution is only 200dpi at A4 sizes.

Cameron's Handy Software

Three pieces of software are available to complement the effect of Cameron scanners: *Handy Reader*, *Handy Painter* and *Handy Scan Base*. *Handy Reader* is an Optical Character Recognition system that should be able to scan in typewritten or printed documents, recognise the letters and convert them to ASCII documents. OCR systems are notoriously unreliable. *Handy Painter* is an art package for retouching grabs. *Handy Scan Base* is a database storage system that allows graphics to be incorporated with text into records. The first two are currently supplied free with Cameron scanners.

Cameron Colour Scanner

The 'Type 6' is a colour version of the Type 2 with a 90dpi resolution and a 64mm scan width. It is capable of recognising the full palette of 4096 colours. Costs £575 but will need a megabyte of memory to work in.

Datel GeniScan 4000

The Geniscan GS 4000 is another mono-only hand-held device with a scan width of 105mm, resolutions of 100, 200, 300 and 400 dpi and three options for dithering, line art and text mode. The company claim 95% accuracy at 400dpi. Comes with its own picture editing software that allows quite resonable manipulation of images. Images are scanned to a buffer, which allows you to look through up to four attempts held therein before deciding which one to use. The scanner is also bundled with *Photon Paint* at an all-in price of £169.99.

IMG Scan

A budget device, weighing in at around £120. This is the clever one that sits on the print head transport mechanism of your dot-matrix printer and uses the mechanics of the printer to scan in artwork that is moved past the head on the printer roller.

Don't be put off by the apparent crudity of this approach or let the comparatively low price deter you - quite credible results can be achieved in up to 256 levels of grey with a resolution of up to 300dpi. Files can be saved in IFF or RAW formats. The unit is manufactured by SunRize Industries in the States and should be available from the Amiga Centre Scotland.

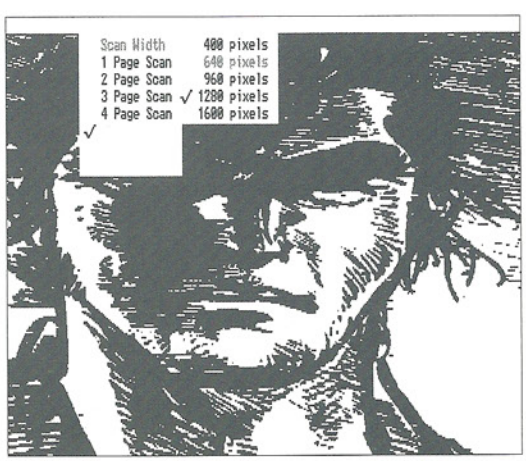
ASDG ScanLab

A step into the realm of professional-standard full-colour scanning comes with a move up to ASDG's Professional ScanLab system. This is compatible with three different types of Sharp colour scanners and is based around a combination of software and hard card. The three scanners it is used with measure up as follows:

The JX-100 is a hand-held colour scanner that can be used with its own software in conjunction with the Amiga to scan colour images of up to 100 by 160mm at a resolution equivalent to 200dpi. The scanner costs around £700 and is static in operation.

The JX-300 is an A4 flatbed scanner that can work in colour or in 256 greyscales. Cost when ScanLab software is included is around £3000.

The JX-450 is up at the real 'sharp' end of the business, forming part of the ultimate Amiga DTP system at a cost of a mere £7500 when bundled with ScanLab. For this kind of money you get the capacity to scan in full A3 images at either 256 greyscales or a massive 1.6 million colours - you may need a 24-bit video card!



Making Music

It's got a sound chip called Paula capable of producing stereo synthesised sound of hi-fi quality. It's got the capacity to sort digital data into audible sound, just like a CD player. And it's got enough software to turn it into a home studio that can do justice to the most complex of modern electronic instruments. You can fit a whole album's worth of high-quality House music on a demo disk. Yes, the Amiga is a serious contender when it cmes to making music. What follows is:

The world of Amiga music is actually quite simple, although it can at first sight seem rather complex. It is also very enjoyable and rewarding to get into, even if it's only at the level of buying music demos from a PD library and whacking it through your hi-fi – remember that the Amiga produces full stereo sound and has ordinary phono outputs, so all you need to hitch it up to the sound system in your living room is a phono lead, as supplied by any hi-fi shop.

Down to the nitty gritty. The Amiga's capabilities when it comes to sound-making, rather like close encounters, split into three obvious kinds – creating, recreating and organising sound. You could look at these as the three Ss – synthesising, sampling and sequencing.

Ok, so let's cut the simple stuff and get into a bit more detail. The first of these ideas, creating sound, is mainly concerned with the Amiga working entirely on its own. The Amiga has a dedicated soundchip called Paula, which is in effect a synthesiser in itself.

All you have to do is listen to the kind of music written to accompany Amiga games. Some of it is very good indeed, although admittedly some of it is rubbish – which has more to do with the economics of publishing games and port-overs from other machines than the potential that the Amiga itself has.

This, however, is exactly the sort of thing that Amiga music of the first kind involves – the Amiga, on its own, playing music. There are packages available that will help

you write music for games. There are also programs that will allow you to make music just for the sake of it, but still involving nothing more than the Amiga – no instruments, no expensive equipment.

Amiga music of the second kind also is based around a capacity of the machine itself. The soundchip is blessed with another very advanced ability, the ability to convert sound from a digital form to an analogue form and vice versa. For anyone not familiar with these terms, analogue sound is the kind of stuff our ears actually hear. Let's take a moment for a simple explanation.

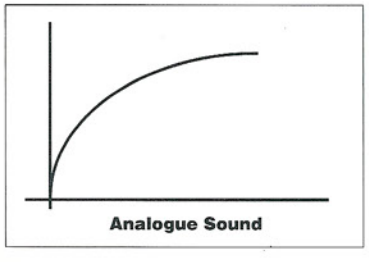
Explaining Sound

The loudspeakers of your hi-fi system or your ghetto-blaster work as follows. An electric signal is passed to the speaker. The speaker is composed of an electromagnet attached to a paper cone. As the electric signal increases and decreases in power, the electromagnet vibrates, pulling and pushing the paper cone backwards and forwards, and this pushes the air in front of the cone out in waves.

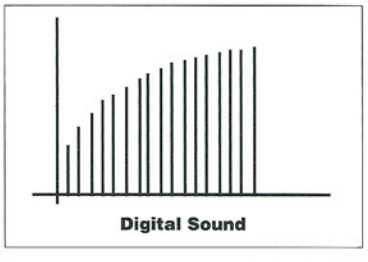
Your ear works almost the other way round – the waves of air push your eardrum backwards and forwards and this movement is converted into what your brain perceives. So sound is no more than vibrations of air.

Okay, that's 'analogue' sound. Note that because the air is moving forwards as it is pushed along by the speaker it moves in waves – very much like waves in water. The closer together the waves are, the higher-pitched the sound is. Equally, the further apart they are, the lower the sound. The number of waves there are in a given time is known as frequency, usually expressed in waves (or 'cycles') per second – or 'Hertz'. A low-pitched bass sound may be as little as 7 or 8 cycles per second (7-8Hz), while a treble sound may be as much as 17,000 cycles per second (17KHz). The highest sound the average adult can hear is about this level.

So, what about digital sound? Well, digital is the system used by Compact Disc players. All it means is that instead of analogue sound which, like those loudspeakers we talked about, moves smoothly in and out, the sound waves are sliced up into bits. You can think of it best as a graph. If you drew a curve going up and then down again on graph-paper, that's like an analogue sound. Alternatively, you could plot it as a series of points and deduce the shape of the full curve from where the points are. That's how digital sound works. Now back to the Amiga.



Analogue Sound



Digital Sound

In order to make a digital sound audible, it must be converted to analogue before being passed to the speakers. The Amiga's soundchip contains a digital-to analogue (or D-to-A) converter which does this vital job. Now obviously this doesn't make it into a CD player. What it does do, however, is open up the whole world of sampling. Sound can be fed into the Amiga from any analogue source, be it a microphone, tape, CD, record deck or video recorder and sliced up into digital information. As digital info it is in effect just like computer data and can be stored on disk.

Sampling is how the Amiga makes sound of the second kind, recreating sound from the environment around it. Samples can also, just like the Amiga's own synthesised sound, be made up into complete tunes or incorporated into music. There are pure sample players around that can write tunes from samples – for instance, by pinching a drum track from one place, synth sounds from another place and vocals from somewhere else. And remember, too, that hit records nowadays, especially of the Acid House kind, do it this way.

Our close encounter of the third kind with Amiga music takes the form of organising sound. This is simply another way of saying you can write a whole tune using your computer. 'Sequencing' is the most obvious form of this: a tune is broken down into a sequence of 'events', such as a drum beat happening every so often, a bass punching out notes every so often too, and so on. If you think about it, the idea of music as a sequence of events is perfectly logical – all traditional written music works on the same principles of when something happens, what that something is and how long it happens for.

Sequencers tend to work on the same principle as recording studio tape recorders do – generally they have a number of tracks with one instrument being played on each track. The concept is really very simple.

Introducing MIDI

The term MIDI will crop up an awful lot in any discussion of music. MIDI is the Musical Instrument Digital Interface, a standard code by which all electronic instruments, such as synthesisers, can be made to operate.

All you have to do is buy a MIDI interface for your Amiga, a fairly simple gadget costing as little as £20-30. With this you can then control most electronic instruments. Instead of having to play them, you can now control them from the Amiga. You could write a song using a sequencer package on the Amiga and just sit back and let it play the song using as many digital instruments as you have space for.

To sum up: the Amiga can be used either on its own or, via MIDI, with electronic instruments such as synths. It can create sounds of its own with the internal soundchip, it can play the sounds made by electronic instruments or it can play samples. It can also, incidentally, alter the sounds made by MIDI instruments. Finally, the Amiga can be used to write songs and effectively to 'record' them in multi-track form using sequencers. Phew!

Starting Out

Instant Music

Instant Music from Electronic Arts is a real entry-level program, easy in use and simple in concept. It allows you to explore the Amiga's capacity for acting as a synthesiser, making music entirely on its own with no external instruments or other complications attached.

You write tunes by a 'graphic notation' (a simple alternative to the traditional notation involving staves, clefs and what have you), a process which simply involves placing coloured blocks wherever you want them. The higher up the screen a block is, the higher the note; the longer you drag the oblong block out, the longer the note; several notes placed at the same distance across the screen (the same time) but different heights make a chord. A different colour of block represents each different kind of instrument and it comes with a full complement of sampled instruments.

The program also provides a rather witty alternative for really simple music, a feature called 'mouse jam'. This is not a kind of rodent preserve – you simply set the backing tune and the style that you want to play in and as you click the mouse buttons and move the mouse around the screen the program manages to pick only those notes that sound in keeping with the piece. Good fun. The program is a pleasant intro to Amiga music, especially for children, and costs £24.95.

Music Studio

Music Studio from Activision is, like *Instant Music*, a simple introduction to sequencing (writing whole tunes) but is also very strong on synthesising or sound creating. It comes with fifteen different preset instruments but features a very strong instrument design page that allows you to subject the sounds to a whole host of changes including harmonics, envelope shaping, sustain, vibrato, tremolo and stereo position (balance between left and right channels). This means it is also a good introduction to creating 'voices', the synthesised sounds that synthesiser-type instruments use.

As well as a graphic notation, the program also offers traditional music notation for you to write tunes with on-screen. Again, each different instrument is displayed as a different colour.

Although this program has a small problem in that it saves files in its own unique format, so they can not be used in another program, it also has the advantage of full MIDI capability, so you can make it play back through or control any kind of electronic musical instrument that is MIDI-compatible. Price is £24.99.

Games Music

Oktalyzer

Game tunes are an interesting form of Amiga music, because basically they have to load entirely from a small amount of disk space and rely entirely on the Amiga's own sound capacity. Many game designers now employ specialist sound programmers, who have very often written their own music-writing programs and so-called 'player routines' to play the music during the game.

However, there are several music-writing tools available, several of which are in the Public Domain or freely distributed. One of the most noteworthy of these is an excellent program called *SoundTracker,* but this suffers from a rather bizarre legal position where the copyright to the program is uncertain and so it is not really available through normal PD channels.

Several other programs have grown up based around the *SoundTracker* principle, however, and *Oktalyzer* is the very latest. It is not a PD product but will be available for sale – although as this book goes to press, it is still not exactly certain who will be selling it.

Oktalyzer is a step forwards in that it uses all eight channels of sound available via the Amiga soundchip. The editing and constructing of tunes is all carried out by the placement of numbers on-screen, a slightly clumsy method and not initially easy to learn, but nevertheless quite powerful once you are familiar with it.

The basic input of sounds to be used as instruments is not using the synthesised principle, however – the program actually uses sampled sounds instead (see the section on samplers on the following page). It also includes a facility for actually making the samples as well as for editing them into a useable form.

TFMX

In very much the same mould, the *TFMX Soundtool* is intended for the creation of games soundtracks by the use of sampled sounds. It comes in two parts – you create your tunes from within the main package, but there is also a player program included which can be called from within a game or a demo and allows tunes you have created to be called up and played.

The creation of tunes is, again, in the style of a simple sequencer, but rather than building up a tune from individual notes you build it from sections of sample which can be anything up to a few bars long, so it's rather like sequencing several short tunes together to make a larger one. Currently one of the most powerful games tune creators around, it costs £44.95 from The Software Business.

Samplers

Introduction

There are actually two considerations to be borne in mind when considering samplers: the hardware and the software. The hardware is the box that plugs into the Amiga allowing input from microphone, audio or video soundtrack signals. The software determines what you can do with the sound after it has been sampled. The hardware that will give the best quality of sample does not necessarily come with the software that will allow you to make the best use of the sample.

Audiomaster II

Works in mono or stereo. Sampling can be started as soon as a signal appears at the source, useful for recording short duration single events: cymbal clashes, sneezes, gunshots and the like. As far as editing is concerned, there is little imaginable that AM2 cannot do. Any part of the signal can be swapped, cut, chopped and remixed with other parts in a variety of different ways. Special effects like echos, fades and stereo pans are a doddle to achieve.

AM2 saves and loads either RAW or IFF, so it should be compatible with all other Amiga sound software. Of course, it can be used on its own to produce totally new samples or edit existing ones from other systems. But to get the best out of it, it should be coupled to some hardware and it comes in a bundle with Sound Trap III at £59.95 from Bytes & Pieces.

Sound Trap III

Where this one really scores is size – with a male connector on one end and female on the other, it allows for a complete pass-through effect, thereby avoiding blocking up your precious parallel port. Indeed, the whole unit is scarcely bigger than the average gender-changer. Sampling rates from 3-30Khz are allowed but it does not perform stereo sampling. The software allows for simple cut, copy and paste functions with which to manipulate samples, but you really are better off buying this one in the bundle deal with Audiomaster.

Pro Sound Designer

Definitely one of the best-equipped when it comes to sample editing. Sampling rate varies from 1-28Khz in steps of one and the software allows you to monitor the sound straight through to your output speakers before you 'record' the sample, so you can play around and get the best effect. You have eight channels available, so you can choose to have either four stereo samples, eight mono ones or any combination. Editing facilities include cut, copy, insert, reverse, replace and merge – like most other samplers, the section to be treated is marked with a pair of lines showing the start point and end point. Pro Sound Designer (Gold Edition) is from Eidersoft, costs £79.95 and has excellent editing features, allowing really fine, detailed work for that Acid House effect!

Futuresound 500

Simple to use, samples in mono or stereo but lacks any really sophisticated editing facilities. It is, however, quite simple to use and allows a very useful function of monitoring the input during sampling to check that the levels do not get too high. Saves in IFF as well as its own format. Its big advantage, though, is the quality of the hardware which provides clean, crisp samples with very low noise. Definitely the one for hardware – remember you can use the hardware of one sampler with the editing software of another. Costs £79.95 from Applied Visions.

AMAS

Stands for Advanced MIDI Amiga Sampler which, as you may guess, means it features MIDI support. The hardware is of a similar quality to that of Pro Sound and the editing features are similar, although the process is made somewhat more difficult by a rather fiddly interface. Will also save in either IFF or RAW formats. Really scores on the MIDI capabilities and also acts as a MIDI interface for other programs, which removes the necessity for buying a separate one. Four mono or two stereo samples can be set up at the same time and samples can then be triggered from MIDI instruments. Costs £89 from Microdeal, which is a good all-round price considering the MIDI capabilities.

MasterSound

Has two unique features. First of these is price, because for only £39.95 you get a sampler with a quality arguably equal to that of Futuresound 500. Second of these is that it comes with its own sequencing system that allows you to make up little tunes from the samples you make and even play them back independently by using the player program that is supplied. Sample rates can be varied between 3-55Khz and samples can be saved in either RAW or IFF format. Editing features are quite adequate, including mix or overlay and several kinds of filtering as well as the usual cut, copy and paste. For the price this is a very commendable package, certainly offering the best intro to sampling for beginners. From Microdeal.

Sequencers

Introduction

MIDI sequencers are in many ways the big boys of the computer music scene. Using MIDI to control instruments such as drum machines and synthesisers, you can write whole tunes on a sequencer and record it professionally to tape or play it back automatically as backing at a live performance. The only thing that stands in your way is getting the Amiga to use the MIDI code, which simply involves buying a MIDI interface for £20-30.

Music X

Since its launch in September 1989 has certainly become the most important of professional-standard Amiga sequencers. From Microillusions, it costs £225 which is cheap considering its many features. It works in real time so, like many of the kind, the main functions are controlled from icons that look like tape-recorder controls. You can record in real time from sections of music played on a MIDI instrument and put these sections together into a whole tune. There are 250 tracks available onto which you put different parts of the song – drums, bass, lead synth etc.

Many features include full time-code support, editing in two different modes with full cut, copy, paste transpose and the like, quantizing to make the notes hit the beat more accurately and set-ups to control sounds from the keyboard. The modular system also includes a patch editor to manipulate and create sounds from your synthesiser and a sample editor which allows you to use sampled sounds to whatever effect you please within your tunes. All in all the most comprehensive and competent package for the price anywhere.

There is also a cut-down version, *Music X Junior*, which loses the timecode support, one of the two editing modes, some of the more sophisticated recording features and most of the patch editing, but is still very good indeed and costs only £99.

Dr T's MRS

The *Music Recording Studio* from American music experts Dr T is a simple eight-track sequencer. The fact that it is included with the Class of the 90s educational pack shows that it is a good beginners' sequencer, and indeed it can use either MIDI instruments or Amiga samples to create tunes. Notes can also be input from the Amiga keyboard and quantization is included. At £49.95 good for beginners, but does have its faults.

Dr T's KCS

The big brother of *MRS* and now available in a new improved Version 3. Allows 48 tracks of recording and the edit mode is very powerful, although because it uses no graphic display, simply a lis of text, it can be rather unwieldy and complex to use. Still, it allows some clever edits, is fully compatible with sychronising timecodes used by MIDI and includes some interesting new extras. All in all, for £299 you get a very powerful tool and one which is tried and tested, but one which it will take some time and effort to get to grips with.

Bars and Pipes

Unique feature is a rather strange but very accessible interface that sees a tune as being like a flow through a pipe. Simply by placing joints or taps in the pipeline, you control the flow of the music onto the different tracks. Editing is simple and powerful with a variety of graphic displays of your tune, including proper music notation, and more detailed information as text. *Bars and Pipes* costs £219.95 from Precision and is a very good way for the beginner to get as much power as the experienced user, though old hands might find it irritating.

Master Tracks Pro

Developed from a system which is much in use on Atari ST and Macintosh. Includes 64 tracks for recording, powerful editing facilities, a separate song editor which allows groups of sequences to be combines into a whole song and a large amount of control over MIDI information. At a price of £285 it is extremely professional in approach and benefits greatly from the song editor, but suffers on the other hand from not having quite the simplicity of *Music X*.

Track 24

Now somewhat aged and does betray origins on the Atari ST, but is still very good for the price of £75. A 24-track sequencer with special functions for the last two tracks including a unique and very simple way of selecting whole chords from a menu. Has comprehensive, indeed copious editing functions but does not use Amiga internal sounds. Uses only traditional music notation for editing, but some might prefer this. Good value.

Dr T's Tiger Cub

In many ways this is the replacement for the somewhat dated *MRS*. It is an excellent entry-level product at a relatively low price of £99. 12 tracks are available for record and quantizing can be done as the notes are

input. The editing is done with a much-improved graphic display of the 'piano roll' type in which the notes scroll across the screen. Several quite sophisticated controls over volume, pitch bend, modulation and stereo balance can be achieved with a clever graphic interface which involves drawing on-screen with the mouse. The package also includes a simple scoring program which works in full music notation and produces good results. All in all. *Tiger Cub* is excellent for basic uses.

Steinberg Pro 24

As this book goes to press this program is not yet available, but it has been in development for two years now, it is based on a well-established ST program and was previewed at the Frankfurt Music Fair so it is definitely a known quantity. *Pro 24* has been one of the major sequencers on the ST, so its arrival on the Amiga signals that the Amiga is now in serious contention to take over the ST's long-threatened musical dominance.

It is basically a 24-track sequencer, accurate to 96 pulses per quarternote and with very flexible quantizing functions. There are numerous forms of recording with the ability to save up to 127 'takes' of any piece and then pick the one you think is best. Editing is on a grid basis with a simple music score display and there is even a separate drum editor. Along with clever MIDI controls and sophisticsted effects processing, you can save in several different formats. The program is sectioned off into modules so that it can be run on a variety of different levels of machine. Price will be around £285, but this should be a serious competitor for *Music X* in the professional-standard market.

Extra, Extra

Included here are several other packages that did not quite fit into any of the above categories. Some of these are of use for beginners, and all are worthy of note.

QUARTET

This is yet another basic sample sequencing package intended to enable you to write tunes made up of samples. The program consists of two screens, one of whic allows simple sample editing functions to take place and the other of which is the sequencer page. Tunes are composed of 'notes' which each contain a number to refer to the sample which they use. A separate player program is included but also provided are assemlbler routines for inclusion into code. *Quartet* is easy to use and includes MIDI support, bit it is not the best program of its kind. Costs £49.95 from Microdeal.

SONIX

Again a simple sequencing program. It is very good at creating its own synthesised sounds and includes an on-screen sound editor which is very powerful indeed. Sounds can be played from the Amiga keyboard, but the sequencing is all done in traditional music notation, so it's not for people who cannot read music – but many people input scores copied from music books. Also provides MIDI support and is very simple to use. Price is around £50 from Aegis.

DELUXE MUSIC CONSTRUCTION SET

Part of the famous Electronic Arts *Deluxe* range. This is a step-time sequencer, which means that a tune is built up by entering each note where you want it, one by one, rather than just playing a MIDI instrument into it. Each note can have its length and pitch defined and up to eight parts are available, made up from internal sounds and also from MIDI instruments. Laborious system, but a good introduction to the principles. No sound editing.

MUSICAL ENLIGHTENMENT

A Dutch program based once again on the principles of the infamous not-quite-PD program *SoundTracker*. The sequencing aspect allows you to type in tunes as a set of notes in a plain text-only editor. Also has a sound editing area, where samples and internally-synthesised sounds can be altered, and an effects page, both of which are very good. Generally a very powerful package with good editing features, if more suited to programmers than musicians. Cost around £15-20 from Softville.

STUDIO MAGIC

An interesting, if rather odd, fun package for beginners. It includes a fairly powerful sample editing and sound creating aspect, but incorporates this with a sequencer that will only work with MIDI and provides no editing facility or quantizing. Easy to use if you work within its limitations, but nonetheless an odd fish. Costs £56.00.

VOICING

One aspect of Amiga music not as yet covered here is that of voicing, the creation and editing of the sounds used by synthesisers. For most synths you can buy extra sounds on a ROM card, but creating your own using the computer is cheaper and more fun. Many good voices are available in the Public Domain (check out PD library lists) but Dr T produce the *Caged Artist* series of voicing programs for various different synths at around £85.

SCORING

Another area not covered here, scoring packages are just like word processors that work with traditional music notation rather than text, allowing all the cut, copy and paste features you'd expect. Check out Dr T's *Copyist Apprentice* (£79.95) and *Copyist Professional* (£280).

Databases

The basic idea of a database is simply to provide an index system for a collection, rather like the card indexes you find in libraries. Handy enough in itself if you want to catalogue a huge record collection. But modern databases allow very much more besides...

After word processors, the most common "serious" application is the database. But what exactly is a database? Well, by simple definition, a database is a program for storing information on disk, then retrieving some or all of the stored information at a later date. This simple idea can be extended to allow the user more control over exactly what information he or she retrieves according to specified rules.

For instance, a small business's database might contain a list of customers' addresses. By simply setting the correct rules, an operator can display just those customers who live in the London and South East areas.

Amiga databases, thanks in part to the power of the machine and in part to the imagination of the designers, are not limited to such overtly trite examples. Many databases break new ground – like displaying pictures, playing sounds, even simulating a strip of microfilm – and with prices to suit all pockets, Amiga owners are spoilt for choice!

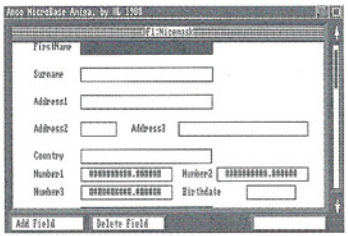
MICROBASE
Anco • £19.95

For those on a budget there is only one choice, and although it comes from a company better known for their "adult" card games and one particularly infamous footy game it performs surprisingly well. Anco's *MicroBase* is a true entry-level database with an entry-level price of under £20. *MicroBase* is supplied on a single (protected!) disk and comes with probably the shortest manual ever supplied with any business software – at just 12 pages, almost anyone could manage to digest this.

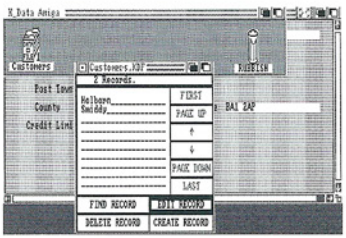
The program is Intuition-based and runs in its own colourful (blue!) screen, but is not very suitable for multi-tasking due to the protection methods employed. Also absent is a "Quit" option. In its favour, *MicroBase* features simple indexing and simple sorting on text fields. It even has a powerful label printer and is fully compatible with Anco's budget word processor, MicroText. It does nothing to rave over – but it is capable and solid. At the price, MicroBase is good value for money and an excellent introduction to databases.

K-DATA
Kuma • £49.95

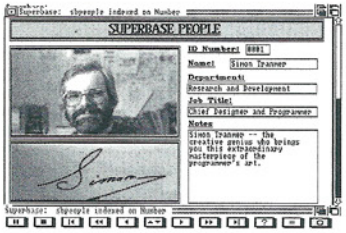
The next rung up the ladder from *MicroBase*, *K-Data* has features which nudge it into the semi-professional category even though it maintains a budget-level price. It has been around for some years now and is claimed to be the best-selling flat-card system for the Amiga. Supplied on one disk, it comes in two versions – one for unexpanded A500s and an enhanced version for larger machines. The main omission on the smaller version is a proper file request box. Recent releases see the inclusion of a standard



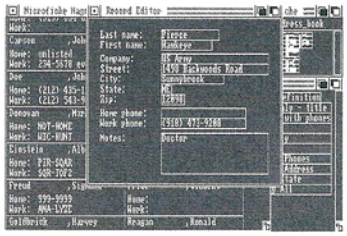
MICROBASE



K-DATA



SUPERBASE PERSONAL



MICROFICHE FILER

ring-bound manual. The most notable feature of *K-Data* is its similarity to the ST's GEM, a hangover that gives away its origins. This does not detract from the quality of the product which is generally good overall. To conserve memory, *K-Data* is split into two parts: a designer where the form layout and fields are defined; and the database which does all the donkey work.

When *K-Data* is run, it opens a small window on the Workbench screen. As each file is opened, it appears in the window as a drawer of filed cards. This can be viewed as a virtual desktop and, again, works just like GEM – the icons can be grouped and dropped in the trashcan, closing the files. At the same time, another window opens listing the records stored in the database according to their key field. This works just like a file requester: find the record to update/edit and double-click on it – simple. Up to four files can be open at once.

The main fault with *K-Data* is its constant insistence to redraw and move windows which tends to make operation slow. Otherwise it is stable enough to be usable under most conditions.

SUPERBASE PERSONAL

Precision • £59.95

This was the first database to use the revolutionary system of a control panel which resembles a video recorder. This not only allows the user to search through records very quickly, it is also a very easy system to learn. *Superbase* has the distinction of being the cheapest relational database described here. This mention of low cost should not be taken as judgement of the quality of Superbase: the price defies its power.

Unlike *K-Data*, the whole of *Superbase* is integrated into a single program which will run in 512K at a pinch, although it is more useable with 1Mb plus. Setting up the database is very simple once the plethora of options has been mastered; a task eased greatly by well-designed requesters. Four field types are available: text, numeric, date and external. Depending on the type these can be made required, calculated or validated according to a formula. External fields allow graphics and text files to be attached to the database – *Superbase* supports all Amiga IFF graphic modes including HAM.

Three separate modes are available for editing and viewing data: Record view displays the records as a list of fields; Form view allows fields to be "dragged" freely around the screen; and Table view displays the data horizontally with the field names heading each column. Editing is not possible in Table view. *Superbase*'s real power lies in its extensive reporting capability, which is unrivalled in this price bracket. The relational characteristics allow several databases to be opened at once and records combined to report to screen or printer. At a simpler level, single files can be filtered with ease through an extensive set of logical and relational operators and indexed records can be accessed almost instantly. Even a label printer has been included.

The glaring fault with *Superbase* lies in its DOS interface. The directory (or disk) has to be set before summoning a file request. Worse still, this option is hidden on a different menu! Nevertheless, the program has become de facto the leading Amiga database in many respects.

MICROfiCHE FILER

• £69.95

A brave attempt to take a database and make it as graphical and therefore as intuitive as possible. The idea is to locate records by scrolling a small magnification window over a larger sheet of "microfiche" – such as those found in libraries. When compared to traditional techniques, this concept seems strange initially but it soon becomes second nature.

Initially three windows are displayed: a small microfiche window; a larger display window where the records appear; and a list of "forms". *MFF* uses these forms to define how records are displayed, sorted and printed. The system permits a large degree of control over how much or little information appears in the fiche. It is possible to have a large number of display forms and swap between them very quickly.

Defining a database in *MFF* is tricky. Three field types are supported: text, numeric and picture. As with normal systems, the fields are named and typed first. However, before editing can commence an editing form must be defined. Each field is added individually, appearing in a small box which can contain either a reference name or the field itself. Field selection is made by clicking a small diamond located in the left of the box. Herein lies the problem: the sector diamond and associated resizing and movement gadgets are small and bunched together, making them difficult to hit.

Text fields can be expanded to any size within the constraints of a window. Picture fields import IFF files, but only support two- or four-colour images because *MFF* runs in the Workbench screen; extra bitplanes are removed resulting in some images becoming unintelligible.

Microfiche Filer is idiosyncratic in many ways. Nevertheless, its strengths far outweigh its weaknesses in most areas. This is an everyday database, tailored to simple jobs – fun to use and powerful enough for most home user tasks. Not one for the professional though.

PRODATA
Arnor • £99.95

Comes from the purveyors of the fine word processor *Protext*. Like *Protext*, *Prodata* is aimed at those users content with largely keyboard-based operations and is completely devoid of pop-down menus; Arnor seem happy with PC-like pop-up types. That said, it is the most powerful of the flat-card databases and has the professional feel, a comprehensive manual, and support for dozens of printers.

Setting up the database is simple, being much more traditional than most Amiga systems. Data types include numeric, text, date and integer and comprehensive input validation is available. When the fields have been defined, data entry is straightforward.

The most powerful feature of *Prodata* is undoubtedly its expression evaluator. This allows filters and layouts to incorporate calculations and a very comprehensive set of tests, giving *Prodata* the clear edge over its rivals in this area. Also, layouts can be made "intelligent" allowing blank (unused) fields to be eliminated – in address labels, for instance.

Many users will find *Prodata* too "PC-ized" for their liking – but ex-PC users, and of course *Protext* Amiga owners, will feel at home. Import and Export can be tailored for Protext making mail merging very simple.

ORGANIZE 2
Microsystems Software • £99.95

Comes from the Works package – hence the apparently high price. Although *Organize 2* is yet another flat-card system it does have the added advantage of being able to import dBASE III database files, although it is not programmable. Also, as part of the Works pack it is fully integrated with *Analyze 2* and *Scribble 2*, so data can be interchanged with these through the clipboard.

Four data types are supported: string, date, numeric and Boolean (yes or no). Numeric fields can be either integer or fixed point format. Setting up the record format, therefore, is simplicity itself. When the record format has been defined the data can be entered directly without having to design a form first. If a form is required this is a simple matter of dragging the fields to the appropriate positions.

Index and filtering are rudimentary compared to say *Prodata* or *Superbase*, but this avoids confusion and the variations supplied are enough to cope with most situations. Simple calculations can be defined for numeric fields within the form layout; plus an option of accumulated figures. *Organize* is a safe option – simple to learn and very easy to live with.

SUPERBASE PERSONAL 2
Precision • £99.95

This upgrade adds a comprehensive text editor and mail merge to the basic package as well as improved documentation – in a ring bound manual. *Superbase 2* also has better external file handling and a "dongle" for protection – a sad mark of the times. Many other minor improvements have been made including limited support for *Lotus*, *dBASE* and DIF files. Essentially though, what applies to *Superbase Personal*, applies here too.

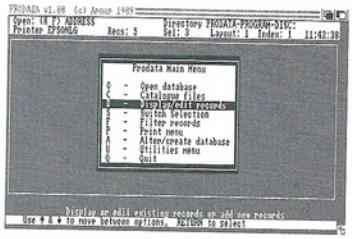
SUPERBASE PROFESSIONAL
Precision • £249.95

The ultimate solution in Precision's range for those who require the undoubted ease of use of *Superbase Personal* with the added facility of programmability. *Professional* is supplied on no less than three disks comprising: a Workbench disk, a set of examples and the forms editor. These are accompanied by two voluminous manuals and, like *Personal 2*, a "dongle" for protection. Even though *Professional* is awe-inspiring at first, the task of learning how to use it is greatly eased by the excellent documentation. Not, however, for beginners.

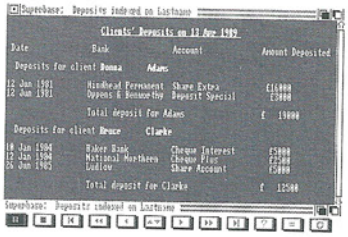
The two features separating *Professional* from its competition are its programming language, which is relatively easy to learn, and the superb Forms editor. This object-oriented package is the key to producing anything from high-quality graphical reports to invoices and statements – imagination is the only limit. External files and graphics can easily be incorporated into the form, which can be tested within *Superbase* at any time. Incidentally, there is now a developers' version available with a licensed run-time module. Contact Precision for more derails about this one.

ACQUISITION 1.3
Taurus • £249.95

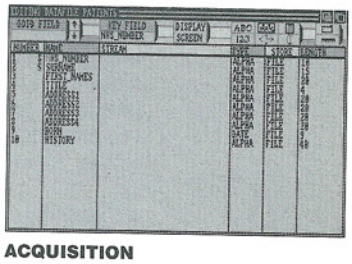
The only serious competitor to *Superbase Professional*. Although having received much less publicity, *Acquisition* was written with the Amiga in mind and exploits, so the manufacturers claim, the full power of the



PRODATA



SUPERBASE PROFESSIONAL



ACQUISITION

machine. The package is supplied on three disks with a massive 350-page manual detailing how to get started with the system and an overview of the command language Acom. Beginners are directed towards a separate 200-page introduction to *Acquisition* which is sold separately.

At the heart of the system, Acom serves as a very powerful interface with the system. Commands are available to access the even low-level graphics functions – one of the supplied examples blits a Garfield around the screen, another draws a complex 3D plot. Some would say this is overkill but it shows how *Acquisition* can form the heart of a much more powerful system. Minimum system requirements are set at two disk drives and 512K – more realistically, 1Mb and hard disk.

Compared to *Superbase, Acquisition* is very difficult to get to grips with. Once the application (not necessarily a pure database) is running, however, it will prove the stronger of the two. The initial learning curve makes *Superbase* a more user-friendly option – but *Acquisition* is a strong competitor.

DBMAN V

Versasoft • $299 US

Finally vying for a place in the database stakes since Versasoft have managed to get it working in the Amiga environment. It has the distinction of being the only database available for the Amiga which can truly offer compatibility with *dBASE III Plus*. The portability of *dBASE* makes this an interesting option in itself, although *dBMAN* systems are available in their own right for the ST, UNIX, XENIX and even mainframes. Among the many enhancements, *dBMAN V* includes windowing support, a relational report writer and a compiler. At the time of writing, *dBMAN* is not available in the UK.

Conclusion...

For the first-time user, there is little to choose between the two leading budget packages, *MicroBase* and *K-Data*. *MicroBase*, the cheaper of the two, has less features but does have a label printer. Conversely *K-Data* boasts better reporting and search facilities, and integrates completely with spreadsheet *K-Spread 2*.

Slightly more upmarket, *Microfiche Filer*'s unique graphical approach will find a niche with users appreciating totally intuitive operation. It falls down where large, complex databases are concerned because all records are limited by available memory. This price range also brings *Superbase Personal* into play at £10 cheaper. Although less intuitive than *Microfiche Filer, Superbase* is a pleasure to learn and very easy to use. Being fully relational, *Superbase Personal* is the most comprehensive of the budget systems.

The more professional user on a budget is guided towards *Superbase Personal 2* with its powerful text editor and perhaps *Prodata*. Although *Prodata* is the least "Amigaized" database, it will find a home with *Protext* users. In the same bracket is the Works bundle which contains the popular integrated system of *Scribble 2, Organize 2* and *Analyze 2*.

The top end of the market sees two packages vying for a place. *Superbase Professional*, the high-powered (and high-profile) upgrade from *Superbase*, combines the smaller package's ease of use with the power of a forms editor and built-in language. The less well-known *Acquisition 1.3* is claimed to be more powerful but will take a lot longer to get to grips with. Both of these are aimed squarely at the the power market – however, only *Superbase* supports *dBase* files.

The last option for dedicated power users is *dBMAN*, ostensibly a *dBASE III Plus* clone. The strength of *dBMAN* is its portability with versions available for most 16-bit machines including the ST. It is by no means a beginner's database and should only be purchased either as a run-time system or for database development work.

...And Advice

The problem of which package to go for must be resolved from two main considerations:

1) Is it easy to use? It is pointless buying an "all-singing" package with a programming language if the person using it has no idea of how to program.

2) Is it affordable? This will depend on individual resources. It is pointless saving money by buying a package incapable of the job demanded. Conversely, it is unwise to spend more money than needed.

These points apply to all software – especially that in the business sector. Make sure that the needs of the application are completely understood before searching for software to ease the task.

Suppliers:

Amiga Centre Scotland: 031-557-4242
(Acquisition & MFF)
Anco Software: 0322-92513 (MicroBase)
Arnor: 0733-68909 (ProData)
CHIPS: 0642 219139 (The Works)
Kuma Computers: 0734-844335 (K-Data)
Precision Software: 01-330-7166
(Superbase series/ARexx)
NovoPlan Gmbh: 010-4929-528080 (dBMAN V)

Spreadsheets

Certainly one of the most specific applications on the Amiga, the spreadsheet is intended for one purpose and one purpose only. Nevertheless, different pieces of software vary immensely in the extra facilities they offer. So, if you want to keep track on the cashflow forecasts for your small business, but want that bit extra, read on!

In the PC world the name *Lotus 1-2-3* is synonymous with the spreadsheet. Spreadsheets are not a new idea and *Lotus* was not the first spreadsheet, but by virtue of its power, not to mention some clever marketing, it has become a standard. A standard by which all spreadsheets are judged: a standard so popular that several Amiga packages boast compatibility with it.

But what exactly is a spreadsheet and why do business people spend hours tinkering with them? Collins' English Dictionary defines a spreadsheet as "a computer program that allows easy entry and manipulation of text and formulae, used especially for financial planning and budgeting." While this sums up their main uses, it does little to describe how spreadsheets work – and how powerful modern variants are.

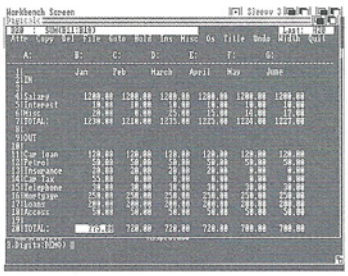
Early spreadsheets were devised to assist with financial planning, so their design closely follows that of a bare sheet used for cashflow projections and profit forecasting. A simple cashflow is defined as follows:

1) Draw a grid of 40-50 rows and 15-20 columns.
2) Along the top fill in twelve months of the fiscal year.
3) Down the left-hand column make a list of items creating income, followed by items of expenditure, leaving two blank rows for headings and results.
4) For the twelve months fill the projected amount expected to be earned by or expended on each.
5) For each month, add together all items of income and enter this figure below the list of incomes. Call this A.
6) Do the same with the expenditures. Call this figure B.
7) For the first month subtract "B" from "A" (income over expenditure) and call the result "C" (balance over).
8) For the rest of the year calculate "A - B" and add result "C" from the previous month.
9) At the end of each month and the end of the year, the result shows the projected gain or loss.

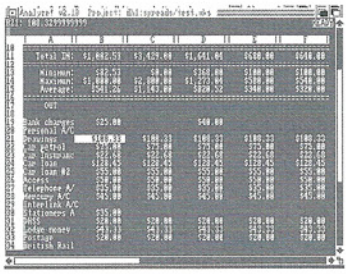
It is easy to see therefore, calculating even a simple cashflow analysis can involve hundreds of calculations before arriving at an end result; and a small change in single figure can mean the entire sheet has to be recalculated. This is a very time-consuming business especially when the forecast has to take into account many variables: market trends, regional sales variations, variable interest rates and so on.

This is where spreadsheets come in. Computers are brilliant number-crunchers and cashflow forecasts represent an everyday business problem. Using a spreadsheet, a businessman can accurately predict what will be happening to his profit margins in one, two or more years' time. Variables, such as interest rates, can be adjusted at any point and the entire sheet recalculated in a matter of seconds instead of the hours associated with the manual system. Correct use of cashflows can prevent bankruptcy or insolvency by helping to identify possible problems before they arise.

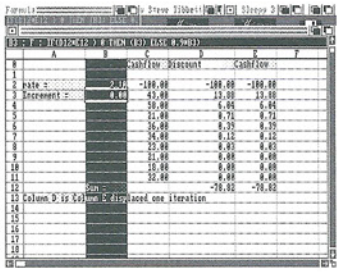
This cashflow example is just a basic function, but modern spreadsheets are capable of much more besides. More powerful Amiga packages now incorporate facilities for simple database applications, word processing and, more recently, project planning. Also, following the cliché "a picture tells a thousand words," most packages have the ability to produce graphs based on worksheet data.



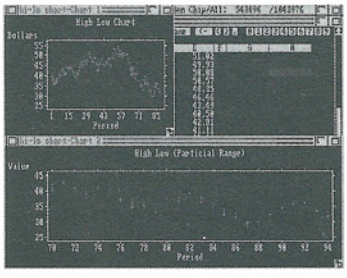
DGCALC



ANALYSE 2



K-SPREAD 2



MAXIPLAN

DGCALC
Digita International
£39.95

Digita International's offering has the distinction of being the cheapest (and therefore the simplest) commercially available Amiga Spreadsheet. There is at least one offering in the Public Domain but it lacks the documentation necessary to make it worth further discussion. Curiously, this is where *DGCalc* scores most highly considering it is ostensibly a very limited package. The 40-page manual covers every aspect of the software. Perfect reading for beginners, it has good coverage of the all-important and frequently-overlooked subject of backups. *DGCalc* itself comes on a single disk accompanied by manual and crib card, all housed in a large plastic box.

This is a basic package which makes do with an absolute minimum of functions, but is nevertheless quite capable of performing simple operations. Straightforward problems such as cashflow projections can be programmed quickly with the minimum of fuss. More complex financial, scientific and statistical forecasts are beyond its limited features, however. *DGCalc* falls down on its lack of graphics. At the price, one should reasonably expect a simple pie or bar chart to accompany data – no such facility is provided. Cavils aside, *DGCalc* is ideal for beginners although most users will quickly outgrow it.

ANALYSE 2
Micro Systems Software £49.95

Has now joined several bundles, such as The Works, but can still be bought separately from some suppliers. Although qualifying as budget software, *Analyse* has some excellent – if at times quirky – facilities. Of the budget packages it is the only one capable of loading and saving *Lotus 1-2-3* WKS files. The similarity with *Lotus* goes even further, since *Analyse* can be controlled through similar sets of slash commands and a macro language which includes the /0 autoexecute macro. This is in addition to the normal pop-down menus supplied by Intuition, making the package instantly useable for those accustomed to other Amiga or PC spreadsheets.

Making *Analyse* unique among the budget systems is its ability to plot a wide range of graphs, in either 4 or 8 colours, as well as saving to an IFF file. In itself this makes the package a real pleasure to use. The addition of slash commands ensures that – once the necessary keystrokes have been mastered – accessing any feature is very easy. This is echoed throughout the package, which was one of the slickest performers overall regardless of price. Similarly, macro programming – based around the slash commands – is a breeze once learned; and help is always available.

Since *Analyse* is now supplied with The Works (price £99.99) and can freely exchange data with other packages supplied therein it is very hard to beat. Although it lacks sideways printing this is compensated by the Platinum Works bundle which incorporates a utility for that very purpose.

K-SPREAD 2
Kuma £59.95

Another entry-level spreadsheet pitched at the same market as *DGCalc*. For slightly more money it offers far more features, at least a token offering of graphics capability, and more comprehensive documentation. Like most of Kuma's business products *K-Spread* has a distinctive look about it – just like a GEM implementation on the ST. This can be viewed as either a plus or a minus depending on personal opinion – GEM is widely used on the PC and professional users tend to feel more at home with it than Intuition.

Manipulation of the spreadsheet is very easy since most operations are fully mouse-controlled. Large areas of the sheet can be selected by "dragging" to mark an area. Marked areas can then be copied as easily as moving an icon on the Workbench, or submitted to the graphics operations. *K-Spread 2* only supports three different graph types although bar charts can be orientated horizontally or vertically.

At the price, *K-Spread 2* affords good value for money and a businesslike feel. Although it does not support *Lotus* WKS files it can load and save in Data Interchange Format (DIF) making it compatible with other Kuma products. Also graphs can be saved as IFF pictures for import into graphics and DTP packages. An unusual feature is its ability to print large worksheets sideways on Epson compatible printers, neatly avoiding an all-too-common problem. Extensive debugging facilities are further features of the package which belie its low price.

MAXIPLAN PLUS
Intuitive Technologies Price N/A

Chosen by Commodore for inclusion in their Amiga Education bundle, this software might be expected to be lacking in power or facilities. Nothing could be further from the truth, although it must be stated from the outset that MaxiPlan lacks the stability necessary for an

educational environment: graphics operations in particular are very prone to Gurus. Also, although supplied on a single disk, the package has to be copied onto two disks in order to function – the installation scripts provided did not work correctly.

Once installed, *MaxiPlan* demonstrates that it is one of the most powerful and flexible spreadsheets available. Certainly a lot of thought has been put into the user interface. For instance, the non-standard file selector does not display a list of files until requested. Therefore a complete path can be specified before AmigaDOS starts in at the disk.

Another feature unique to it (and its successor *Plan/IT*) is the zoom mode. This facility allows viewing and movement around a vast area of a worksheet by "zooming" the view out. Cells containing values, formulae, text and so on now appear as coloured bars – to move simply click the required cell and normalise the display. *MaxiPlan* is the lazy man's dream: every conceivable function, with the exception of text, can be input without touching the keyboard.

PLAN/IT 3.0
Intuitive Technologies

At the time of writing *Plan/IT* is the subject of an American legal wrangle which stems from its links with *MaxiPlan*. *Plan/IT* is a vastly improved and more stable version of *MaxiPlan* but carries a different name because Intuitive Technologies changed publishers. Until this problem is resolved, *Plan/IT* will remain unavailable.

Features added to those of *MaxiPlan Plus* include minimum recalculation, log scales on line, bar and XY charts, print previewing, interpolation line for scatter charts, and Gantt charts for project management. There have also been a number of internal changes to make the program more efficient overall. Two other new features are worth further explanation since they are unique to *Plan/IT:* Outlining and Dataview.

Outlining is a new idea for assisting with worksheet presentation. The idea is, some rows in a spreadsheet are more important than others in the final analysis – although all are required for the calculation. Outlining involves setting priority levels for the rows, then setting the global outline level. In outline mode the display only shows rows equal to, or lower than the outline level used. Dataview is the natural progression from the database facilities now found in many spreadsheet packages. When dataview mode is selected, *Plan/IT* prompts for a database to be loaded, then the sheet re-configures itself so data can be entered a record at a time – just like a real database!

Facilities like those just described make *Plan/IT* just about the most powerful all-round spreadsheet for the Amiga. However, it could be some time before it makes a proper appearance in this country...

SUPERPLAN
Grafox £99.95

This comes from the database masters, Precision Software's subsidiary Grafox, so one could reasonably expect it to be a impressive productivity tool. It comes on two disks accompanied by a large crib card and voluminous manual rivalled for size only by *K-Spread 3*'s tome. It is also the only spreadsheet featured to employ any form of protection. Like *Superbase Professional,* this comes in the form of a joystick port dongle.

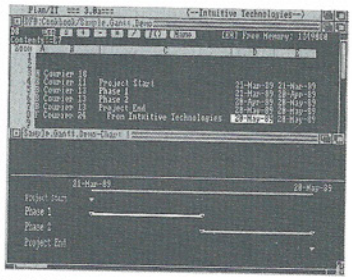
First the good news: *Superplan* is powerful – and unique among current Amiga spreadsheets in that it incorporates Time Management (or Project Planning) facilities. *Superplan* can even load alien files from *Lotus* and *dBase II & III,* in addition to Logistix, CSV, DIF and ASCII text. Finally it can be remotely controlled from ARexx making it compatible with *Superbase Professional.*

Now the not so good news: *Superplan* is slow – very slow. Screen updates are languid and calculation speed is reminiscent of 8-bit micros. It gives the impression the system was written on a 68020/68881 based system and never tested on a standard Amiga. To be fair, if *Superplan* were running on such a system there would be little to touch it in terms of versatility.

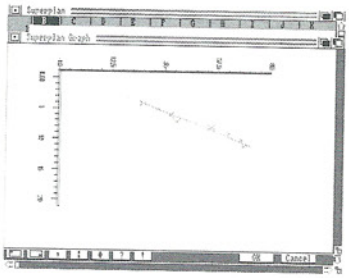
Adding to the poor impression, however, *Superplan* is far too quirky to be friendly. For example, it lacks a proper file request and directories must be set first using the Prefix command. Also construction of graphs is based around a painful system of macro commands. While this is very impressive it is either too time-consuming or complicated for many tasks.

ADVANTAGE
Gold Disk £99.95

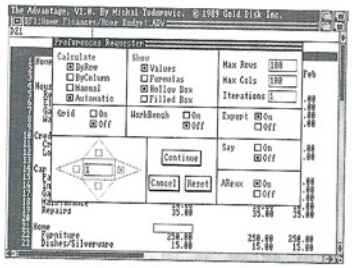
Written using Benchmark Modula II – a departure from the ever-present C. This (and some excellent programming) gives *Advantage* its advantage (ahem!) – a wicked turn of speed. Notable also is the Intuition interface which conforms stringently to Commodore's guidelines – something Commodore rarely seem to bother with themselves. Also worth a mention is its ability to import files from *MaxiPlan* and *Lotus* too, of course. It comes on two disks with a small but clearly-written, well-illustrated manual: the second, the Examples disk, containing a stripped-down version of



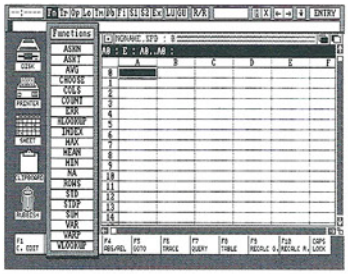
PLAN/IT



SUPERPLAN



ADVANTAGE



K-SPREAD 3

Advantage for smaller-memoried machines. What makes *Advantage* so special is its superbly thought-out user interface. At no point is the user left feeling frustrated – meaningful error messages make debugging a simple matter. A better illustration still comes from the Chart Options requester. Other packages mention charts by name: pie, XY, line and so on. *Advantage* pops up a little window with an illustration of what each chart looks like so users can pick the one they want. Graphics are drawn at lightning speed too. The Options requester is available in the graph window so changing graphs for comparison is a doddle.

It is difficult to find fault with *Advantage*. Gold Disk have taken the best features from the best packages and incorporated them into one bumper bundle. This is Version One, remember. Throughout the trials it was the most consistent and most stable of all packages tested. Although it lacks many "fancy" features, *Advantage* sets standards of friendliness and speed by which others should be judged.

K-SPREAD 3
Kuma Price under £100

Trusty *K-Spread 4* rises from the ST to the Amiga at last. The new version, in the first stages of conversion, tended to be far less stable than its ancestor. What can be said is *K-Spread 3*, although based on a GEM-like interface, does look like a force to be reckoned with. Kuma claim that although the package supports *Lotus*, it is modelled more closely around Microsoft's *Excel* – for the Macintosh – which is far more powerful and more up-to-date than Lotus.

Conclusion

Selecting the right spreadsheet for an individual's needs is not easy – especially when the choice is so wide and the quality, on the whole, good. At the budget end of the market, *Analyse 2* emerges as the clear winner although it is becoming increasingly difficult to obtain. *K-Spread 2* is far and away the lesser of the other two evils.

At the high end, exact choice is even less well-defined. If (and only if) Project Management is a prime concern, then *Superplan* is the only answer. On pure ease of use, Gold Disk's *Advantage* is a superb contender but finds *K-Spread 3* (when it arrives) and *Maxiplan Plus* barking at its heels. Adding to the foray will be *Plan/IT 3.0* when the creaky legal system unravels who should be marketing it. There can be no overall winner since all packages have some redeeming feature to recommend them. But, for the average Amiga owner – owning *Advantage* may be just that.

Project Planning

In today's world time is money. An airliner waiting on a runway at an international airport costs around £8000 per hour; similarly, a plaster sitting around waiting for an electrician to finish costs £60+ per day. Two extremes certainly, but either way expenses which are best avoided and this is where project planning and time management comes in. Like a cashflow forecast, creating a timesheet manually is a laborious task prone to errors; errors which can inevitably cost money and waste resources. With suitable spreadsheet (Superplan has customised extensions) project planning is as simple as defining the jobs and the timescales – the computer does the rest. Many other spreadsheets can be programmed to perform these tasks, however.

To examine this in more detail consider the task of building a house. First the spreadsheet must know the units of time best suited to the task. Most construction work takes place over a number of days therefore bricklayers, labourers etc. can be allocated a set number of days to complete their jobs. Then the calendar is defined. Some dates can be removed because of weekends and other holidays. Finally the resources are allocated and the jobs assigned to a schedule.

However, some jobs cannot start until certain tasks have been completed. The plasterer cannot start until the electrician has completed at least 50% of the wiring; the electrician and the roofers cannot start until the bricklayers have built the walls; and they cannot start until the foundations have been laid.

When all of the jobs have been defined and given a timescale, the spreadsheet can calculate a completed timesheet and, given a starting data, provide a finishing date – incorporating any holiday periods. Once this has been done, the timesheet can be modified to reflect certain "What if?" situations. For instance, would it be more cheaper to offer the bricklayer a 10% bonus to complete the walls in four days rather than five. Or, what would happen if another bricklayer joined the team.

Accounts

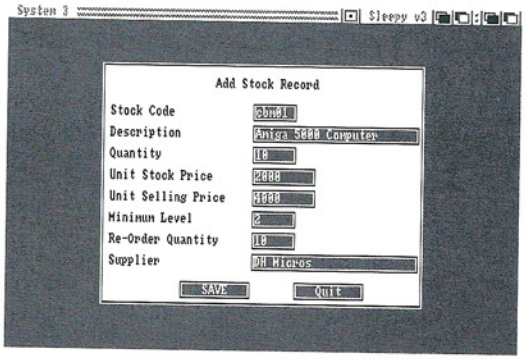
If you run a small business, either as a full-time occupation or as a side-line or an extension of a hobby, you may well be tempted to invest in some accounts software. This could make the task of keeping track of where your money is easier, but on the other hand it could complicate things immensely for you. Remember too that the legal situation of tax returns and audits complicates affairs further. The best idea is not to buy until you've read our guide to accounting software...

In business, accounts are vital. For many of us, even the word 'accountant' conjures an image of a bespectacled little man working feverishly into the night, sweating over a voluminous, leather-bound ledger. The smoky atmosphere lit by a wilting candle; the silence disturbed only by the scratching of his fine quill upon the vellum.

Bringing this idea more up to date requires the paraphrasing of a recent television commercial: "You surprise me Arthur. I know you're a wizard with your souffle a l' orange – you may even be a genius with your sales projections and cashflow forecasts – but can you cook the books?" A good set of accounts can mean the difference between a Caribbean vacation or a holiday at Her Majesty's pleasure. Despite what this may immediately imply, a well-produced set of accounts can save hundreds of pounds in accountancy fees – and thousands in tax. Also, modern accountants use biros.

Years ago the sales pitch for computers included hackneyed phrases like "You can even use it to do your books..." Quotations used by people with about as much idea about financial bookkeeping as a soya bean has about the Vegetarian Society. Thankfully, those days are long since gone; salespeople now admit Amigas are pretty good for playing games on. Accounts? You can leave them to the PCs – or can you?

Since all computers rely on software almost any computer can do the job – just how well depends largely on the quality of the software. As it turns out, the Amiga, although not well served with accountancy packages, has a few tricks up its disk drive.



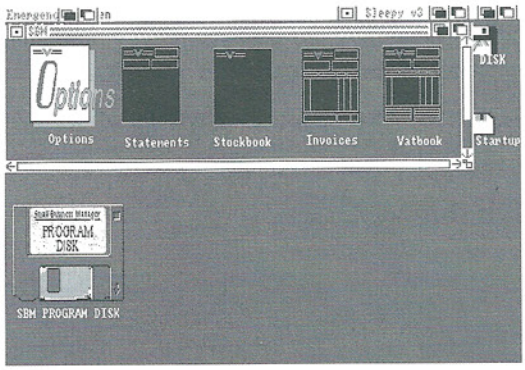
SYSTEM 3
Digita £49.95

Digita have a reputation for producing good quality software at a keen price – on the PCW, that is. Digita have not yet achieved the same reputation in the 16-bit market, but continue to produce new software and also offer good, business-like support. Telephone support is offered five days per week at a cost of £25 per year – free for the first 60 days after purchase.

System 3 is better than many offerings in that it operates in a complete Intuition environment. The idea, and hence the name, is a system offering Sales Invoicing, Cashflow Control and Stock Control all in the one box. It comes on a single disk with 44-page manual. The software itself is split into two programs – one for the ledgers and the other for invoicing and stock control.

The most notable feature of *System 3* is its ease of use. Even though the user interface is far from perfect – what is? – it remains surprisingly good. The only serious criticism is the inability to leave certain forms at any point. This can happen while entering an invoice, say and forgetting what the stock code for a 1/8th" widget needlebearing is – it is impossible to leave the form until a correct code is entered. This is a nuisance. That said, all the forms used by the program are remarkably well thought out.

System 3 is supplied with a minimal manual and no example data to get the new user going. However the simplicity of the package should ensure most users get to grips with it very quickly. Some of the features, like the extensive reporting, quite belie its low price. Although capable of handling simple VAT, like the rest of the systems here, *System 3* is not really geared for full use in most retail outlets.



SMALL BUSINESS MANAGER

Hi-Tension £99.95 + VAT

Comes from the Hi-Tension stable – programmed by non other than Steve Marriot of *Tipster* fame. *Small Business Manager* boasts a suite of programs, from stock control to invoicing and VAT returns. It is supplied on two disks with an unusually packaged manual – that is, when opened the large cover forms a variation on the loose-leaf binder theme. More surprising still, the pages are only printed on one side – with a liberal smattering of "Page Intentionally Blank" messages. This results in an essentially small manual taking up space of almost biblical proportions. Cavils aside, this was the best thought out manual. What it lacks in style is made up for by the tutorials – no less than 13 in all.

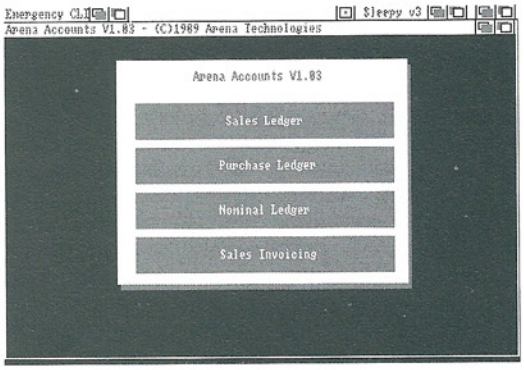
The first time *SBM* is started, it becomes apparent something is slightly odd. This is due to the use of the "Pearl" font to simulate the proper Intuition interface it lacks. Fundamentally there is nothing wrong with this approach – but it creates a program which looks like Intuition, but isn't! Problems arise when the user makes an error, and wants to go back to the previous box. Under Intuition this is as simple as a mouse click – no provision has been made in *SBM*.

The editor, too, is sadly rather crude. Proper menus have been provided but these seem to suffer from "overzealous user syndrome." Pushing the right mouse button too soon after a module loads can result in partial or missing menus! This minor irritation is remedied by a little patience.

The most striking feature of *SBM* is the way each module is a separate entity in its own right: data is shared among the programs as a common set of files. This should allow the system to run on even minimal configurations like an unexpanded Amiga 500. This removes the need for a multitude of menus just to get to the required section.

Additionally, inside each of the main modules is a facility to test the printer – a very handy tool. There is even a feature to draw very simple bar charts, though how useful this proves in practise remains to be seen.

Small Business Manager scores on ease of use and has a functionality that allows users to pick it up and start right away. What it lacks is the solid "feel" which must be present in any application of this type; something which may prove to be its downfall. It has a lot to recommend it just on specification and price alone, but leaves some doubt that it could do the job efficiently.



ARENA ACCOUNTS

Arena £149.95

Is the most serious attempt yet to bring "businesslike" software to the Amiga. Developed specifically with the Amiga in mind – thus boasting by far the best user interface of this bunch – *Arena* has the most professional feel. The most expensive package featured, at 149.95 + VAT, *Arena* lacks features found in the cheaper *SBM*. However its implementation is far more professional, justifying the higher cost.

Sadly these first impressions do not extend to the documentation, which although sizable, does not do enough to accommodate the first-time accounts user. Arena is based on the frightfully complex (but powerful) "doubleentry" bookkeeping system which must be understood before attempting to use the package. Surprisingly, the manual does feature a reasonable introduction to the machine itself. This gives the impression that *Arena* is aimed directly at accounts

minded people – not everyday Amiga users. This unusual approach is dubious: Amigas are seldom bought specifically for business use – PC compatibles being first (and obvious) choice.

Comments over the documentation aside, this is the only package which feels as if it means business. Although the system is very Amiga specific in implementation it seems to have taken many ideas from PC based packages. To this end, many of the data entry screens take on the impression of simple (and not so simple) forms.

Like *SBM*, Arena have opted to use their own line editor – preferring it to the Intuition supplied "gadget." Far more refined than *SBM*, the system works well and is easy even for inexperienced users. The extra feature of copying the line above saves time when entering lists. Mouse control is available to an extent too. At some prompts the system offers a list of possible options when required data is omitted. Very helpful.

Unlike *SBM*, Arena have opted for printing to existing stationary. This is a far better system in the long run because it removes the need to reprint a new set of invoices/statements/letterheads and so on, just to aid the computerisation. In the short term this does mean the package must be customised to meet the peculiarities of the business's existing printed forms.

If criticism has to be made of *Arena Accounts* it would be of the "front end" menu design. So many of the menus look so similar, it is often difficult to tell at a glance which one is current. One further objection would be with the odd system of needing to assign images before running the software. Overall though, if the manual's tutorial content were improved – and a decent glossary added – it would be hard to beat. Unfortunately, *Arena Accounts* only runs on Amigas that are fitted with AT LEAST 1Mb OF RAM.

Conclusions

When the final arithmetic is done it is difficult to pick a clear winner from the top two packages. *Small Business Manager* has the price advantage, customised stationary and the addition of stock control. *Arena Accounts* looks more businesslike, has far superior input validation – thus reducing the risk of errors – and feels more solid. Neither system can cope with the special VAT Schemes for retail outlets – necessitating the final computation be done manually. This is almost unheard of in even simple PC based packages but not a major problem, nevertheless.

At the bottom end, only *System 3* is worthy of consideration. It is not geared for a larger small businesses with high turnover of stock – but could be useful for the small manufacturer. However, it is not a complete accounts package by any means – nor does it pretend to be one. Several other "accounts" packages are available on the market, but they were omitted because they did not cut the financial mustard. They shall, necessarily, remain unnamed. Note: even a low cost item is expensive if it cannot do its job efficiently.

A Word of Warning

In all too many cases, a small business can manage perfectly well without a computer doing the accounts and/or stock control. Such systems come into their own when the stakes are greater. It should be noted also, the computer does not necessarily ease the task or relieve one person entirely. It is useful when:

a) A department looks after a company's financial affairs.
b) Several people need to examine and alter the data.
c) The business is primarily mail-order of small items.

It is true to say, many businesses can benefit from this sort of system – but most would be well advised to think very carefully first. Discuss the matter with an accountant and listen to the reply. Many can relate the unfortunate – and all too common – stories where the computer ends up in the bin and the business in bankruptcy court!

Amigas – like all computers – are tools. Used correctly, they can enhance the profits and streamline the business. In the small business they are best kept for mailing lists, stock control and forecasting. In the slightly larger businesses – those employing 10 or more people they are useful for wages and indeed, accounts – provided someone is employed to operate and update the system weekly. The small businessman will profit by staying with what he knows best – making money.

A Wealth Warning

Putting too much faith in any computer accounts software can endanger your business. Less true today perhaps, but when computers were in their infancy many profitable companies had to cease trading altogether – many more barely survived – solely because of computer errors. All too often, the problems lay not with the computer system, but with the operators. There is a term which, although rarely used today, describes this people failure perfectly: GIGO – Garbage In, Garbage Out.

The theory goes something like this: Just suppose, computers cannot make mistakes; a flawed assumption to start with. Operators are human and – like it or not – humans do make errors however trivial they may be. Feed the perfect adding machine the WRONG set of figures (Garbage In) and the result will also be wrong (Garbage Out). Therefore, the results of any set of accounts are only as accurate as the data used to compile them.

The sad fact is, while we have an automatic tendency to mistrust the results of our own calculations, we tend to believe the computer's results – regardless of how ridiculous they may appear. This often only comes to light when the Inland Revenue or Customs and Excise (who usually check by hand, incidentally) find errors in TAX or VAT returns. But just try explaining that to the magistrate...

You And The Law

The law requires any business computerising its accounts system, in part or full, to register this fact with

the appropriate bodies: Customs and Excise for VAT; Inland Revenue for Income Tax. Also, The software must be approved because VAT officials want to know the computer is not cheating them! It is believed all the systems reviewed here have been approved – it is the duty of the software companies to do this.

The situation is similar for anyone needing to store customer information on computer file – customer and supplier names and addresses, for example. This comes under the 1984 Data Protection Act.

More important: what happens when either GIGO or Murphy's laws take effect. That is to say, if a bug in the software or a simple entry error causes an error on a VAT return, who is responsible? The official stance is predictable: a spokesman for Customs and Excise told us "It is up to every trader to make accurate returns." In a nutshell, the business (and therefore, the manager) is solely responsible for the accuracy of the computer's figures.

When mistakes are spotted it is up to the company to rectify them. If VAT has been underpaid C & E will usually require that the amount owing is repaid in full immediately. If on the other hand, VAT has been overpaid, getting it back can be a tenuous business. This sort of error is not uncommon – and often means large amounts of capital being tied up for many months.

Video

At relatively low cost, your Amiga can become a full professional-style video editing suite. What follows is a brief intro to the world of desktop video and recommendations as to what software you need.

Only five years ago a complete video editing suite could have cost you over £100,000. You can have it today for less than one percent of that price. What's more you already own half the kit involved – you only need a genlock and some state-of-the-art software and the picture's all yours. Yep, it's Amiga desktop video.

Aside from all the other hi-tech-specs heralding the Amiga's launch was one simple little feature that may have been lost, but in hindsight proves that Commodore's development engineers were a very forward thinking bunch of boffins indeed. They thoughtfully included external sync pulse in the Amiga's CPU right from the start. As such, your machine can rightly claim to be the only reliable low-cost means of producing videotape material from the desktop in existence.

For although video production systems exist for other machines, notably the Macintosh and Archimedes, the Amiga has a greater selection of cheaper hardware and software in this rapidly growing field. Video processing on the Amiga is the most cost-effective alternative to both home and professional video editing.

You don't need to be a mechanic...

The genlock allows you to superimpose computer and video displays on a single screen by synchronising the output from the Amiga's video chip with that of a live or recorded video source. It works by synchronising and locking together the line and frame generators of each display's refresh rate, hence the name 'genlock'. After providing both horizontal and vertical scan synchronisation it presents you with rock solid superimpositions. This is achieved by combining the three separate RGB signals from the Amiga into a composite video or PAL signal which is in turn combined with the composite video output from a videodeck.

An on-board video chip allows you to control the horizontal position and phase of the signal on your screen through the genlock's front panel. The resultant signal is a mix; a superimposition of the video signal on a specific colour you've made 'transparent' in your computer image – usually blue. Alternatively, the video image can be behind the computer image where the chosen 'transparent' colour is the only one visible – the choice is referred to as foreground or background 'keying' or 'masking'. So for instance, displaying titles over a video image, like the subtitling in foreign feature films, is foreground keying while for any applications where the computer screen borders are active – in wipes and fades – background keying is used.

But remember, just because you have a video mix on screen doesn't mean you can save moving video images to disk. The genlock is merely superimposing one image over the other – the signals themselves remain entirely independent. However it is possible to direct the mixed output to videotape, since the signal reaching your monitor in mix mode for all intents and purposes appears as a single signal.

...to drive a car

So what ends can you put all this to? Firstly you may wish to record some Amiga productions to videotape instead of disk. It might be a lengthy animation sequence you've designed which you may wish to superimpose over a recorded video sequence.

The kind of material here might involve overlaying foreground material such as animated characters over a landscape background. With a little care you could 'borrow' a sequence from a TV programme or film, note its duration and lay it down to tape before sequencing your animation to fit.

Or you may want to send out demos of games or sprite routines to software houses on videotape instead of sending hot source code. But it's probably in the area of overlays that a genlock can be most effectively used. Simple operations such as adding titles to a videotape are achieved by opening up a window on your Amiga desktop and setting its background to a 'transparent' colour, booting up an Art or DTP package and overlaying the text.

Alternatively you can use a dedicated paint or video package like *DPaint III, DVideo III, Deluxe Productions* or *Video Studio* to produce a range of animated, scrolling credits or 4096-colour logos. This is probably the easiest way of producing superimposed material.

In this way you could annotate photographic albums you've previously digitised as well as add titles to home video productions. It might be something as useful, yet profitable, as producing a looping window display for your company that shows your product line along with details of special features and products.

At the end of the day your Amiga video hardware and software exists as an enhancing tool to the already secure and installed medium of video. What next? Demos for broadcast TV? Offers of promos for your local bands? The only limit on the extent of use is the limit of your imagination.

VIDEO SYSTEMS BREAKDOWN

1. SOURCES
Any video source - be it a videotape deck, camera or live TV capable of outputting composite video or RGB signal can be directed to the genlock. Likewise, digitised or scanned images can be imported into the Amiga in the normal manner, processed and sent to the genlock for mixing with the other video source signal.

2. VIDEO MIXER
Two or more channel mixers are not essential - a single source can easily by-pass this device - mixers are only if you want to combine two or more video sources before overlaying the results on computer-generated displays via the genlock

3 THE AMIGA
Although a straight A500 will suffice, as with all serious applications a RAM upgrade will allow you much more scope in productions. the displays of Video effects and paint package/animation software are sent to the genlock via the RGB output to be mixed

4. THE GENLOCK
The incoming video signals are synchronised and can be redisplayed on the Amiga's monitor either as foreground or background 'masks' i.e either the Amiga display is overlayed on top of the video signal or vice versa.

5. THE OUTPUT
depending on the genlock either a composite video or RGB signal can be sent to a video deck in recording mode. But some VTRs are more suitable than others - they must be capable of frame accurate edits otherwise all your edit points will be full of glitches and roll-bars while sync is reestablished.

DESKTOP VIDEO EDITING

It's not too difficult to see how we can enter the realms of desktop video editing on our Amigas without too much trouble. After all, if you have the means of combining live or recorded video with computer images, all that's needed is some means of sequencing it to videotape.

It's here that things can get a little tricky because results are entirely dependent on the quality of the video recorder you're using. In 'assembly' editing, where you're merely pausing your recorder while the next section of programme is being selected and added after it, the recording machine must make sure that the sync pulses recorded on the control track of the videotape line up with the previous passage. If not, there will be a disturbance caused by loss of sync between the assembled passages of recording. Unfortunately the majority of domestic VHS decks have been designed without this simple facility.

To check whether your machine has it, look for the machine backspacing along the tape for a second or two prior to it resuming recording in pause mode. This delayed response allows sync to be reestablished before any new recording is added. The result is a 'clean' cut without roll bars or glitches. Another problem is that of machines which lose tape position because they unroll or unlace the tape when in Stop mode. Beta or Video 8 machines are preferable to VHS as they both have these crucial features.

Also essential are machines that have search modes based on the control pulse track so that individual frames of the assembled recording can be located. It is best if this reads hours-min-secs so that it's compatible with the time code readouts found in some of the best art, music and video effects packages. Good video editing requires accuracy down to 1/50th of a second as each frame is composed of two scans. VHS recorders that unlace tape as they pause or stop cannot use the control track for a counter, making them useless for the essential facility of 'Insert' editing.

But most professional video editors use insert editing all the while – it's much more convenient than assembly editing. It's a little like the process involved in using a music sequencing package, but instead of laying down a drum track as your reference beat you lay down a digital time code readout – an 8-figure number that appears overlaid on the black background to be recorded onto. In this way you always have a guide to the start and end points of the blank tape you wish to record a clip onto.

Working from paper beforehand, you can build up a track guide that illustrates the sequential running order of your production. Insert editing in this way is more convenient because if you are operating from a number of different source tapes you don't need to keep swapping them ad nauseum. But it remains a shame that in the face of personal computers and hard/software designed to bring professional video editing to your home it's the common or garden VHS deck that lets down the side.

What you need and where to get it...

All this may sound a little daunting but of course there's a range of excellent Amiga software to help you out. Before utilising any of it though you might be advised to buy some extra RAM and second drive as you're going to be dealing with memory and disk intensive operations. A digitiser or realtime frame grabber will also be worth considering buying as it provides a good basis for importing images, which can be used as guides to emulate as 'hand-drawn' images material.

Also, before embarking on any video production it's worth getting into the habit of storyboarding your Amiga movies. This saves valuable time and colour clashes when keying left, right and centre. So what is the essential supporting software and hardware you'll need to become an Amiga video producer?

FOR OVERALL VIDEO PRODUCTION

Deluxe Video III Electronic Arts 0753 49442 £99.99
The best all round package for combining computer and video images via a genlock. Although it offers none of the useful utilities present in *Video Studio* from ZVP, its impressive range of features include super smooth animation, borderless overscan mode for graphics on videotape, dozens of transition for sophisticated screen effects and frame accurate timing right down to 1/60th second. In addition it offers automatic scrolling backgrounds, colour cycling animation, and an object-orientated HyperCard style interactivity which allows you to build multi-level branching.

This last point shows the way to the future, as it enables true interactive video where your Amiga can be used as the controlling component in a system that drives videorecorders in realtime. As such training, presentation and promotional films take on new meaning – the user has control over the narrative he or she is experiencing by defining the pathway to be explored. Live video overlay and fades are also in there along with full support for all Amiga graphics and sound modes.

FOR IMAGE PRODUCTION

The Amiga has an excellent range of art packages at its disposal for working into video productions. Worthy of note are *Deluxe Paint III* (£80) from Electronic Arts on 0753 49442. This excellent package produces hi-resolution keying areas for genlocked superimpositions, and can be used for producing background pictures and retouching digitised images. It can also quickly produce animated sequences. For a further £25 you can get your hands on *Real Things* from RGB Studios on 082 581 2666. This little beauty is an add-on which allows you to construct detailed choreographies of animated sequences with ease. Also worth a look are *Photon Paint 2* at £89 from Microillusions on 0703 703030, which is good for manipulating HAM images and *DigiPaint 3* from NewTek (available from HB Marketing on 0895 444433) at £70 which offers good text manipulation for titling effects. *Fantavision* from Domark on 01 780 2222 for £40 is also great for creating foreground animations that can be superimposed on video-generated backgrounds, but since the created objects are silhouettes it might be best to use the excellent 'tweening' facility to export the objects to a package like *Sculpt 4D* from ACS on 031 557 4242 for £368 which is an excellent 68020 compatible animated ray-tracing suite allowing animation productions complete with shadows and reflections.

FRAME BUFFER

Amiga Centre Scotland 031 557 4242 available soon
A sub-£1000 24 bits per pixel frame buffer allowing 16.7 million colours at 900x600 resolution on a standard Amiga. Combine this mother with a genlock and you'll be pushing the boundaries only just recently extended by six-figure systems like Quantel's Paintbox and Harry. Digital Pictures beware. With 3 megs of onboard RAM all images can be fully double buffered and used in conjunction with NewTek's latest 21-bit Digi-View digitiser.

FOR TITLING

Although *DPaint III* can be used effectively to generate titles, custom software like *Aegis Videotitler* from HB Marketing for £96 can do the job a lot more easily. It uses Amiga fonts in any resolution to produce a range of captioning effects to create animated titles. There's also a variety of wipe transitions on hand. But the best of the bunch is *Video Studio* which also comes along with an impressive range of transition effects.

FOR VIDEO EFFECTS

Video Studio from ZVP (available from Maze Technology on 01 520 9753) for £99 is the state of the art for dedicated video effects as it incorporates 12 of the most commonly used video production utilities in one package. 20 broadcast quality fonts are on hand with nine wipe patterns and a comprehensive suite of broadcast test signal patterns. Fades up and down are included as are logo and copyright screens you can customise yourself. You may also utilise broadcast-style VTR control code time readouts. For budget productions you might also consider *TV Show* from Brown-Wagh for £61, which is a low-cost effects package concentrating on wipe effects produced by using an editable script file to create synchronised sequences. But something like Videon from Power Computing on 0234 273000 for £250 might be better since it allows you to map 4096 colour digitised images onto the surface of any objects generated in an art package. Ideal for sexy superimpositions!

ADDITIONAL ILLUSIONS

Cel Animator from Microillusions on 0480 496497 for £100 is a useful component of the *Photon Video* suite which allows you to convert colour drawing to rendering and video tape production. Both digitised and 'hand-drawn' images can be synchronised to sound tracks and played at varying speeds. Automatic loops and slow motion can also be employed. Microillusions' *Edit Decision List Processor* at £299.95 is also well worth a look since it allows you to keep track of all edit points and offers duration times as well. The company's *Transport Controller* at £200 enables infra-red control of videotape recorders thus disabling the human error or nerves – hitting a Record button right on cue while leaning over enough wires to make a Bolognese is something to be avoided.

GENLOCKS

Most genlocks support the range of Amiga models, though, of course, it's worth checking this out beforehand – even better is to ask suppliers to forward you a manual beforehand as these babies don't come cheap! However the ideal solution is to visit a show and see one at first hand.

Commodore itself has badged two devices – the A1300 and 2300. Prices are a bit sketchy on the former but it is intended solely for use with A1000s and isn't reported as providing a particularly good signal mix, while the 2300, at £250, provides a better output but still not broadcast standard. As it uses the Amiga's video slot it can't be used in conjunction with Flicker Fixer and is only able to provide background keying.

For a cheaper no frills affair, Minigen from Applied Systems and Peripherals at £114 is probably your best bet as it knocks out a good stable signal and uses the RGB port. Rendale's A8802 genlock is a good quality PAL device supplying both foreground and background keying for £287 and which provides near broadcast quality, though its older brother the 8806 at £800 provides broadcast quality output. It fits on an internal card and uses the video port but has selectable colour keying, composite video and RGB mode mixing.

The G2 Videocentre at £595 is another professional performance genlock with video mixer and PAL encoder allowing fade and mix controls through software and supporting Super VHS machines but SuperPic at £574 from Precision Software might be a better bet as it combines a digitiser with frame store along with genlock. It can grab 50 frames a second to the framestore before displaying them as a sequence mixed with external video.

Triangle's T8000 at £914 is pitching in there at quite a high price but it boasts full broadcast quality and is probably unique in that it features a sub-carrier phase adjustment making it ideal for use with professional video mixers. The Neriki Image Master at £1000 is the top of the range price-wise but doesn't have good features.

Education

The Amiga is already used in many schools as an educational tool. There the emphasis is mainly on secondary education and using beginners' versions of professional-standard packages – DTP, WP, music, graphics – as practice for the real world. Parents of younger children might like to use their Amiga to help teach younger children, however. What follows is a few guidelines and some brief reviews to get you into the swing.

The Amiga has much to recommend it as a learning tool for children. In particular because it has a great capacity to work through attractive, colourful pictures and to make interesting noises – even to use synthesised speech – it's one of the few things that can drag the children of the video age away from the telly. Plus the fact that computers have a certain credibility and appeal for kids nowadays, anyway.

Since the Amiga is such an outrageously flexible machine, Commodore are particularly keen to see it being bought by parents who have young children: the reasoning being that ma and pa can do their serious work (home accounts, word processing, DTP) and their hobbying (music, computer art or alien-blasting) while the little 'uns are helped out with their pre-school learning (reading, 'riting, 'rithmetic and the like).

To this end, Commodore will soon announce a special bundle of the Amiga 500 aimed at the under-eights. A logical move, the company believes, as follow-up to the "Class of the 90's" pack, which was aimed at a similar combination of parents and slightly older children. And also a recognition, perhaps, of the lack of support currently given to a growing market for pre-school computing.

What do The Kids want?

The Class of the 90's pack very much reflects the philosophy of secondary schools using computers: they would rather have the children using real, 'adult' applications of the kind they may be using in later life. It contains a spreadsheet, a database, a powerful art package, word processor, DTP, and a music package.

The priorities of pre-school learning and primary school, however, are different. Although teaching 'computer literacy' remains a general aim, basic skills such as logic, maths, reading and spelling are more important. The needs, then, are different.

Until now, Commodore's only official contribution to this age-group has been *Amiga Logo*, an excellent version of the programming language used in many schools from the age of five upwards, and the *BBC Emulator*, intended to make old faithful BBC programs useable. They have also tended to emphasise the benefits to even very young children of paint programs such as Electronic Arts' *Deluxe Paint*.

The programs that follow are nearly all intended for very young users, many for pre-reading or pre-school. Most of them make very heavy use of the Amiga's graphic power and of synthesised sound, in an attempt to keep a child entertained and absorbed. And, mostly, they try to replace traditional ways of teaching basic skills such as reading and maths.

Worthy, Worthwhile, Worthless?

It's worth noting, just before we take a look at the software for this month, that computer programs for young children can suffer from one very obvious pitfall.

The danger is that a child, plonked down in front of a computer, lacks the interaction with real, live people that is a vital part of its social, as well as intellectual, education. Is it really a good idea to have a computer reading your child a story? Wouldn't both you and the child miss the sharing and the companionship? Wouldn't it help stunt a kid's emotional development? Think hard about these.

You may not agree, but one of the biggest arguments against video games is that children, locked in mortal combat with aliens, are usually locked away from other children. Schools' use of computers tends to concentrate on working in groups so that problems raised by the machine become a focus for discussion and group problem-solving. Well worth bearing in mind. So, with that warning, on to the software...

AT THE ZOO
MERIT SOFTWARE £24.95

Essentially a colouring book on disk, the scenario, as you might have worked out, being a trip to the zoo. The piccies to be coloured appear as line drawings on a nice, neutral grey background and are accompanied by an appropriate sampled sound effect. Each 'page' is a different animal or scene.

The pencil pointer is used to select a colour from the palette of 24 and then point at the area to be filled, which floods rapidly. Only criticism here is that some areas are tiny and rather fiddly to point to. Areas can be re-filled if the chosen colour doesn't please, an 'oops' button can be clicked to undo mistakes and an eraser can be used to clear the pic and start again.

As far as it goes, the program is excellent – but it is just a colouring book. Still, the glowing, saturated colours should make it a big hit with the little 'uns and the animal recognition has an educational value.

DESIGNASAURUS
DESIGNWARE £34.95

There are three parts to this one. The first is a game in which the player must control a dinosaur with the aim of survival, in pursuit of which finding appropriate food is vital. The learning part is sneaked in nicely, here, with diet, habitat and historical info all of siginificance but not rammed down the player's throat. And there's a reward stimulus – if the dinosaur survives for five screens a certificate is granted which can be printed out and kept.

The second part is dinosaur construction. The job here is to build a complete skeleton from a head, body and legs, and a tail. Parts of lots of different dinosaurs can be matched and mismatched to your heart's content. Each part is accompanied by a detailed description of the dinosaur it belongs to, so there's a lot to learn here too. The third part of the program is the act of printing out pictures of the dinosaurs. The skeletons from the second part can be printed, as can a large range of line drawings of the creatures as they would have looked.

The lasting charm of the old thunder-lizards is not about to fade, but the nice thing about this one is the way it sneaks all the hard facts in amongst the fun. Only slight criticism is that there's less to the program than might have been possible, but it scores well on sheer appeal.

UNCLE D'S CON-SOUND-TRATION
ALOHAFONTS £19.95

The only real 'game' here. The basic idea is rather like that quiz show on telly where contestants have to remember what is hidden underneath the various squares on a grid. Instead of one grid, however, there are two. The player must match a graphic image from one of the squares on the left-hand grid with the appropriate sound from the right-hand grid.

Play follows a simple pattern: the player just clicks somewhere on the left-hand grid, sees what image is displayed, and clicks on the square on the right-hand grid he thinks may conceal the correct noise. If he is right and a match is made, a clown's face smiles and the pair of squares turns green. If he is wrong, the clown's face grimaces. Either way, play continues until all the squares are correctly matched.

Not half a bad little game. It is pleasantly presented and the sampled sounds are admirably clear. Younger children will probably enjoy it and the two-player option will get a lot of use. The added bonus of including letters of the alphabet and numbers is obvious, though it couldn't be used to actually teach these: more to reinforce or introduce them. Its only fault may be lack of longevity, because it uses the same pictures and noises every time – though it does hide them at random around the grid, so the chances of repeat games are slight.

MATH-A-MAGICIAN
THE OTHER GUYS £22.95

The magician is a character who hopes to make the learning of simple sums fun. Hmm. All this 'game' really does is display a sum in large, friendly letters on the screen, reading it out aloud as it does so, and wait for you to answer it. If your answer is wrong, a voice encourages you to try again. If you succeed, a whizzy graphic of the magician appears and a fatuous piece of praise along the lines of "You must be a personal friend of Albert Einstein!" is read out.

The game is backed up by a large grid of the times and addition tables using the numbers one to twelve, which can be explored.

The speech is very good, clearly because it is sampled, not synthesised. Overall, if you want your child to practice a few sums, this program is not a bad way of doing it: but the fact that this is maths is not at all disguised, so it's hard to see it being 'fun' if the child has already been put off by maths.

THE TALKING STORYBOOK "LITTLE RED HEN"
DESIGNING MINDS £19.95

Certainly a very clever little project, but of how much use? This is, as you may already have guessed, a storybook that talks to you. It makes brave, broad steps in the attempt to use the Amiga's sound and graphics power to the full. The pictures are very pretty indeed. The music is really very enchanting. The story – an old children's favourite – is good. And the synthesised speech is, well – interesting. The robot voices don't really make for the most atmospheric of tale-telling. As anyone who has used the speech synth on Workbench 1.3 Extras will know, it's an impressive gadget – but gets nowhere near how you and I speak. Apart from anything else, kids are likely to have trouble recognising the words as they are spoken. To be honest, the bond provided by reading

your kids a picture book and the chances given for them to ask questions is not worth losing out on. This program might prove a novelty and a diversion, but is by no means an alternative.

WORLD ATLAS
CENTAUR SOFTWARE £34.95

Putting an atlas of the world on floppy disk is an ambitious idea, but one of which the Amiga is quite capable. This program goes further still, though – as a learning resource, it aims to provide facts, figures and background history on 170 nations of the world.

Each individual nation is accessed by clicking on a map of the world to decide a continent, then clicking on any country of interest. A detailed information screen appears filling you in on size, poulation, the major cities and the like. Each country also has a scrolling potted history which borders on the sketchy.

Other options allow you to get details of international organisations such as NATO or OPEC and to call up lots of different statistics about the Earth, as well as to sort countries out by their size or their language.

All in all this is a cracking idea and could provide a good means to stimulate report-writing or special projects within a school environment. There is, however, one big problem: this project has bitten off more than it can really chew. The national histories are at best sketchy and at worst entirely misleading, featuring some dubious spelling and some selective choice of facts.

World Atlas is better used as a stimulus for research than as a reliable work of reference. And it comes on two disks, which means if you don't have a second drive you'll be doing an awful lot of disk-swopping.

MYPAINT
PRISM COMPUTER PRODUCTS £34.95

Or 'My First Paint Program', as it might well have been called. This is an excellent little paint program, presented using large, friendly, colourful icons. Basic drawing functions are thin or thick lines from a palette of 12 colours, fill, symmetrical drawing, palette cycle, a rainbow brush, undo and clear screen. A special feature is the host of line drawings that can be loaded in from disk. These can appear as a 'surprise' picture, slowly revealed as the user paints over the screen, or can just be slung on screen ready to be coloured in. Each is accompanied by an excellent sound sample – the song of the whale is particularly impressive to listen to!

Paint packages are notoriously good starting-points for kid computerists – they help develop mouse control, disk usage, icon systems and the like in a very friendly way, while having just as much 'fun' appeal as a piece of paper and crayons. *MyPaint* is an excellent product all round: it manages to be a 'kiddy' program that delivers the ease of use, the interest and the entertainment a kiddy version should have. The only problem is that a 12-colour paint package is never quite as flexible as using real paint, or as physically enjoyable as splashing paint around. Still, this is good, clean, creative fun and the program is very well constructed indeed.

ANSWER BACK JUNIOR QUIZ AND SENIOR QUIZ
Kosmos Software £19.95 each

Quizzes are always popular, nowhere more so than on a computer where they have educational as well as entertainment value. The Junior quiz is aimed at 6-11 year olds, whereas the Senior quiz is a bit trickier (12 years and up) and there is a total of 15 quizzes on each.

You get a choice of question formats – multiple choice, true or false, complete the answer – and you can have an assortment of each. Quizzes can be completed in sequence (starting and ending at certain questions), but a random selection is more fun.

Both programs offers you the chance to play a subgame after answering a question correctly. The Junior version gives you the chance to save a damsel in distress from a fire-breathing dragon by dropping a brick on its nose fromThe senior version is a more conventional 'shoot the UFO down with lasers'. They're not terribly hot games but they do make the puzzles less monotonous. If you want you can change the questions, making up your own quizzes. This is quite useful as one of them is now outdated on the Senior version: George Stephenson is now on the back of a fiver, not the Duke of Wellington. New quizzes can be saved onto disk and quizzes from either version can be freely interchanged.

PROF PLAYS A NEW GAME
Prisma Software £29.99

This is part one of the "Play and Read" series. It has a modest goal – to teach a child a simple vocabulary of 63 words. The way it goes about this task is a bit complicated, so I hope you're sitting comfortably...

First off, you have to get the pupil to listen to the included audio tape, recorded by Patricia Hayes. Then there's a game of five sections that is played on the Amiga. All that's required is to guide a little red man around a few boxes onscreen, using a joystick and/or the keyboard. He has to match words, which means running up to it, pressing the spacebar, and then finding the duplicate which is somewhere else on the screen. The Amiga tells the player what this strange word sounds like when it is found.

Once each game section is complete, whoever played the game should know all the words used in the relevant picture book which are all included in the box. The first three books each teach nine words, whereas the last two will hammer in 18 new ones.

If your child doesn't show much enthusiasm for reading, then this particular piece of educational software could give them that spur – but only if you're willing to put the hours in too.

LET'S SPELL AT HOME
LET'S SPELL AT THE SHOPS
Soft Stuff £19.95 each

Designed to help young children with their spelling. Interestingly they're for children between the ages of four and nine, which is quite a gap as far as spelling is concerned. Depending on the location the Amiga kicks off with a picture of all the places you can visit. So, down at the shops you can visit a DIY store, a clothes shop, a traditional toymaker's or a greengrocer.

You move the figure of a girl to the relevant place, and the view turns to the inside. Once inside, you can select different objects laid about the shop. Apart from a magnified view of the object two teddy bears and a teddy's face are displayed, along with an alphabet. If the child isn't very good at spelling, clicking on the small teddy will switch to simple mode.

The word for the object is displayed, and the child has to select the right letters. If a letter is correct, then it will be filled in. So, the child will gradually pick up what the word is for each object.

Clicking on the big teddy will mean that the pupil has to guess the word in full. To help them, pressing the nose of the big teddy will display the word. Another help option is a thermometer. This can be switched on or off, and when on will tell children if they're hot or cold when selecting the next letter.

One nice thing about the series is that they're integrated. If the child gets bored of looking round the shops, by putting in a disk from one of the others in the series they can go straight to the relevant scenario without having to reboot the Amiga. Nice touch.

This system is really just a computerized version of a coloured, illustrated spelling book. Based on a principle like that, it should be a real winner. The ability to cope with children who don't know a lot about the alphabet is another well thought-out aspect of it.

It has to be said that the onscreen help is difficult even for an adult to understand. You'll have to spend some time with the child getting them used to how the system works. Once they've learned that, there's quite a lot of exploration to do. If there's one thing to motivate children, it's finding out something new for themselves.

THINGS TO DO WITH WORDS
Soft Stuff £19.95

Rather than depend on the usual "What is a baby hare called?", this program tries to get young children thinking about how to break sentences down into their meanings. Three totally different games are included.

Anagrams takes a list of normal word, picks one at random and displays it as an anagram. Using the mouse to select words from an onscreen alphabet, the pupil has to work out the anagram.

Sentences works on similar principles. A sentence is jumbled up onscreen, and the idea is to select the words computer takes pity and puts everything into the correct order. The third game, *Word Hunt,* is a favourite. First, a word is selected from a list. After that, you have to make up as many words as you can out of the letters that made up the original word. It's not as easy as it sounds, but the computer will display all the possibilities, highlighting the ones you couldn't work out.

The way that the programs try to help you out is noteworthy, and the ideas behind the product are well implemented – everything is designed to get your child to think about written English, rather than learning by rote.

THINGS TO DO WITH NUMBERS
Soft Stuff £19.95

A short compilation of three programs designed to help children get better acquainted with numeracy.

Time Teller helps children to practice their knowledge of the 24-hour clock system. A standard clock face is displayed with a time on it. The pupil has to enter the time in 24-hour format on a calculator-type keypad using the mouse.

Train Fill involves putting the right number of passengers on a train. The correct number of passengers is displayed, and then you have to build up the train to that level. The difficult part is that you're only allowed to use certain numbers of passengers. For example, you might need to make a train of 33 travellers using blocks of four and three.

Book Search is more of a guessing game than real education. A grid of books is put up on the screen. From the bottom left corner, movement is possible a given number of steps to the right and up. Once there you can look for an errant bookworm who's hiding somewhere on the grid. If you're wondering just what you're looking for, the answer is a bookworm. Obvious really.

To help guide you, a thermometer is placed on the right of the screen, and it shows whether the guess is cold, warm or hot. When the correct hiding place is found, it overheats and explodes less than dramatically.

A child could probably get more useful skills from playing Battleships with pen, paper and a friend than from this lot. I can't deny that there must be some people it can't help, but the audience is surely much smaller than for many pieces of educational software.

Suppliers

These are the people to contact for the software mentioned here. Kosmos Software, Dunstable: 0525 3942. Prisma Software, Chester: 0244 326244. Soft Stuff, Tonbridge, Kent: 0732 351234. All the other programs reviewed here are available at the prices quoted from ESP, 32a Southchurch Rd, Southend-on Sea, Essex SS1 2ND, tel 0702 600557. ESP also produce a catalogue with details of around 50 educational programs that they supply. ■

Multimedia

Multimedia is currently one of the major buzzwords in computing. It promises to take computers into a new age where we all really are using computers every day, for everything from doing the shopping to learning foreign languages. Commodore's new CDTV is a step in the direction of Multimedia. Here we explain exactly what this complex term involves and how Amiga owners can get a jump on the future.

Certainly, the words 'Multimedia' and 'Hypermedia' are fast becoming the buzzwords of computing in the Nineties. Less clear, however, is exactly what these phrases mean. These couple of pages of this book are intended to give a brief run-down of the principles of multimedia so you know what to look out for in the future and also to show that the Amiga is already well-placed to take advantage of this new concept. Indeed, there are already several Amiga systems in use that could be described as multimedia applications and there are already several packages available which will help you to write multimedia applications on your own machine.

But let's start by attempting to define the term multimedia itself. The derivation of the word is fairly straightforward. A 'medium' (plural 'media') is a means by which something can be achieved, stored, displayed or transmitted – hence magnetic disks and tapes are media to computer users, watercolour and inks on paper are media to an artist and newspapers, magazines, radio and television are media to almost everyone. 'Multi', of course, means 'many', as in multi-coloured or multiple. So we have simply 'many media'.

The media available to a computer user these days are, of course, many and varied, and all are available to Amiga owners. They include such storage media as data from magnetic floppy and hard disks, data from optical disks or compact disc, videotape input, music and sound from both audio inputs and MIDI. They also include such display media as text, titling, graphics and internally synthesised or sampled sound. That's a whole lot of different ways of storing and displaying information.

Here comes the crux. Currently, these media tend to act independently of each other and are handled in different ways by different applications. Databases are used simply to store raw information. Graphics programs are used to make and perhaps print out pretty pictures. Word processors are used to handle words. Only a few specialist areas use MIDI music or video and these are mostly concerned with the computer's ability to help out the video or music, not the other way round.

Multimedia, by contrast, suggests the idea of using all these different areas of the computer together and harnessing them to produce a whole new attitude to producing applications. Multimedia would combine them all – so that if you wanted to find out about something you could be shown detailed computer graphics, or perhaps even video footage, of the subject, combined with music or sound effects to complement the subject and text on-screen or a commentary in digitised speech to tell you all about it. At this level, it's a kind of a cross between a book and a television programme.

There is also, however, another concept implicit in the idea of multimedia that takes it a step further than this – the concept of the user interacting with the computer in a way that you can't possibly when you are reading a book or watching television. This has to do with

the way computer interfaces have developed, from the original 'command line' idea where you had to type in instructions to get anything done, through the more advanced 'WIMP' systems that were much simpler to use because everything you needed to do was presented for you in graphic form on-screen. WIMP systems are still guided by the need to run old-fashioned single-use applications, but the next stage will be different. Complex menus will no longer be needed – everything will be handled by on-screen displays, mostly just pictures and words. The user will click on the word or picture that guides him to what he needs to know either with a mouse or, even more simply, by pressing on a touch-screen.

With this kind of interface in use, the concept of 'interactivity' becomes more clear. A multimedia machine is not a computer as we know it – it is intended mainly to be entirely transparent to the user. The user does not need to have any idea about where the information he needs is stored – he simply navigates his way around the system at will, hopping from subject to subject as the fancy takes him but constantly guided by the machine's prompts, enabling him to get what he needs as quickly and as concisely as possible.

Uses of Multimedia

Amiga multimedia systems are indeed already in use, so a quick look at these might give a better idea of what the whole thing's about. there seem to be two main uses: what is known as 'Point of Sale' information, which is basically guides to what products are available and what their features are, in a shop; and training or information giving, particularly at tourist sites.

One such system is the Ariadne Amiga Authoring Environment, a multi-tasking multimedia development system consisting of software tools, hardware devices and independent programs that runs on Amiga 2000s and integrates graphics, sound and windows. The applications produced so far are used for training purposes at such places as the National Physical Laboratory, British Aerospace, the Immigration Office and GCHQ in Cheltenham. Ariadne are currently working on a system that allows Amiga 2000s equipped with 68020 cards and 40 or 60Megabyte hard drives to use up to nine laser videodisc or VHS/U-Matic video decks.

Another system is Xebec's Discover. This is in use mainly at tourist sites, such as the New Forest and the Museum of Science in Manchester. It makes great use of touch-screen or keypad interfaces to help the user to gain access to the areas about which he wants to know. A typical Discover system is the one at the Royal Britain Museum in the Barbican, London, which combines photographs and computer graphics into a fifteen-minute programme displayed simultaneously on ten monitors.

And for the Future?

A glimpse into the future of multimedia may be provided by the new Commodore CDTV. Although its main name-tag is as an 'Interactive Graphics Player', this might just as well be shorthand for the first ever complete multimedia-based machine. It is no longer, in effect, a computer – the presentation of information to the user has finally taken over in importance from the medium by which it is done. In the words of Commodore it will completely replace books; it "will be used for reference works, special interest areas, surrogate travel, music, entertainment – and once we abandon the high ground it will play one hell of a game." Irving Gould, Commodore's chairman, promised enthusiastically that "This will change forever the way we communicate, learn and entertain – all at an affordable price". So far, it has already been promised to help Derbyshire schoolchildren learn about the Japanese language and culture. Will the CDTV live up to the promises made for it? Well, the only way to find out at the moment is to wait and see!

ULTRACARD - THE AMIGA'S FIRST MULTIMEDIA APPLICATION

***UltraCard*, from Intuitive Technologies, is very much an adaptation of the Mac *HyperCard* system. It allows you to bring together a collection of data within what it calls a 'Stack'. A stack consists of frames (pages) of information that can be linked to other data within the system. The information within a frame may be graphic, audio (Amiga sound samples) and textual. Textual information can be single line or multi-line and include Hyper-Text links. Hyper-Text is one of the most powerful tools of multimedia; any word, phrase or sentence can be linked with any Data in the multimedia system. For example, you could link the word 'Education' with any data within the system associated with education, such as a database of University courses.**

A Typical *UltraCard* stack would consist of one or more screens that contain 'buttons' that are used to access the information within the system. When a button is pressed, it calls a script file to carry out particular tasks using *UltraCard* commands. The language used by *UltraCard* is called UltraTalk, and is basically a BASIC-like mini programming language geared towards information and resource handling. UltraTalk contains the usual loop and decision making constructs, information handling commands plus extra commands designed specifically for hyper-media applications.

When you first create an *UltraCard* Stack, the very first frame that you create is taken as the root of the system – every time you use the system, UltraCard will automatically jump to this first frame. The first thing you will want to do is to add a backdrop to the frame, which can be any standard IFF picture, then add one or more buttons to the frame. These buttons can either be transparent, filled with a graphic or contain the name of the object.

***UltraCard* drives all the necessary input devices by using A-Rexx. As long as the device drivers provided by the hardware manufacturers support the A-Rexx standard, *UltraCard* can take advantage of the device. Costs £39.95.**

Part Two

The Amiga Inside and Out

First Steps

It may be the middle of the book, but if you've never used an Aniga before, this is the place to start. If you're past the beginner stage but still a relative newcomer, you may find it useful to check out the Workbench and CLI pages that follow for an easy guide to the interface. In the meantime, put your feet up and soak in the info...

POWER ON!

The Amiga power supply is, somewhat unusually, in a separate transformer block known bizarrely as the 'brick'. This is handy in some ways, because you can leave it on the floor under your worktop, but awkward as well, because the power switch is on it. Power up, and the first thing that will confront you is a white screen with a picture of a hand holding a disk. Fine, the Amiga's working so far!

First thing you'll realise, if you've not used an Amiga before, is that it will now do nothing at all until you put a disk in. All that has happened so far is that the basics of the operating system have been put into use, checking that all systems are working, providing an output to the monitor and preparing the disk drive to receive a disk. All this has been organised by a chip called Kickstart, whose job is to get the Amiga going.

Since the Amiga was introduced, Kickstart has been updated to work with the latest versions of the operating system. Underneath the hand-holding-disk picture is a number: on all new machines, the number will be 1.3, the latest version of Kickstart. If you have an older machine, the number might be 1.2, in which case you can upgrade to the latest version by having a new Kickstart chip fitted. You can fit your own new chip if you really want to, but it's best to have it done by a qualified person.

Now you are ready to put a disk in the disk drive. Be careful to put it in straight and level: a disk jammed in the drive can be very awkward to fish out!

DISK IN!

You have two choices, here: you will either insert a 'self-booting' disk or the Workbench disk. The process of loading a piece of software from disk into the machine is known as 'booting'. The program is loaded into the 512K of RAM (that's Random Access Memory, the program storage space) that the basic Amiga possesses.

Most games are known as self-booting because when you put the disk in they will load themselves. Supplied on the game disk is something called a 'boot sector' or 'boot block' which starts the game loading and supplies all the bits of the operating system necessary to actually run the disk. The boot block is often where copy protection is hidden: if you can't copy the boot block, you can't load the game. It is also the part of the disk where viruses normally hide themselves.

Most serious software, by contrast, makes use of much more of the Amiga's operating system so the first step is to insert the Workbench disk on which much of the operating system is located. Workbench, like a game, will happily load itself. Remember to wait until the disk drive has stopped whirring away and the green 'drive being accessed' light has gone out before taking out the Workbench disk. You can then put the disk with your software on it into the drive. The disk will appear as an icon (a little picture) with its name underneath.

Generally, if you want to start using a new piece of self-booting software it's a good idea to switch the machine off, put your new disk in, wait about ten seconds for the RAM to clear out and the switch on again. If, however, you need to start up the same piece of software again you can simply leave the disk in and hold down the two [Amiga] keys and [Ctrl] at the same time. This will perform a 'warm reboot' or 'restart'.

VIRUSES

A virus is a program that hides itself on a disk or inside another program and copies itself to other disks. After a certain set of conditions is met, like copying itself 20 times or reaching a certain date, the virus then reveals itself by doing something like wiping the disk clean.

Not all viruses have a terminal effect – some are quite entertaining – but because of the danger they represent they should be avoided at all costs. They go by many different names and have many effects. There are also virus killers available through the public domain or commercially which can remove certain viruses off a disk. However, new ones keep being developed and the only safe way to avoid them is to follow the tips in the DOs and DON'Ts section.

TAKE CONTROL!

The Amiga will only accept digital, rather than analogue, joysticks to play your games with. Suppliers will tell you if the joystick you want is suitable for the Amiga. Easy enough for the gamesplayers: just get on with blasting some aliens!

Those finding their way round Workbench for the first time, however, have more of a task ahead. Though Workbench is vital to get to grips with, it can be a litte confusing because it was put together in a hurry and as a consequence is a little schizophrenic. That is, it has two different ways of operating.

The first is what is known as a WIMP system: Windows, Icons and Pull-down Menus (shouldn't that be WIPDM?). The WIMP system is controlled by the mouse and is very simple and straightforward to use. We won't go into detail here but you'll pick up the general idea in no time: move the mouse pointer around the screen, double-click on icons to make things happen, or pull down a menu at the top of the screen by holding down a button and then release it to make other things happen. As soon as you're used to the mouse and the way windows, icons and menus work, you'll find it a pleasure to use because everything is represented visually.

The dark alter ego of Workbench, on the other hand, is the CLI: the Command Line interface. In your Workbench disk window you will see a small blue icon called 'CLI' or 'Shell'. Double-clicking on this opens up a command window into which you type CLI commands and press [Return] to make them happen. Trouble is you have to remember the commands, spell them correctly, and get all the words in the proper order. This can be a real pain in the bum. Meanwhile, make a start with our basic guide to the Workbench and CLI on the next pages.

Starting in DESKTOP PUBLISHING

Desktop Publishing is best defined in contrast to word-processing. With word processors all you are concerned about is the words, not what they look like when they are printed out: so the printer uses whatever font or typeface it has available, and the result is rather like a typewritten document. The basic aim of DTP, on the other hand, is to imitate proper type-setting as used in professional magazines like this one. The basic tenet of DTP, therefore, is WYSIWYG: What You See (on the screen) Is What You Get (printed out).

DTP packages allow you to set up whatever page size you want – A4, for example – and then lay out your text in a range of different typefaces (or fonts) and sizes wherever you want them to be. What you print out will then be exactly how you want it on the finished page.

Many DTP packages allow you to 'import' graphics: in other words, you can pull in scanned or digitised pictures, or graphics drawn with a paint package, and shove then wherever you want them on the page before printing it out. This is useful, but makes far greater demands on the quality of your printer than text alone.

If you are producing simple posters, newsletters or fanzines, you may get much better results by printing out your 'typeset' text and then simply photocopying photographs, cutting them out and sticking them down: this is very like the old 'cut and paste' methods that all newspapers and magazines used until computers took over. You can do quite large 'print runs' on a photocopier and get remarkably good results this way. The slightly rough-and-ready look is very trendy, too.

The graphic power of the Amiga makes it ideal even for professional DTP work and many organisations use it as a low-cost alternative to the Apple Macintosh. All you need is a DTP program and a printer. Many programs are available, at prices of £100 and up, while printers can be anything from a simple dot matrix at £150 to a hi-tech laser printer at several thousand pounds. Most people will be happy with a simple set-up, although a colour printer can improve things considerably. A more professional set-up will require an A2000, hard disk, laser printer, colour scanner and extra memory.

However, even with an A500 and a dot matrix printer, impressive results can be obtained for producing press releases, newsletters, fanzines, etc. DTP can even be done using art packages, although most are not equipped with sophisticated text handling facilities. *DPaint II*, for example, can handle text perfectly well to produce posters and the like.

For more information on getting started in DTP see Pages 19-22 of this book.

Starting in SOUND AND MUSIC

The Amiga has a very powerful built-in sound chip that can produce impressive stereo music and sound effects. When it is hooked up to an amplifier and speakers the sound can be quite outstanding. There are three main aspects to Amiga sound and music.

Your first encounter with the soundchip (called, incidentally, Paula) is likely to be through games music. This is a fine example of the first kind of music-making which is known as 'internal chip programming' because it consists simply of using the Amiga's internal soundchip to produce music. There are plenty of programs available to let you write music using only your Amiga: *Music Studio* from Activision or *Instant Music* from Electronic Arts are good starters.

LEGAL EAGLE

Make sure you stay on the right side of the law and don't get conned by remembering these points.

1. Copying and distributing commercial software, even if it's just one copy to a friend, is illegal. Some software is unprotected and allows you to make back-up copies but those are purely for personal use.

2. The only software that can be freely distributed is public domain or shareware: see the section on public domain for more on this.

3. If you want to copyright a program, all you have to do is put a copyright message in the code somewhere.However, in order to prove copyright in a court of law you will need more than that. The safest method is to leave a copy with a solicitor: that way you have proof of when you first created the program. Slightly easier is to post a copy of the program to yourself recorded delivery and leave it sealed. If in doubt, go with the solicitor.

4. Most serious software comes with a licensing agreement that means you can only run it on one machine. In other words, if you are in an office with several Amigas you can't make several back-ups of a word processor, database or whatever, but have to buy a copy for each machine you are using it on.

Another example of using the Amiga's soundchip on its own is the speech synthesiser on your Workbench 1.3 Extras disk. With this installed, you can use the command 'say' from the CLI to make the Amiga speak whatever you type in.

The second musical capacity involves buying a MIDI interface, a little piece of hardware that costs around £30 and plugs into the back of the Amiga. With one of these, your Amiga can talk 'MIDI', a universal language for all electronic instruments, and so can control one or more synthesisers. There are then two kinds of software that can come in handy: 'patch editors', with which you can mess about with the sounds your synth produces, and 'sequencers', which allow you to write whole tunes (tunes are just 'sequences' of notes, you see) and play them back through the synth. Sequencing is responsible for the sound of much modern pop music: particularly of the Stock, Aitken and Waterman kind.

The third kind of sound manipulation is sampling. Samplers are usually a combination of a piece of hardware that plugs in to the Amiga and some software to control it. Using any sound source, such as a cassette player, a CD, a video recorder or a microphone you play sound into the sampler: the sampler then slices the sound up into digital information and stores it as a file. This sample can then be played back through the Amiga's soundchip. Bits of samples can be incorporated into music, the technique that has made Acid House such a success.

A whole sub-culture has sprung up around the Amiga's power to manipulate sound and graphics, in the form of demos. These combine the best music and graphic effects to make entertaining rolling demos that are circulated on the PD scene.

For more information on getting started in music see Pages 35-40 of this book.

Starting in DESKTOP VIDEO

The Amiga is a very talented machine at combining video images with its startlingly good computer graphics. In order to do this there are two crucial additional items required: a genlock and some titling software.

A genlock is a hardware device that enables the graphics to be overlaid onto video images. The software is a mix of standard art and DTP programs that allow the creation of complicated graphics and text. The software and genlock can be bought for as little as £100 each, but more expensive and professional options are available.

The idea is to take a raw video – your family holidays, perhaps – and add intro sequences, flashy ccomputer graphics and titles to make it look like a professional TV program. You can also edit together video sources to have a number of different things running on-screen at the same time: great for home-made pop videos.

Even with a basic set up you can produce amazing videos and with top-of-the-range software and genlock the Amiga can produce broadcast quality graphics, and is already used by many companies doing video and television work. For more information on getting started in video see Pages 53-6 of this book.

DOs AND DON'Ts

1. DON'T plug anything in or unplug anything while the Amiga is switched on. That means joysticks, mice, disk drives, printers etc. You may be able to do it safely any number of times, but there is always the risk of having a static spark blow one of the chips.

2. DON'T worry about harming the Amiga by playing around with any software – software cannot damage hardware.

3. DO switch the power off at the power supply and leave it off for 10 seconds before booting up a new program. This prevents the spread of viruses that can damage disks.

4. DO write protect disks wherever possible because this too reduces the risk from viruses.

5. DON'T leave disks near to strong magnetic sources (monitors, TVs, speakers etc) as this may corrupt the disk.

6. DO back-up disks where possible in case the original gets corrupted.

7. DON'T turn the Amiga off or eject a disk while it is still being accessed, signified by the green light on the right of the keyboard on an A500 and by lights on the drive of the A2000 and external drives.

Starting in GRAPHICS

The most basic form of graphics software is the plain, simple paint package. These work simply by manipulating the 'bitmap', which is the graph in the Amiga's memory that maps out where every pixel is on the screen and what colour it is. The leader of the pack by a long way is *Deluxe Paint III,* with which you can not only paint and draw on screen, but also animate your pictures, moving them about the screen in much the same way as sprites in a game. Also in the straightforward paint category are *Photon Paint 2* and *DigiPaint 3,* both of which work with a weird Amiga feature called HAM to allow 4,096 colours on screen, which means you can achieve very natural non-computer-like tones.

Next step up are the CAD packages, which use vector graphics to produce line-drawings. Big advantage here is that they can be created as 3D images and rotated to view all sides, much like a professional technical designer's kit.

Top of the bunch are the ray-tracing packages, which use complex mathematical techniques to calculate real 3D images and work out the way light is reflected or absorbed by surfaces. These give incredibly realistic animations: you may have seen the silver spheres bouncing against a chess board image which has ecome almost a cliche of ray-tracing. Highly recommended is *Sculpt-Animate 4D.*

For more information on getting started in graphics see Pages 23-28 of this book.

Starting in COMMS

First step here is to buy a modem, a piece of hardware that costs only a couple of tenners. One end plugs into your Amiga, the other end into a standard telephone socket. Then get some comms software: much good stuff can be found in the Public Domain libraries, particularly *Access!*

A program like *Access!* is also useful for transferring data from one machine to another, but its main purpose is to phone up Bulletin Boards. Many of these are just

computers hooked up to a phone line, but the main ones are large profit-making organisations. Usually you are given a free-of-charge but restricted access untill you join. Most charge a fee to join the board, after which you can read news and information, chat to other board users and even copy programs and graphics onto your computer: all from the comfort of your own armchair! Everything is typed in via your Amiga: even the phone numbers, which the modem dials for you.

For more information on getting started in comms see Pages 91-94 of this book.

GAMES YOU MUST HAVE!

Now you have the machine, whether you want it to be a business workhorse or an art tool, the time will come when you actually want to play a game. But with so many out there, how do you know which to go for? Simple, read the following guide!

SHOOT-EM-UP – Several to choose from, but for the familiar spaceship type, you could do a lot worse than *Denaris* from Rainbow Arts or *Xenon II* from Mirrorsoft.

ADVENTURE – Text adventures are always popular and a fine example of the genre is *Fish* from Rainbird. But even better and more user friendly is *Journey* from Infocom.

ARCADE CONVERSION – Some excellent ones here, but most will be covered under other headings. *Strider* from US Gold is well worth a look at, as are *Ghouls 'n' Ghosts*, also from US Gold, *New Zealand Story* from Ocean and especially *Rainbow Islands*.

DRIVING SIMULATION – *Power Drift* from Activision is a cracking buggy-driving game, and *Chase HQ* ranks up with the top few. Both of those are arcade conversions, though, so if you're after an original driving sim, *Stunt Car Racer* from MicroProse reigns supreme.

FLIGHT SIMULATION – Tipped as the best of the bunch by an RAF pilot on a recent visit to the *Amiga Format* offices is Digital Integration's *F-16 Combat Pilot*.

MOTORBIKE SIMULATION – MicroProse's *RVF Honda* is a corker of a game, as is Activision's *Super Hang-On*.

COMBAT FLIGHT SIM – Digital Integration's *F-16* could easily qualify here, but for less realism and more action, go for Electronic Arts' *Interceptor*.

FOOTBALL SIMULATION – *Kick Off* from Anco is, without a shadow of a doubt, the top of the first division.

FILM CONVERSION – *Robocop* or *Batman The Movie*, both from Ocean, are the best for some while.

ROLE-PLAYING GAME – *Bard's Tale III* from Electronic Arts is a goody, but if you've got a 1 Meg machine, *Dungeon Master* from Mirrorsoft is by far the best.

HELICOPTER SIMULATION – *Gunship* from MicroProse is the best yet to appear.

ARCADE ADVENTURE – Puzzle-solving games, usually joystick controlled. *Kult* from Infogrames is one of the best of this type.

SPACE GAMES – The epic is *Elite* from Firebird, combining shoot-em-up with trading skills – an all time classic.

WARGAMES – Top of the heavy duty league are *Waterloo* from Mirrorsoft and *Red Lightning* from US Gold, while *Laser Squad* from Blade is much more suited to the novice.

OTHERS – Games too unclassifiable but still worth a place in anyone's library include: *Sim City* from Infogrames, which is a highly enjoyable city building simulation; *Balance of Power* from Mindscape, which is a very involving study of global politics; *Populous* from Electronic Arts allows the player to adopt a deity's persona and cultivate his followers; *Nebulus* from Hewson is a simple but incredibly playable platform game; and *The Sentinel* from Firebird is an all-time classic that combines quick reactions with some very tactical thinking. Last, but by no means least, is *Virus* from Firebird which is a bizarre kind of shoot-em-up needing precise control.

WHERE TO GET HELP

1. If the machine breaks down while still under guarantee then return it to the dealer you bought it from: you did fill in the guarantee card, didn't you?

2. If software you have purchased is in any way defective despite your having followed all of the manufacturer's precautions, then return it to the manufacturer to be replaced.

3. If something about the machine is troubling you and the manual has no explanation, consult your dealer. If you're still troubled, contact Commodore Technical Support on 0628 770088.

4. For more informal helpand advice scour the small ads of the computer press for the address of your local Amiga User's Group – they're always willing to do a body a good turn.

The Chips: Inside the Amiga

So often we hear that the Amiga is a superior machine because of its superior hardware design. The 'architecture', we are frequently assured, is vastly different from that of other machines, and explains the Amiga's advanced features. But despite these throwaway comment, nobody ever quite explains what the whole thing's about. So this is a brief run-through of exactly what all that hardware is there for.

The 'architecture' of a machine describes the physical way the various chips and components are arranged on the printed circuit board. The PCB, essentially, *is* the computer: all the other stuff that goes up to make an Amiga is simply a disk drive unit, a keyboard and a load of plastic for the casing. Architecture also implies a conceptual view of the way in which the various components combine to control the way in which the computer works.

So why is the Amiga's architecture superior? Well, basically the difference lies in the use of custom chips. Your ordinary, run-of-the-mill computer depends almost entirely for its function on the Central Processing Unit, or CPU. The Atari ST, for instance, uses the same CPU as the Amiga, but the ST has no custom chips.

The CPU is the main chip that handles all the processing of information: it is also the chip that defines a computer as 16-bit, 8-bit or whatever. These bit numbers descibe the size of the 'data bus', which is the vital holding area through which all information must pass when a program is running.

The size of the bus and the speed at which information can be passed through it define the speed of operation of the computer. The more things the computer is asked to do, the more tasks need to share processor time: and the more the whole business slows down. This is the big problem with multi-tasking: different tasks, although they appear to be running concurrently, actually have to take turns to use processor time.

The Amiga, as you will shortly discover, does not rely entirely on the CPU: so it doesn't suffer from all the attendant problems. The independent functioning of the Amiga's unique custom chips takes much of the weight off the CPU and allows more speed and power to be applied to graphics and sound. It also frees the CPU to take on the challenge of multi-tasking, unique in a home computer. A remarkable performance by the young machine from California.

If you wish to learn more about the Amiga hardware, try these books: Abacus's 'Amiga System Programmer's Guide', Ariadne's 'Kickstart Guide to the Amiga' or Addison-Wesley's 'Amiga Hardware Reference Manual'.

CPU: MOTOROLA 68000

The Amiga uses exactly the same 16-bit chip as the Atari ST and the Apple Macintosh, the 7.16MHz 68000 chip, first released in 1979. This is one of the best 16-bit chips because it has a very good instruction set (the set of commands used to program it via a programming language). The difference between the ST and the Amiga, however, is that the dear old Amiga does not depend on the 68000 to do all the work. Instead, it employs a set of custom chips known collectively as 'The PAD': Paula, Agnus and Denise. The custom chips are allowed to ignore the CPU completely, performing their own operations and accessing memory directly.

AGNUS

Agnus is the big boss chip of the PAD custom set. Although all three of these chips work together, each has its own independent tasks. A major key to this is the concept of direct memory access, DMA, which means that for their own allotted tasks these chips can go straight to the RAM chips to get information and so avoid using CPU time.

All three custom chips are constructed using VLSI technology. Standing for very large scale integration, this concept means that each chip (any chip is an 'integrated circuit') has many more separate pieces in its construction than is normal. So they are very carefully tailored to the tasks they are meant to perform.

Agnus is home to the blitter. Blitter stands for Block Image Transferrer, now being rephrased 'blimmer' by Commodore to mean Block Image Manipulator, or even 'bimmer' for Bitmap Image Manipulator. It is responsible for a whole wealth of graphics and display functions. It has three inputs (channels A, B and C) and one output (channel D), so it can do such clever things as take inputs of a graphic object, a mask and a screen background and output the bitmap which represents the actual display on-screen resulting from these.

The blitter can move a 16-bit chunk into memory every 280 nanoseconds, which is really pretty rapid. It has 256 logic instructions all of its own: and is also directly responsible for line drawing and solid fills. It is capable of drawing nearly 4,000 lines every second. Agnus and the blitter are also responsible for reading information from disk into memory. This is done a track at a time, starting from any point where the disk heads happen to be, sorting it all out into a sensible order afterwards. Again, this is a DMA function so uses up no processor time at all.

Agnus also includes the copper, a simple graphics co-processor with its own three commands, which basically monitors the functioning of the screen display (actually watching where the phosphor dot is which draws the screen). In this way it can handle such weird displays as split-screen, which is particularly handy for the pull-down screen capacity of multi-tasking.

DENISE

Custom chip Denise's specific responsibilities are to control the major functions of screen display. It converts bitplane information into an actual screen display. Denise is responsible for the 4096-colour capability of the Amiga and also controls the mouse and handles hardware sprites. The mouse pointer is a good example of a hardware sprite, but these types of sprite are often used in games. Denise also provides for such features as collision detection in games.

PAULA

In much the same way as Denise controls the physical realisation of screen display, Paula is in charge of the creation and the output of sound. It features a full nine octaves over four voices of sound, configured as two stereo chanels, and also includes the D-to-A (Digital-to-Analogue) converter that builds an audio output into analogue impulses that the speakers can handle. Internally, sound information is handled entirely digitally: it is built up from wave-forms stored in memory. Both amplitude and frequency modulation are supported. This digital wave-form technique is what gives the Amiga its masive sound sampling and manipulation abilities.

GARY

The function of the other named chip is not so dramatic, but no less important. Gary is a contraction of 'Gate Array': it monitors interfaces, handling the movement of data to peripherals such as a Bridgeboard.

Workbench and the CLI

The Amiga is a bit of a strange machine and can take a bit of getting used to, because unlike most computers it has two kinds of interface. The interface, incidentally, is the bit that allows you to actually make use of it. Most users are familiar with the Workbench – this is a modern 'WIMP' interface (Windows, Icons and Pull-down Menus) which is very easy to use. The less-used interface is the CLI, the Command Line Interface, which follows a more antique pattern as used in PCs - all commands to make it work are typed in. If you don't use the CLI, however, you are missing out because it is very powerful indeed. What follows is a guide to the CLI to get you using it and a guide to all the obscure parts of Workbench so you can use those, too.

Let's start at the very beginning, as Julie Andrews once said. When you turn on your Amiga, the first thing that happens is the very basics of the operating system are loaded in from a chip called the Kickstart ROM. This gets the disk drive ready to load stuff into the computer from whatever disk you put in. It also displays the hand-holding-a-disk icon if you don't put a disk in straight away to show that it is ready.

If you put in the Workbench disk, it checks the 'boot block', which is at the start of the disk, and then follows the instructions in the start-up sequence of the disk. Somewhere in that start-up sequence is an instruction that says LOADWB, which loads in the Workbench from the disk. You can actually edit the start-up to remove that instruction, or you can hold down the Control key and press D repeatedly to break it off half-way through loading: either way, you will be plunged straight into the CLI rather than Workbench. Or you can do it the easy way and simply double-click on the 'CLI' or 'Shell' icon in the System drawer of your Workbench disk.

Now you are in the Command Line Interface. What do you do from here? Well, first of all remember that many people never touch the CLI because it is seen to be far too difficult. This is totally untrue. If you use it the smart way it can be quite simple to use as well as being incredibly powerful. It does require a slight discipline, because each command must be correctly typed withoot anig mistooks and file 'paths' must be correct.

1 Get the latest Workbench

For the purposes of this piece, we'll assume you're using the latest version of Workbench, number 1.3. This number will be on the label of the Workbench disk you are using: it will also be on the hand-holding-disk picture that the Amiga boots up with, because to use Workbench 1.3 you have to have Kickstart 1.3 fitted. If not, it's a good idea to get this put in: any dealer can do it for you for about £40. Workbench 1.3 is the one to use simply because it is more error-free and has extra features.

2 Correcting your mistakes

Some CLI commands can be quite long, so if you're not a good typist it can take a while to type each one in. This makes it even more annoying if you make a little mistake and it doesn't do what you asked it to, telling you 'Bad arguments' or 'Command COD unknown', so that you have to type in the whole thing again. If this happens, look to the cursor keys.

Pressing the up arrow will repeat the last line you typed in, so you can whizz back through the line to correct your mistake. Remember too that you do not have to send the cursor to the end of the line before banging Return to make the machine get on with its business. On top of this, if you press the up arrow repeatedly it will cycle back through all the commands you have typed since you opened the CLI, so you can re-use any of them without more typing.

3 CD = Change Directory

One of the most-used CLI commands is CD. This changes the directory in which you are currently working. For instance, CD df0: will set you up to work in the top directory of the disk in drive zero, the internal drive. The first directory you CD to must always be followed by a colon. CD df0:files will set you up for a directory called files on the disk in drive zero. This is the second directory down, so you don't need a colon. Going any further, you will need to put a backslash in, as in the example of CD df0:files/text.

Remember that if you've just done a CD df0: then you only have to do a CD files: to set yourself to work in files. Remember also that if you are already several directories down from the top - in df0:files, for instance - you will have to go right back through the list to get to any directories that are not within the directory you are working in already. It's a kind of tree structure. All this is very easy to get used to after a little practice.

4 DIR = A list of what's in the Directory

The DIR command allows you to see what's in the directory you've just CDed to. The list that is produced will include both files and other directories.

5 DELETE

This CLI command simply deletes the file name you specify. You can either specify the whole path first, as DELETE df0:files/text/unwantedfile, or you can CD to the point you want then type just DELETE unwantedfile.

You can also delete a whole heap of files at the same time simply by putting in all the filenames, as in DELETE file1 file2 file3 file4. If you haven't CDed to the directory these files are in, however, you will have to specify the whole path name for each filename, as in DELETE df0:file1 df0:file2 df0:file3.

6 QUIET = Don't tell me about it!

You will find if you delete a whole bunch of files together, as in the last example, the CLI will tell you what it is doing as it goes along: file1...deleted file2...deleted and so on. If you don't want this to happen, you can use the extra parameter QUIET, as in DELETE file1 file2 file 3 QUIET. This also applies to other commands which you can use on lots of files at the same time, such as COPY (below).

7 RENAME

If you want to change the name of a file you can simply type in RENAME oldfilename newfilename. It might make things easier, if you wish, to use the extra parameter TO in there as well: RENAME oldfilename TO newfilename.

8 COPY

More or less obviously, this copies a file. There are two different variables you can use with this one. You can copy the file and rename it at the same time, in which case you could, if you wanted, leave the copy in the same directory: COPY df0:originalfile df0:copyoffile. Or, on the other hand, you can copy it to a different directory or disk drive, in which case you have the choice of renaming it or not: COPY df0:oldfile df1: or COPY df0:oldfile df1:newfile. Again, if you wish you can use TO to make things clearer: COPY df0:file TO df1:newfile.

9 INFO = Tell me about the disks

If you just type in INFO the CLI will tell you how much space is used or free on disks in all drives attached.

10 LIST = Tell me about the file

If you type in LIST the CLI will tell you about the status of the directory or file you specify. Things to notice here are the flags RWED standing for Read, Write Execute and Delete. You can stop a file from being deleted, for instance, by setting it without a D flag as follows...

11 PROTECT = Make undeletable

If you want to prevent an important file from being deleted you can PROTECT filename.

12 TYPE = Display a text file

If you want to read the contents of a text file on screen simply enter TYPE filename. The file will be displayed scrolling up the screen: press the Space bar to pause it and the Backspace key to carry on.

13 Being Choosy

Supposing you had a disk with twelve files on, six of which were called sheep1 to sheep6 and six of which were called goat1 to goat6. You can choose to delete (or do anything else to) just the goat files, for instance. You use the signs #? to replace the variable bit of the filename - in this case, just the numbers 1 to 6 - as follows: DELETE goat#? will delete all the files with goat in the name. You can replace as many of the letters in a filename as you want - in this case, simply DELETE g#? would do - but be careful.

14 Stopping it in mid-flow

If you decide you want to stop the CLI from doing something it has already started on, you can hold down the Control key and press C. It will BREAK off at once.

15 Running Programs from CLI

To run a program, you only have to enter its name.

16 File names with spaces in

You can quite happily use file names with spaces in: the only problem is that the CLI might think the name is several separate words, so you must enclose the filename in double quotes every time you use it.

17 DISKDOCTOR

How often have you put a valued disk in the drive only to see the dreaded message, "Disk is not readable - use DISKDOCTOR"? All you have to do is type DISKDOCTOR df0: and put the sick disk into the internal drive. The machine will do the rest. DiskDoctor is incredibly good, but it can only be used from the CLI.

What's On Your Workbench Disk

EXPANSION

The more important drawers (System Prefs, Utils) will be looked at later, but less important to most people is the Expansion drawer. The drawer contains specialist device drivers for add-ons such as touch tablets etc. Unless you intend splashing out on such luxuries, the chances are you'll never use this directory.

TRASHCAN

A bit of a lost soul on the Amiga. On other WIMP systems, the trashcan is completely independent of any disks that are current in the drives, and is used to quickly discard files. The Amiga trashcan, however, is just another directory like any other and is used as a temporary storage area for files that you wish to eventually discard. Unfortunately, like other directories, any files within the trashcan will still take up valuable disk space, therefore making its use rather long-winded. Just try asking experienced Amiga owners when they last used the trashcan!

SYSTEM

Of all the subdirectories that branch off from the Workbench root directory, the System drawer is without doubt the most important of them all. Here's a rundown of the programs you're likely to find:

CLI - The Command Line Interface is a little like using a machine such as an IBM PC, where instead of pointing and clicking on icons using the mouse, all commands are issued by typing them in manually using the keyboard.

If you wish to get the very most from the Amiga, a basic understanding of the CLI is a necessity.

DISKCOPY - With a filename as subtle as a sledge hammer, I'm sure I don't need to tell you what this command does. Do I?

FORMAT - Before a disk can be used to store data, it must first be initialised. For this task, the Format program is your person.

FASTMEMFIRST - FastMemFirst attempts to force programs into expansion memory, therefore freeing up valuable chip RAM for data such as graphics, sound samples etc. If you only have 512K, them FastMemFirst will have no effect.

SETMAP - Because of language differences, different countries use different keyboard layouts on equipment such as typewriters and computers ($ instead of £ etc). The SetMap command is used to change the keyboard configuration to any one of several presets available. For UK Amigas, the keyboard configuration is automatically set to 'GB', but this can easily be changed to anything from American (you've got three different US keyboard layouts to choose from!) to Greek.

INITPRINTER - As the name suggests, InitPrinter is used to initialise your printer. This process basically involves reading the printer driver into memory and setting the printer up ready for use.

NOFASTMEM - If you have a RAM expansion in your machine (ie, you've more than 512K of memory), then the NoFastMem command is used to disable this. This is necessary with some very old (or badly written) software that will not function correctly if more than 512K of memory is resident.

MERGEMEM - MergeMem is of use to users who have multiple RAM expansion boards connected to their Amigas. The program attempts to pull all free memory available across various RAM boards together into one, continuous 'memory pool'. Definitely one best left for the techies.

FIXFONTS - Adding or removing a point size for a particular font isn't just a case of copying the new font data directly into the Workbench fonts directory: the font's header file (.font) must be informed of the change. This is where FixFonts comes in. FixFonts will check all available point sizes for all the available fonts, and make any necessary modifications to the font header file.

UTILITIES

The Utilites drawer contains a whole host of useful little utilities to make the life of an Amiga user much simpler. Most are new additions to the Amiga Workbench, and are designed to provide greater control over the system for the Workbench user who doesn't want to resort to using the CLI.

NOTEPAD - what's the first piece of software you'll be buying for your new Amiga? A word processor perhaps? NotePad is a mini word processor to keep you going until your fully-fledged word processor arrives. NotePad allows multiple fonts onscreen, full cut, paste and copy as well as search and replace.

MORE - display the contents of any text file with More, a powerful text display utility.

CLOCK - Check the time without looking at your watch.

CLOCKPTR - Even more convenient than an onscreen clock, ClockPtr attaches a digital clock display to your mouse pointer.

SAY - You've probably already discovered the Amiga's powerful speech synthesis capabilities. Say can be used either to read out existing text files, or just as a fun toy to allow you to experiment with this powerful facility.

CALCULATOR - In true multi-tasking style, the Workbench calculator will happily run alongside any program that operates from the Workbench.

CMD - CMD is a powerful little tool that allows you to redirect output to either the serial or parallel port to a designated disk file. This allows you to print things out while your printer is off-line: when you are ready to finally print, the outputted file that is stored away can then be sent straight to the printer.

GRAPHICDUMP - GraphicDump attempts to dump the frontmost screen to the printer. To give you time to bring the desired screen to the front, GraphicDump will wait 10 seconds before it starts to print.

PRINTFILES - Want to take a hard copy of a text file? If so, then PrintFiles is the tool for the job.

INSTALLPRINTER - Guess what this program does! Surprisingly, the answer isn't as obvious as it may seem. What InstallPrinter actually does is to copy printer drivers on your Extras disks across to the Workbench disk. Once copied, you must then use the Workbench Preferences tool to select the driver to be used.

PREFS

Although the Prefs drawer appears to contain five separate programs, strictly speaking, only two exist: Preferences and CopyPrefs. The remaining three icons (Pointer, Printer, Serial) merely call separate parts of the main Preferences program. Read on for more...

PREFERENCES - The Preferences program is one of the most important programs on the Workbench disk and one of the most fun. Its sole role in life is to allow you to customise your Workbench to your heart's delight. Once any changes are made, the new configuration can be stored for recall whenever the Amiga is rebooted from the Workbench disk.

The program is made up of four separate sections. The first page pops up as soon as the Preferences program is run. From this top page, the general configuration of the Workbench (colours, screen positioning, text size etc) can be changed.

Next up, and probably most important of all the pages, are the printer configuration pages which are used to install your printer onto the Amiga system. Printers may be connected to either the parallel or serial ports, therefore Preferences also includes a serial port setup page. Baud rates, handshake type, stop bits and other techie things that only comms users understand can be easily set.

Most fun of all is the mouse pointer editor which, as the name suggests, allows you to change the general appearance and colour of the mouse pointer sprite. The sprite will not take on its new form until you exit back to the main Preferences page.

COPYPREFS - CopyPrefs is used by people who have assigned the logical path where the preferences configuration file is stored, to something other than the standard boot disk. Clicking on CopyPrefs will transfer the configuration file to the 'DEVS' directory of the disk currently inserted in the internal drive.

THE BITS THAT YOU CAN'T SEE

The Workbench disk also contains all those important little files that actually make the Workbench work. Most are simply auxiliary files used by the Amiga system, but for the curious among you here's a list of those hidden extras only visible from the CLI.

DEVS - Short for devices, the DEVS directory contains O/S device drivers for the parallel and serial ports, printer output, the RAM disk, the Amiga speech synthesiser etc. DEVS also contains two sub directories containing the system keymaps used by the SetMap command and the printer drivers.

LIBS - This directory contains complicated operating system libraries. A library is basically a collection of routines that, once opened, link into the operating system to allow control over a particular aspect of the machine. For example, the library diskfont.library is used by programs that wish to take advantage of the Amiga's powerful font handling capabilities.

FONTS - Doesn't take a brain the size of a planet to guess what this directory contains. Any program that allows different fonts to be used will always read its fonts from this directory, unless told otherwise (that's got you confused, hasn't it!)

C - The C directory contains all those lovely CLI commands mentioned earlier, all stored as separate program files.

S - The S directory usually contains AmigaDOS batch files (sometimes called Script files - hence S for Script). Batch files are ASCII text files containing a list of CLI commands to be run when the batch file is 'executed'.

L - The L directory contains device handlers that AmigaDOS uses itself to carry out such tasks as disk validation, RAM and port management.

What's On Your Extras Disk

The Extras disk contains a host of different utilities and auxiliary files that are designed to further enhance the Amiga Workbench environment.

AMIGABASIC

Unlike eight bit computers such as the C64, the Amiga's BASIC language is not built into ROM. Instead, AmigaBASIC is loaded from disk every time it is needed. To help you get the most from your BASIC programming, Extras also contains a drawer that is positively bursting with useful source code. there's example code for such tasks as loading and saving IFF pictures, using the speech synthesiser and accessing the screen hardware.

TOOLS

As the manual states, 'the tools drawer contains several utilities that let you 'work' with your Amiga.'

MEMACS - Not quite a word processor, MEmacs is an Amiga version of the universally-adopted 'Emacs' text editor that can be found running on machines as diverse as Atari STs and Unix 3B2s.

FED - Now this really is the business. FED is a powerful utility written by Dale Luck of Commodore-Amiga which allows you to edit existing fonts, or even create your own from scratch. Similar programs on machines such as the ST and the Mac could set you back a lot of money, but with the Amiga, you get one for free!

FREEMAP - FreeMap displays the amount of free 'chip' RAM available in a graphical form. Each pixel in the map area represents a 64 byte block of free memory. If any bytes within this 64 byte block are not free, then the pixel remains unfilled.

PERFMON - PerfMon, short for Performance Monitor, dynamically displays the amount of free chip and fast RAM, and the performance of the 68000 central processor. While the program isn't really of much use to most users, it's quite interesting to watch.

KEYTOY2000 - Mac users will feel instantly at home with Keytoy2000. Keytoy is an Amiga version of the 'KeyCaps' accessory that allows you to view the current keymap setting when various qualifier keys are depressed (Alt, Shift, Control). Although it sounds like it was designed for the 2000, 500 users can benefit.

PALETTE - Palette is a simple utility that allows you to change the colour palette of any standard Intuition screen that is currently open.

ICONED - IconEd lets you edit the appearance of Workbench icons using a paint-package-like editing system. Just load the icon that you wish to edit into IconEd, make the necessary changes, resave, and your new Icon will be installed.

ICONMERGE - Icons on the Amiga can be a lot of fun. Not only can you create your own using the IconEd utility, but you can also breathe life into your creations using the IconMerge utility.

Put simply, IconMerge will let you animate an icon by attaching an extra, second icon image that will be displayed when the icon is clicked on or selected. Although this approach is rather simple, some impressive results are possible.

PCUTIL

The PCUtils drawer provides you with the necessary tools to allow the use of a 5 1/4 inch PC disk drive with the Amiga. With the addition of a 5 1/4 inch drive, you can copy files between PC format disks and the Amiga.

PCCOPY - PC Copy allows you to copy files from a 5 1/4 PC disk to a standard Amiga 3 1/2 disk.

PCFORMAT - As the name implies, PCFormat will let you format a 5 1/4 disk to the PC disk format, for use with both PCCopy and ToPCCopy.

TOPCCOPY - ToPCCopy will basically carry out the reverse process of PCCopy, namely copy files from an Amiga format 3 1/2 disk to a PC format 5 1/4 drive.

EXTRAS' EXTRAS

With the release of 1.3 of the operating system, the Extras disk has very much become an overspill for files that didn't quite fit onto the Workbench disk.

You'll find a mass of spare printer drivers (any one of which can be installed onto the Workbench disk using the 'InstallPrinter' utility), a whole host of different keymaps and several new fonts to brighten up your documents (Helvetica, Times etc).

Also lurking on the Extras disk is a rather strange directory called 'FD1.3'. Upon examination, the drawer contains a single icon saying 'IMPORTANT! BASIC FD Files Here!'. AmigaBASIC (and any other languages) can take advantage of operating system libraries that can contain a number of special routines. For AmigaBASIC to be able to access these routines, it must be told the parameter format of each routine, and which processor registers must be used. This information is all contained within these special FD files.

Hardware

The Amiga is not only a remarkable machine in its basic incarnation – it is also capable of being stretched to limits that make even the most advanced professional computers seem relatively weak. The basic A500 might seem to have all the advantages already, but as a home computer it is capable of extraordinary expansion.

An extra 3.5" disk drive is just the beginning – the A500 can accommodate RAM expansions up to a massive 8 megabytes as well as taking on board 68030 processors that can make it one of the fastest of the 16-bit generation. But for the low-down on what extra hardware you may find useful for your purposes, from alternatives to the mouse to different central processors, read on.

The Amiga is truly a remarkable and flexible machine. Not only has it incorporated the most advanced design in its field from day one of its launch, but also its designers have borne in mind the needs of successive generations of Amiga owners and have made the Amiga system flexible enough to incorporate many different kinds of extra hardware.

Some of these are mundane, if incredibly useful in application. The first hardware upgrade you are likely to consider is simple enough: it is likely to be a new kind of joystick, if you play games a lot, or a new kind of mouse if you prefer serious applications and your original Commodore mouse is beginning to show its age. There are all sorts of alternatives, many of which you may not even have considered.

The first dive into the insides of the Amiga you are likely to want to make is if you have an older Amiga and are using Workbench 1.2. If you want to move on to Workbench 1.3, with its extra facilities and relatively bug-free operation, you will have to fit a new Kickstart chip.

The next most accessible upgrade is likely to be a second 3.5" floppy disk drive. This is an obvious choice if you play a lot of games: you will no doubt have encountered two-, three- or even four-disk games that would be made considerably easier if you could ignore those "Insert Disk 2 in any drive" prompts and just get on with the game. A second disk drive is almost a must, however, for any serious user of the Amiga: operations as simple as copying the contents of one disk to another are made so much quicker and easier if you merely have to copy from one drive to another.

The next upgrade option, and again one which will prove useful for games as well as serious use, is the addition of a RAM expansion. The obvious first step is to purchase an extra half meg (half a megabyte = 512K) which will bring your machine into line with the one megabyte standard required to get the most out of some games. Remember that the Amiga is a 512K computer: it comes with 512K of RAM ordinarily. This can usually be expanded in steps of half a megabyte (512K) at a time.

Larger RAM expansions tend to come in two types. Either the board is 'populated' to its full capacity, in other words it has all the chips in there already, or it is wholly or partially 'unpopulated', in which case there is space on there for you to add more chips. Although RAM capacity usually advances in steps of 512K, the actual chips tend to be something in the order of 128K each, so you need to buy four for each half meg.

Boards come in all sorts of sizes right up to 6 megabytes to fit in the trapdoor. Any board over 4 meg is liable to need Kickstart 1.3 and many of the larger boards will also need a little gadget to be fitted under the Gary chip, which can be awkward.

By contrast, most of the basic half-meg expansions are extremely simple to fit and should not be beyond the capacity of even the most computer-illiterate beginner. All you have to do is remove the panel in the bottom of the Amiga and slot in the board. Simple!

Kickstart 1.3

If you're not sure which version of Kickstart is in your Amiga, simply look at the hand-holding-a-disk icon when you boot the thing up. Underneath the symbol there is a number which will tell you if you've still got the old 1.2 chip in there. If you want to upgrade, to take full advantage of Workbench 1.3, fitting the chip can be done quite easily yourself with a little care and full instructions are available. The chip alone costs about £15. If you want to get the conversion done by a qualified engineer, the whole thing shouldn't cost more than about £40.

If you are worried about upgrading to Workbench 1.3 because you have heard about the new Workbench 2 that comes with the Amiga 3000, don't worry too much. It is going to be a fair while before the Amiga 500 can be upgraded with the new enhanced chip set to take full advantage of the new release, and even the CDTV uses Kickstart 1.3, so for the foreseeable future this is the most credible option.

Floppy Drives

As with most hardware, it's true to say that one floppy disk drive is pretty much like any other. Most Amiga external drives for the A500 are for the usual 3.5" floppy disks, but you can if you wish obtain an old-fashioned 5.25" PC-style disk drive, which may be of some use for transferring over PC files to the Amiga, or using with something like the BBC Emulator.

The standard-issue official Commodore 3.5" floppy disk drive is the A1010, which can be bought from most suppliers for around £85. Other similar units from a number of other suppliers are also on the market, the main distinctions being size and looks rather than any actual functions. Prices vary between £75 and £90.

Remember that disk drives are straightforward plug-in add-ons and so are no trouble to fit.

Hard Drives

The official Commodore product in this area is the A590 hard drive, which was released just over a year ago and has since become one of the most popular products of its kind. This is, of course, because it is a very high-quality product indeed.

The A590, like most of its counterparts for the A500, plugs in the rather bizarre sticky-out card expansion slot on the side of the Amiga. The A590 scores greatly in design, coming in a strong, thick plastic case colour co-ordinated and shaped to match the lines of the Amiga. The capacity of the A590 is 20 megabytes, which is likely to be more than enough for most uses. It also includes plenty of space to fit extra RAM chips, up to 2 megs worth, internally, although it comes as standard without the extra chips. Price of the A590 is £445 RRP, which probably means you can get hold of one for around £350.

Another option is Xetec's excellent range of hard drives, both external ones for the Amiga 500 and internal ones to fit in the Amiga 2000. The Fast Track range are not the cheapest on the market – for that you'll have to look elsewhere, such as at ASAP's Amdrive, a good value external drive for the A500 – but the Fast Track drives are, as the name implies, really very rapid. They are also blessed with some excellent supporting software, which makes life very much more pleasant in the long run.

Fast Track hard drives come in a huge range of different configurations and capacities: 22Mb, 32Mb, 50Mb, 72Mb, 88Mb etcetera. The basic A500 system of a 22Mb drive with 25 millisecond access time and SCSI host adaptor will set you back around £449, while the top-of-the-range 229Mb device will cost a cool £1795. For even faster performance, you can opt for the extra 64K RAM cache which will speed up access even more. The basic Amiga 2000 internal drive is £399 for a 22Mb version, which can be mounted directly onto the card or can be set in the spare 3.5" floppy drive space.

Monitors

The standard Commodore Amiga monitor is the 1084, now in its most recent incarnation, a slightly posher redesign, the 1084D. At around £230, this is a very good colour monitor with all the features you are ever likely to need, except one: it only has mono sound. There is, however, a solution to this problem in the form of the 1084S stereo sound version, which costs around £250.

There are, of course, plenty of alternatives to the standard Amiga monitors. One option is to go for a Philips version, which is essentially just the same as the 1084 but has a different case and a few of the controls moved from the front to the back. Only real difference is that it has an etched screen, which gives a better protection against reflections than the anti-glare coating on the 1084. Price is around £299.

The alternative of a rather more expensive Multisync monitor may be of use to some because of the wide range of different graphics modes they support and the extra features. Two examples of this type of monitor are the Taxan Multivision (£746) and the Quadran MS1420 (£399). A more fun alternative for the home user is to buy a television that also acts as a monitor, killing two birds with one stone and saving money into the bargain. Sony make a suitable machine, but a favourite with several computer suppliers is the Philips 2530 (£269), a 15" telly with 60 channel presets and infra-red remote control as well as SCART input for the Amiga signal.

Fast Processors

There are very few excuses for treating yourself to a faster processor, the best being graphics techniques that rely on vast amounts of calculation and in particular ray-tracing. A ray-traced image that literally has to be left overnight can be done in a fraction of the time with a 68020 or 68030 instead of the ordinary 68000.

Features to look out for in a processor card are ROM shadowing, which means that any Amiga program is redirected automatically to take full advantage of the extra power of the new chip, and a 68000 fall-back mode, which enables programs that violently object to the presence of a different chip to use the ordinary 68000 without you having to mess around changing it.

A good first step into the world of power computing is the 20-Card from Solid State (£349), a particularly low-price 68020 accelerator card that is easily installed into the innards of an ordinary Amiga 500. Although the low price is achieved by using some second-hand components, this should not do any harm to the general performance or reliability of the card. Solid State claim that it is the only card of its type to auto-synchronise with the Amiga perfectly..

A good 68030 alternative is GVP's card, available in this country from Power Computing (phone 0234 273000). This board provides full 68000 fall-back as well as running in 16Mhz, 28Mhz and 33Mhz modes. It is also expandable to provide up to 8Mbytes of RAM and comes with a 12-month warranty, well worthwhile having.

Printers

Printers are often the last thing people think about when buying add-ons and peripherals for their Amiga. Let's face it, that second disk drive always gets priority to ease disk copying and make those big adventure games easier, then that RAM expansion is very tempting to help produce zappier graphics.

But what happens when you want to preserve your pixel paintings for posterity, or you want to print out a letter to your bank manager in a style guaranteed to impress? What happens when your desktop publishing pages need to be printed so that they look as crisp and professional as they do on your display? The answer is to get a printer that does the business and does it well.

What follows is a look at the various kinds of printers available, from the inexpensive to the very costly, explaining how they work, how much they cost and what you get for your money.

Whatever you use your Amiga for, it's pretty certain that at some time or another you're going to want to get something printed out. It may just be the listing of a program that you're writing, in which case you won't be too fussed about the quality of the printout, providing that it's legible, but generally it's true to say that you'll want to get the best quality possible, so that the results are clean, sharp and impressive-looking.

Obviously, there are two main types of printout that you may need, words and pictures, and two main considerations, black-and-white or colour. Most modern printers are pretty adaptable and can print either words or graphics and are available in colour versions.

When it comes to printing out words, particularly for something that you want to make a good impression with such as business letters, it's going to be important that the final result is clear and smart. Your word processor may be a lot easier to use than a typewriter, but if the printed results look shoddy you might just as well do it the old-fashioned way.

The measure of how effective a printer can be is summed up in the phrase 'letter quality' or 'near letter quality (NLQ)'. If a printer provides NLQ results, then it means that your printout will be sufficiently sophisticated in appearance to be used in a professional environment such as for business letters.

Daisywheel

The oldest kind of letter-quality printer is the **Daisywheel** printer. This type works in very much the same way as an electronic typewriter, each letter being printed onto the paper through the inked ribbon by the impact of a raised letter shape. The letters are arranged on the end of prongs radiating out from a wheel at the centre, which spins round to position each letter when it is needed. The whole attachment looks vaguely like a daisy.

Daisywheel printers are very noisy and can only be used to print text, so they are going out of fashion somewhat, but if you just want to print text the quality obtained is very good. Different 'fonts' or typefaces can be used by fitting different daisywheels, but of course you can't use more than one in any single printout. Three daisywheel printers you might want to look at are the Brother *HR-20* (£445 ☎ 061 330 6531), the Olympia *ESW 1000C* (£378 ☎ 0789 415875) and the Qume *Sprint 11/55 Plus* (£850 ☎ 0635 523200).

Dot Matrix

Currently the most popular kind of printer is the **Dot Matrix** printer. These use an arrangement of pins that stamp through the ribbon onto the paper to form the shape of the letters. Because they are not tied to any pre-set shapes, dot matrix printers can support a variety of different fonts or print graphics with equal capacity.

The cheaper versions of the dot-matrix printers are the **9-pin** models, which use (obviously enough) an arrangement of nine pins to make up the printed shapes. Although this may not seems to be sufficient for letter quality to be achieved, nearly all these printers have a 'draft' mode in which they just print a rough and an 'NLQ' (near letter quality) mode in which each printed character is overprinted a second time in a slightly offset position to fill in any gaps. NLQ printout from a 9-pin dot matrix is generally pretty good.

The more expensive big brother is the **24-pin** dot matrix which, because it uses an arrangement of 24 pins, naturally enough prints in a higher resolution. This makes printing quicker, too, because it removes the need to go over the characters again.

Finally, not only can dot matrix printers print graphics, but they are also very often available in slightly more expensive versions that will print in colour. This is achieved by having different-coloured ribbons that print the three 'process' colours from which any other colour can be made up – cyan (blue), magenta (red) and yellow. The cost of this kind of colour printer is relatively low, but the results are pretty good.

If you make regular use of a basic DTP package or one of the flash modern breed of word processors that allows considerable use of graphics in amongst your words, then a dot matrix is the only relatively inexpensive way of getting decent results.

Here we take a look at five of the best of the low-cost 9-pin dot matrix printers, followed by a brief glance at five of the better 24-pin machines. Remember, too, that the prices quoted here are the recommended retail prices, so you can usually get a reduction of up to 40% by shopping around for bargains.

Amstrad DMP 3160

A rather unusual machine developed out of the Amstrad philosophy of creating cheap and cheerful products for the person in the street. Rather than passing the paper through the printer around a roller, it simply feeds paper through from front to back across a flat bed. This means the print head has to face downwards to print onto the paper, which in turn means it has to be a very lightweight mechanism. The ribbon is short and likely to need frequent replacement.

In test, the Amstrad proved the old saying 'you get what you pay for' – it is, after all, the cheapest. It is easy to set up for tractor feed but not so easy for continuous feed, having little guidance for the edges of sheets. The NLQ print is uneven and it seemed to be slow. Print quality for graphics is reasonable, but sometimes banding across the picture spoils the appearance. Big advantage is that because of the unique flat design it can print on any thickness of paper, including card. And it is the cheapest. (Amstrad £171 ☎ 0279 454555).

Mannesman Tally MT81

A neat-looking printer from a company with a reputation for solid and reliable gear. Has efficient top covers which hide the workings and reduce noise levels substantially, the latter aided by a mute mode. A push-feed tractor wastes less paper than the pull-feed of other 9-pins and continuous single sheets are handled well. The manual, however, is not too great.

Print speed is pretty much the same as the most of the remaining 9-pin machines and the quality of the draft text is good, spreading the dots to good effect. NLQ text is also very clear and clean. Graphics print well, with little banding. This is one of the quietest printers around with all its covers on, but the right-handed majority may find the positioning of the knob for the roller – on the left side – awkward. (Mannesman Tally £183 ☎ 0734 788711).

Epson LX-400

As you may have noticed from your Workbench Preferences settings for printer drivers, Epson have set standards for some time – it's a fair bet that if you can't find the name of your printer in Preferences, it does Epson emulation and so should be set to EpsonX. This particular model is solid and built to last, but has a rather ungainly plug-in tractor feed mechanism.

It does have a pull-feed tractor, which means that for every document you print you will waste one page of paper. The NLQ text printout is slightly notchy-looking and

takes a bit of getting used to. Graphic printing is good, the substantial head mechanism giving little banding. This is also one of the fastest of the 9-pin printers. (Epson £199 ☎ 0442 61144).

Citizen 120-D

One of the lightest around and also one of the smallest, taking up less space on a desk. It also has a pull-feed tractor which again is detachable. Print speed is reasonable, up to the standard of the Star (below) or the Mannesman Tally. The print in draft mode is somewhat spidery and in NLQ it is light, probably because the print head is very lightweight. A big plus is the very good handling of continuous feed paper.

It does, however, have a rather bizarre interface system whereby you have to plug in either a serial or parallel interface separately, but the cost of one of these is included in the price quoted here. A new version with some improved features will be available soon, the 120-D Plus. (Citizen £229 ☎ 0895 72621).

Star LC-10

The Star LC-10 has something of a reputation of being the ideal low-price printer for use with the Amiga, and this is not entirely undeserved. It is the most recent design of those mentioned here and Star seem to have learnt from the mistakes of others. The tractor is push-feed and parks itself neatly, and single sheets can be fed through while the tractor holds continuous paper aside.

This is the easiest printer to use, with good documentation. The speed is well up to par, the print quality is second only to the MT-81 and it has more NLQ fonts available. There is no problem with set-up in Preferences and graphics printing is among the best, with a good even density and good alignment of the head from one pass to the next. It is easy to see why this is the most popular entry-level printer – it is the best designed and is available in a very good colour version, too. (Star £229 ☎ 081 840 1800).

24-pin Dot Matrix

As mentioned earlier, what follows next is a brief look at five machines that were considered by an independent reviewer to be amongst the best 24-pin dot matrix machines on the market. It's worth mentioning before proceeding, however, that there are several others on the market that you should certainly consider. Star make a 24-pin version of the popular LC-10, called (perhaps unsurprisingly) the LC24-10, which is equally popular in this price range and is available at very competitive prices, often for as little as its smaller brother's RRP. Epson's LQ range includes some relatively inexpensive models that provide good letter quality print, if lacking some of the frills. And IBM and NEC both produce machines that may be worth the comparison.

Seikosha SL-92 £389

A small and compact unit with a fair bit in its favour despite being the cheapest of these five. The design is simple but well thought-out, making tractor feeding, for instance, fairly painless. It features no less than nine different NLQ fonts and prints at a good speed, but print quality does not suffer, coming out very well indeed. A good little performer.

Panasonic KX-P1124 £399

Has been widely praised and deservedly so. Print quality in both draft and NLQ is excellent, controls are clear and comprehensive and paper-handling is both flexible and effective. Has a slight problem with speed, tending to be up to 30% slower than some of the other machines mentioned here, but this is made up for by its wide range of features. A solid all-rounder.

Brother M-1824L £595

Another solid all-rounder, with a couple of unique points about it. It has the most advanced font selection system of any machine in its class and it is the only one of these printers to feature a two-line LCD display to give information on the current status of the print set-up. In common with those that follow, however, it has one main drawback. Although print quality and speed are both excellent, it is perhaps not worth the extra money over the cheaper units.

Fujitsu DL 3300 £599

Pleasant to look at, compact and friendly to use. It features a top-of-form button and proper paper parking. The draft print quality is excellent and, of course, rapid, but the NLQ print is not so good and not so quick. Overall a good product, but again does not seem to justify a substantially higher price-tag.

Olivetti DM-324 £619

Both functional and stylish, but lacking in extra fonts. In draft mode this is the quickest printer of all these: in NLQ mode it is easily the quickest, achieving a realistic tested speed of around 50 cps (characters per second). The only real problem with this is that the finished result seems to be somewhat lacking in weight, being grey and shady rather than bold.

Laser Printers

Laser printers are a real step up in quality when it comes to printing crisp, clear black-and white, but of course this does not come cheaply. The mechanism is similar to that in a photocopier: instead of ink, powder is picked up on a roller which is electrostatically charged

where the print needs to be and is transferred onto the paper from there. Once on the paper it is fused in by heat. Where the laser comes in is in scanning across the roller to charge it up in the right places.

Laser printers fall into two main categories, the cheaper category lacking one crucial thing that the more expensive machines have: PostScript support. **PostScript** is a high-quality print definition language used by sophisticated graphics and DTP programs, such as Gold Disk's *Professional Page* and *Professional Draw*, that ensures that no matter what the display on-screen, the finished result is of the highest possible quality.

Laser printers tend to be too expensive for the home user, coming in at between £1300 and £2000 for the cheaper models and anything up to £6000 for a PostScript version. They are also limited in the main to black-and-white work. They do, however, have several big advantages for a professional use. Firstly, they are very quiet: the only noise is a low whine when actually printing. Secondly, they are very quick, producing up to about eight full pages a minute. And perhaps above all they are of a very high quality, very nearly up to the standard of professional typesetting.

Because laser printers are so expensive, it makes little sense for us to look at any in detail here. If you do intend to buy one, there are many factors, such as repair and maintenance support, that you will want to take into account. The big names in this field are Apple, Qume and Hewlett Packard, so look at their machines first.

Ink Jet Printers

These are an evolution of the pen plotters used in architecture and technical drawing and are essentially exactly what they sound like: the ink, rather than being stamped onto the paper through a ribbon, is sprayed on through nozzles. This process is not as haphazard as it may sound, because the nozzles are extremely small and the arrangement of them is similar to that of a dot matrix. This system is just as quiet as laser printing and the quality obtained is often virtually indistinguishable.

Although inkjet printers suffer from one very obvious drawback – because wet ink is used, it must be allowed to dry before it is handled or it will smudge – they can also handle graphics superbly and are easily adapted to full-colour versions, where the three process colours, cyan, magenta and yellow, are used as separate inks. The quality is certainly better than a dot-matrix output and the cost is quite reasonable. If you do want to print out full-colour graphics, a colour inkjet printer could be the way of getting the quality you want.

A few different machines to look at are the Highprint (Siemens, £655 to £755), the Deskjet and Deskjet Plus which are certainly of laser quality (Hewlett Packard, £699 and £849 respectively), the Paintjet, capable of high-resolution full-colour images (Hewlett Packard, £1095) and the Epson SQ850 (£769). Certainly it's wise to look carefully before spending that amount.

Thermal Transfer

This is a rather bizarre and archaic kind of printer which uses heat to transfer the image onto the paper, very often through a wax ribbon. Again, these are easily adapted to full-colour use with a different ribbon for the red, blue and yellow in a three-pass process. There are various different thermal machines around, ranging from the aged and extremely cheap (Okimate, about £150) to the advanced and highly expensive (QMS Colorscript, £8,995 to £16,995) so ask around if you want to delve into this area.

Alternatives to using a printer for full-colour graphics...

If your main aim in life is to be able to hang huge full-colour prints of your own artwork on the wall or be able to take around high-quality portfolios of your computer graphics, there may be an easier and cheaper way than rushing out and buying yourself an expensive printer.

After all, you could easily spend £400 on a 24-pin colour dot matrix printer and still not be satisfied that the results look anywhere near as good as they did on screen. There is one obvious alternative, particularly if you don't want to do this too often, and that is to use a photographic technique.

There are several bureaux advertising their services in the Amiga magazines who will transfer your images from almost any Amiga art package to 35mm full-colour slides. The price of these is usually very reasonable and you can always get prints from the transparencies afterwards. .

An even easier way is to do this yourself. The basic method used until recently by most magazines is to set up a 35mm camera on a tripod in front of the screen and simply photograph it. Best results, the experienced hands say, are obtained by using 100ASA 35mm slide film with the camera set on a wide aperture (f3-f5.6) and taking a few different speeds, such as a half, a quarter and an eighth of a second.

This process should, with a little trial and error, get you very good results at little cost. It even has one particular advantage. Because the picture is being taken from the monitor display, rather than from a digital memory map, the pixels are smoothed out and blurred somewhat so they do not tend to show so obviously. With this technique it is possible to blow up a computer screen to several times its natural size with little or no loss of colour or clarity.

Programming Languages

If you want to learn to program, there's only one way to start: get a language and practice. Most popular languages are BASIC for beginners, C for cleverer hands and assembly language for the real experts. Here's a quick guide to these on the Amiga, and a few more besides...

In days long past when 8-bits ruled the earth – or at least, the home computer market – the two languages in common use were BASIC and assembler. Even these split into many varied dialects, but BASIC was by far the most popular. For better or worse, those days have gone. The arrival of the Amiga has seen a new generation of languages sneaked into the home environment, some of which were previously unseen outside universities or scientific institutes, most of which were unable to run without the sheer processing muscle of yesterday's mainframes. Even familiar titles like BASIC have silently undergone a complete revamp to rival more accepted languages in terms of power, complexity and performance.

BASICS

The term BASIC has become synonymous with home computing. It is intended as a gentle introduction to programming – indeed, the acronym BASIC means Beginners All-purpose Symbolic Instruction Code.

It is friendly, easy to learn, simple to program and invariably simple to debug. BASIC listings tend to be easy to read and understand. Also, the extensive error checking provided by most interpreters (later, compilers) make it the language least likely to crash the machine.

For the reasons outlined here, the Amiga is very well served with versions of BASIC varying in quality from the sublime to the downright appalling. There are so many BASICs there isn't room to fit them all in here; this is a selection of the more common ones.

Amiga BASIC •
Free with the Amiga

Not good, even though it is many people's first impression of programming the machine. Window updates are very slow, it lacks any form of decent file request and as a final nail in AmigaBASIC's pine overcoat it is slow – very slow. True, by comparison to other interpreted BASICs it is reasonably fast – but in terms of pure performance it makes the Amiga seem tedious.

HiSoft BASIC
HiSoft, Compiler £79.95, Extend £19.95

Comes as some salvation to AmigaBASIC users because it is largely compatible with it. The main difference is HiSoft BASIC is compiled, resulting in programs which run up to (it is claimed) 50 times faster than standard AmigaBASIC. And indeed, overall it manages quite a reasonable speed. The main cavil with the system is the lack of an interpreter: this adds unnecessarily to the development time.

It has an excellent editor, fast and effective. The curious system of using function keys for block marking could be better, though. Features a simple interface to Intuition, although this must be criticised for lacking anything more useful than screens, windows and menus. To be fair, HiSoft have tried to remedy this by offering an extension to the language – called Extend. What they forgot to add was support for the ever-useful proportional gadgets. These crop up everywhere, from *DPaint*, to *Sonix*. Their absence is a mistake.

GFA BASIC
GFA, Interpreter £49.95 Compiler £29.95

Definitely not compatible with anything other than GFA BASIC. When Version 3.0 first appeared, it was so full of holes it was a wonder it managed to survive the furious press critiques it received. Nonetheless survive it did, and GFA have finally got a solid product.

Unlike several other third-party BASICs mentioned here, GFA BASIC is interpreted: those wanting a compiler have to pay another thirty quid for the privilege. The suggestion GFA is interpreted should not be taken as meaning it is slow – far from it. With this release, GFA have demonstrated just what can be done with a "mere" interpreter and extracted performance previously unseen from the language.

Compiled programs are compact and very faaaaast! The editor is a strange, though powerful beast and the language itself has an unusual but well thought-out

syntax. Notably line numbers have gone, as have multi-statement lines. This, coupled to the automatic indenting of loops and so on, forces programmers to produce clear, readable and logical code.

More unusual still, GFA supplies a complete interface to all the library functions found in the ROM. Common functions like opening Intuition windows and screens have their own calls, simplified for the beginner but powerful enough for the expert. From a programmer's angle it is difficult to see how long C compilers will remain in favour, since even complex programs would be much easier to produce in BASIC's protective and people-friendly environment.

True BASIC
Addison-Wesley

Comes from Kemeny and Kurtz – the inventors of BASIC, no less – and a very nice job it is too. While it retains the feeling of the BASIC language and remains easy to learn, it is capable enough to produce large applications and still remain simple. True BASIC is compiler-based which means syntactic buggettes – like typing errors – are caught long before the program is run properly. The same is true of all compilers here, incidentally. The logical progression from those first BASICs.

C

Devised by Brian Kernighan and Dennis Ritchie (from B, would you believe!) with the sole intent of writing operating systems – something which it is very good at. UNIX, GEM, Kickstart and many others were developed using C. However, the language has found many more uses than the one for which it was originally intended. This is the case with many languages once they become accepted – the few which have fallen by the wayside have done so for good reason, and shall remain unnamed.

The main advantage of C – as defined by its lovers – is its portability. In theory at least, a C program can be written on one machine and easily converted to run on another. This advantage has been whittled away somewhat, recently, with the advent of Modula 2 which is also extremely portable; and also, of course, has been reduced by WIMP systems. By definition, WIMP-based systems tend to be very machine specific, hence reducing the portability of software.

Manx C, £160
Lattice C, HiSoft, £229
Lattice C++, HiSoft, £299

There are two main C compilers available for the Amiga: Lattice and Manx. Of the two Manx – being the cheaper – has the larger (or is that louder?) following, but Lattice appears to have the better back-up. As main distributors HiSoft were keen to point out, Lattice is ANSI compatible and can produce code running more than 60% faster than Manx. But after all, what are a few benchmark results among friends?

ASSEMBLERS

In order to gain the greatest speed from any computer, there is no option but to resort to the complex world of assembly language. At first glance assembler looks complex – because it is. More to the point assembly language is long-winded and very prone to subtle bugs which cause spectacular crashes. To ease the situation a good 68000 development system MUST feature a debugger – machine code programming without one is like playing Russian Roulette with six bullets.

DEVPAC 2
Devpac Amiga, HiSoft, £59.95
Devpac Developer (1Mb+), from £199

From HiSoft comes the sibling to the hugely successful Devpac development system widely used by professional games programmers which should be a recommendation in itself. Many regard it as being the de facto standard by which all others must be judged – surprisingly there are a few pretenders to Devpac's crown. The system is supplied in three parts: Editor, Assembler and Monitor and comes on two disks with an excellent manual.

The most impressive feature of Devpac 2 is the way the whole thing has been thought out. From within the editor (a good value package in its own right) it is possible to assemble the code to memory and immediately test it either at full speed or from the debugger. This reduces development time enormously over the more conventional systems of edit, assemble, (link), debug – where each part of the system is a separate entity. For those wishing to use Devpac as part of a larger development system, it can produce linkable code which could be joined in a modular form to compiled C, Modula 2, or even other assembly language modules. At around 70,000 lines per minute the assembler may not be the fastest around, but considering Devpac has probably the best multitasking debugger available for the Amiga (and a massive following) it represents unequalled value for money.

ArgAsm
Argonaut, £79.95

Comes from Argonaut Software, the home of *Starglider* and an impressive stable which can be expected to produce something special. Which is precisely what ArgAsm is, boasting a multiwindowed editor and claimed assembly speed of 250,000 lines per minute. It should have taken the programming world by storm, knocking Devpac straight off its perch.

The multiwindowed, multifile editor is a joy to use – far better than Devpac's. Scrolling text in windows moves at blistering pace, showing it was written by people who consider speed of paramount importance. Also, like Devpac, ArgAsm can produce linkable code making it usable with other languages. As a pure assembler, ArgAsm knocks spots off the competition in terms of

performance alone – which is by no means enough to endear it to the buying public. The complete lack of debugging facilities and heavy memory requirements (above 1Mb) are serious mistakes. Argonaut use their own debugger in-house but refuse to release it on the grounds that its advanced facilities would only serve the needs of pirates. Fair comment, certainly – and a sad sign of the times.

Argonaut would have been better advised to think less about fancy features – like compatibility with other assemblers – and more about releasing a product that worked. Yes, it's bugged too: it sometimes fails to produce runnable code at all. ArgAsm could have been a masterpiece, but it isn't.

K-Seka
Kuma, Price around £50

Getting long in the tooth, but nevertheless a sizable number of programmers still swear by it – and at it too. It is capable enough – the ST and Amiga versions of *Wizball* (remember *Wizball*?) were written using it. The problem with Seka is it looks dated and the author has refused to update it, discouraged no doubt by the excellent competition. Even so, Seka wins hands down on price alone and it does have a debugger (of sorts).

The most notable features of the package include the weird editor, reminiscent of Ed, and the curious command structure. Assembly is very fast BUT this is definitely not a package for producing applications since no INCLUDE libraries are supplied. This means every _LVO (Library Variable Offset) must be looked up in the reference manuals. A tedious operation even on a simple system like an ST – on the Amiga this is incomprensible.

Assem
Metacomco, Price N/A

Like Kuma, recently-demised Metacomco were one of the first to produce an assembler for the Amiga; like Seka, it looks crude in comparison to today's offerings. In its favour, Assem does use standard macros and can include files. From here it's downhill all the way. The editor supplied is ED, there is no debugger and the program only produces linkable files. Worst of all, Assem is supplied with ALink – this should also be replaced with BLink. Or better still, buy something else instead.

PASCAL
MCC Pascal, Metacomco, Price N/A

Invented by Professor Nicholaus Wirth as a teaching language and named after the French philosopher, mathematician and physicist Blaise Pascal. The only Amiga version has become, sadly, something of a rarity since the demise of Metacomco. Unless someone else picks up the baton, Amiga Pascal will become a thing of the past when existing supplies dry up. Those wanting to try this fascinating language should act now.

MODULA 2
Benchmark Modula 2, Price N/A

Another invention of Nicholaus Wirth, Modula 2 shares many of the features first devised for PASCAL but without some of the drudgery of type checking and exacting syntactic specification. Modula is a logical progression from PASCAL and is seen by many as been the first in a new generation of computer languages. Proof of this comes in the form of Gold Disk's excellent *Advantage* spreadsheet which was developed in Modula as opposed to the more usual use of C.

APL
MicroAPL, £99.95 basic version , £299.95 with 68881/68882 and faster libraries

Must rank as one of the most peculiar languages around, since the major body of its definition relies on a set of special symbols unique to it. The name APL comes from 'A Programming Language' (sic), probably because its inventor, Dr Kenneth Iverson, couldn't think of a better way to describe listings which amount to little more than runic diagrams. Perhaps the ancient Egyptians invented computing after all?

Like many fringe languages though, APL has a fiendishly dedicated band of followers – some of whom are responsible for bringing this ISO standard implementation to the Amiga.

FORTRAN
AC FORTRAN, £295

The great grandfather of high-level languages and arguably the precursor to BASIC. Certainly much of the structure of FORTRAN can be found in today's BASIC. The name is an acronym for FORmula TRANslation language which describes it very well. FORTRAN appeared very early on because it was devised for scientists who needed to be able to write programs which expressed their formulae in (more or less) simple English, impossible in other languages around at the time.

Although FORTRAN is still regarded very much as a scientific language – the stuff of minis and mainframes – at least one software house has seen fit to produce a version for the Amiga. AC FORTRAN is available from larger suppliers including HB Marketing.

LOGO
Commodore, £49.95
Free with 'Class Of The 90's'

Quite where the name LOGO comes from is unclear. Inventor Seymore Papert designed it – like PASCAL – primarily for teaching purposes. LOGO's syntax is meant to encourage clear, logical thinking which should be present in anyone wishing to engage computing as a profession. LOGO is best known for its "turtle graphics", a technique for creating a solid idea a child's mind can

key to. It gives the teacher and child a common ground to communicate on. Giving movement commands to turtle is something the child can envisage more easily than a graphics cursor.

REXX

A relative newcomer to the computing scene since it appeared as recently as 1985 when M F Colishaw described it in "The REXX Language: A Practical Approach To Programming". It should be made clear from the outset ARexx (William Hawes' Amiga implementation of REXX) has not been accepted as a language in its own right, but adopted as a script language for controlling other applications. However, this should not be seen as taking anything away from ARexx, since it is without doubt a very powerful language, and quite capable of producing stand-alone programs.

Very briefly, the language is not entirely dissimilar to BASIC – although this may be doing it some injustice. It comes on a single disk with a clearly written manual explaining the implementation and the differences between Amiga REXX and Colishaw's original specification. Beginners are advised to refer to this for a more coherent explanation.

ARexx programs use a resident process – that is, a program sitting in the background which applications use to communicate with ARexx. ARexx programs themselves are interpreted at run time in much the same way as one might start a CLI program.

Bluntly, ARexx is best viewed as a means to an end: that is to customise other software packages and produce, in effect, meta-applications based around them. Typical examples of software supporting ARexx interfaces are *Superbase Professional* (database), *Cygnus Ed* (text editor), *SuperPlan* and *Advantage* (spreadsheets). Since Commodore have been far-sighted enough to include ARexx with Workbench 2.0, this list should get longer; but only time will tell.

FORTH

HB Marketing, Around £49.95

Invented by Charles Moore and Elizabeth Rather in the early '70s as a control language for radio telescopes, no less. Its name derives from the inventors' belief it was a fourth-generation language. Unfortunately, the machine used to develop early compilers only allowed five-letter filenames – so the "u" was dropped, and the language was named. Since then, FORTH has been adopted and evolved beyond the imagination of its inventors. At least two major support groups exist, The FORTH standards team and the FORTH Interest Group (FIG), each defining its own specification for how the language should behave. However, due to the design concept of FORTH, its is difficult to define a standard as such; only to define what words should exist. FORTH is a language which is almost unique in that it is defined in terms of itself!

A FORTH program is no less than an an extension of the language. Indeed, this has been further extended by advanced FORTH programmers who have used this concept to invent new, FORTH-like languages.

HITTING THE METAL

Games programmers always program the hardware and applications programmers always program through the operating system. Why? The reason is simple – games programmers need the speed, and sometimes the special effects, only possible by addressing the hardware directly.

Recently the case for "hitting the metal" has been weakened to some degree by Readysoft who have produced *Escape From Singe's Castle*, the follow-up to their hugely successful *Dragon's Lair*, in a way that can coexist with the multi-tasking environment. This has raised eyebrows in some corners and shouts of "We told you so" from Commodore.

It should be said, though, that while Readysoft have skilfully avoided techniques requiring the hardware approach, not all games can be written this way. No doubt the arguments for and against shall continue long into the night.

Where 'serious' applications are involved there is no real option but use the operating system routines provided by Commodore – even though some, the graphics library in particular, are tediously slow. The advantage of operating system usage is upward compatibility with new versions of the machine and, theoretically at least, all suitable configurations too.

Commodore caused some concern amongst developers recently when they announced Workbench 2.0 with its new version of Intuition and scalable fonts. "For the first time, users will be able to decide the screen font and window fonts." they said. All fine and nice in a perfect world: but hundreds of applications already use the default font and expect to find Topaz 80 or something similar. If users start altering things willy-nilly, as Commodore intend, hundreds of applications will cease to work correctly! This will show itself as alert boxes and requesters suddenly refuse to work properly, if at all.

Programming Games

There's only one real way to program games that are right up there with the best professional product and that's to learn Assembly language. It takes several years to do this properly and to get really competent – but in the meantime, however, there are a number of ways of starting off and getting in some practice. Lately, too, there are a few packages around that really can get very close indeed to the sort of results gained by even the best Amiga programmers. To find out where to start and how to produce quite remarkable games, read on!

'Games programmers do it with Assembler' – it's almost as much a cliche as 'Young Farmers do it with wellies on'. Yet for the most part it is entirely true – if you want to get the very best in speed and power out of the Amiga, there's nothing to match using a language designed for that very purpose. The only problem is that all the gains that are made by using assembler are almost equally matched by the difficulty encountered in learning it.

Now, there are those people who believe that the best way to learn to ride a motorbike is to get on a very large one and give it a bash. Certainly, if you do want to dive in at the deep end (aren't we mixing our metaphors a touch, here?) and start learning to program by learning assembler, that's fair enough. It may even turn out to be the best hing in the long run. Pop out and buy Devpac 2 and a couple of good books and off you go.

There are, however, a number of easier ways. You can start by learning Basic – after all, you get a free Basic with your Amiga and though AmigaBasic is a shade cumbersome there are plenty of people offering advice on how to do clever things with it – just take a look at the Workbench tips pages in this very book! Any kind of Basic will give you a good grasp of the essentials of program instructions and program structure which will apply to almost any language you move on to later.

Basic is one area to start in, but there are others. Also on the market are a couple of games creating packages for which you need no actual experience of programming at all. These can produce quite good games with graphics of your own design and enough features to make it worthwhile releasing them into the Public Domain to try out on other gameplayers.

And finally, there is a very strong third option. Mandarin's AMOS is a combination of a programming language based on Basic and a load of utilities to help you put a professional-standard game together. It already seems likely that proper, commerical games will be written using AMOS and all aspects of games – the graphics, the sound and the gameplay – can be produced to an excellent standard with the help of AMOS.

Reviews of the products concerned follow, but two quick notes first. Remember that many commercial games have been produced using simple languages like Basic and have been very good indeed: particularly games that do not rely on speed but rather test the intelligence, like strategy, adventure or management games. Remember also that the superficial aspects, such as graphics, are not the be-all and end-all.

Finally, it is worth bearing in mind that you do not have to be a programming whizz to make it in the world of games-writing. If you are good at graphics, for instance, your skills may be of use to a software house and you will need nothing more complex than *Deluxe Paint* to prove this. If you get a lot of practice coding games that aren't impressive-looking, but have an awful lot of gameplay in there, you may turn out to be the kind of game designer that so many game-authoring teams need: in this case you need no programming skills, a lively and intelligent imagination. Think about this carefully if you would like a career in games – it could be worth it!

Talespin

Talespin from Microdeal is a straightforward program that allows you to create simple graphic adventures. You first draw up a load of background screens and characters in a paint program, then you plan out the basics of the game on paper. Then into the program: it takes you through the plot of your game step by step. Using menu controls, you decide which backgrounds and characters should be present in each scene. Dialogue boxes are opened when a character is clicked on, and you decide what text these boxes should contain and what choices should be offered to the player. In this way you can build up all the conditions necessary to progress and eventually to finish the game. A somewhat limited program, all things considered.

SEUCK

The full, and slightly less confusing, name of *SEUCK* is the *Shoot-Em-Up Construction Kit*. This program from Palace was based on an old C64 version that was very popular a couple of years ago. The idea of *SEUCK* is that you can create games, and not just shoot-em-ups either, from a basic set of structures and objects. By clever use of these basic ideas, you can produce effects which you might have thought was beyond their scope.

There are three basic kinds of object in the game – enemy, ship and bullet. Enemy objects are fundamentally aliens but can be used as things like extra animated background graphics or even counters and displays. Ship objects are, of course, the player's ship. All objects can have a variety of attributes – such as flight paths, collision detection and associated sound effects – controlled. All animated sprites can be drawn and animated at varying speed from within the program.

A sound effects module is incorporated which allows the use of any sampled sounds as effects. All in all this is quite a good little program for the price of £30 and a few *SEUCK* games have found their way into PD, but the results do tend to look a bit 8-bittish.

AMOS

Intrinsically, *AMOS* is a powerful and very quick version of Basic. It has all the sophistication of a modern Basic, but its speed comes from the clever trick of using custom routines rather than the Amiga's own Intuition for handling most operations. This makes sense with a games language, because most games bypass the Amiga operating system anyway.

It also includes a number of very clever features that most Basics come nowhere near. You can import any kind of IFF graphic with ease, so all the graphics can be done in *Deluxe Paint*. You are given special routines to access the Copper, so the famous colour-bars can be used. Multiple screens, each with its own palette and resolution, can be displayed. HAM or EHB can be used.

Two utilities that come with the package are used to edit sprites for animation and to edit maps or backgrounds, but both can be drawn in a paint package beforehand. AMOS allows up to 64 hardware sprites plus blitter-based software sprites or BOBs, the number of the latter limited only by memory. Animation of the sprites is incredibly easy: a special language called AMAL is used to move anything up to an entire screen. There is even a special utility that simplifies this by allowing you to define movement paths by simply dragging the mouse pointer around the screen.

AMOS can make full use of sampled sound and soundtracks written in PD programs such as *Sound Tracker*, but currently has no music editor of its own. This will come shortly, along with a number of other add-ons and upgrades all of which will be free to registered users. The first of these is already available – AMOS 3D, which allows AMOS users to incorporate vector 3D objects into games and to write true 3D games. AMOS Sprites 600 is another such add-on, being a collection of 600 sprites for use in games.

For the price of only £49.95 (from Mandarin on 0625 878888) AMOS is an incredible games tool. With the package you get four free games, all of a very high quality, and another, *Cartoon Capers*, is shortly to be a commercial release. When will your AMOS game be out?

Communications

Much maligned as the preserve of the Amiga's equivalent of train-spotters, but Comms can be a lot of fun and also very useful. All you need is a modem, some software and a few telephone numbers and you can communicate with like-minded enthusiasts and download useful software to your own machine.

Perhaps one of the most common feelings expressed by modem users is that of loneliness. The long hours spent tapping away at a an impersonal keyboard, the importance of finding that last little bug, the tedium of slaving over a hot VDU...

Don't believe a word of it: they are having a whale of a time. And here's how. At the end of your telephone is a whole new world just waiting to be discovered. But enough cliches: you want to know how to get in on the act. Communications is a subject which can quite easily fill several books. Nevertheless, there are a number of things which even this short primer must tell you before you launch yourself on the communications sea.

For instance, the first thing you will need to add to your Amiga is the necessary hardware, this being a modem and a telephone – or at least access to a telephone point. The number of modems available for the home user has increased dramatically over the last few years, and as such the choice has never been wider. This does, however, bring about the age old problem of which one to buy! Browsing through the classifieds in the computer press will often bear witness to that.

You must remember though, the modem you eventually choose will largely dictate which computer systems you can access. All the same, the larger systems do support the more common speeds and therefore, most modems. So what is available?

Restrictions, which are mainly due to Telecom's archaic telephone network, dictate four standard data transmission speeds for use in the UK. These are referred to by the codes V21, V22, V22bis and V23: just to complicate matters further, these numbers bear no relation whatever to the actual speeds involved. What's more, other V codes refer to entirely different topics. V24 for instance is more usually called RS232 – it's the non-standard standard for serial data connections!

In English, the V codes applying to modems for general purpose use and the speeds they indicate – transmission (TX) first, then reception (RX) – are as follows: V21 is 300/300 baud; V22 is 1200/1200 baud; V22bis is 2400/2400 baud; and V23 is 1200/75 baud. The faster the baud rate, the faster the data is transferred from your Amiga to the host and back again.

The reason modems are limited to these speeds is the quality of the phone lines; the odd pop is annoying to the ear but fatal to data. Much higher speeds are possible on special, leased lines but these are costly and limited to large, business users.

In the bad old days, there used to be two very distinct types of modem – acoustic and direct connect. Thanks to Telecom's privatisation, and better technology, all of today's modems are directly connected to the phone line with a plug: acoustic types, where the phone handset rested on a modem receiver, were rarely any use since they invariably picked up every little sound.

This does mean, however, that in order to connect a modem to your phone your house must be equipped with the new miniature plugs. The outdated "jack" variety will not do. Telecom must do the first conversion for you, but if you have more than one socket it is cheaper to do the rest yourself. A good specialist telephone shop can change the plug on most telephones for a small charge.

Buying the Gear

As far as modems are concerned, this standardisation means you can almost buy one off the shelf, so to speak. If only it were that simple! The most basic modems available today are of the single speed (V23) variety usually used for accessing older Viewdata services like The Gnome At Home.

Even so, such modems can still connect to many modern services like Telecom Gold and Istel, who still support this largely outdated standard. The problem with machines such as these is the Amiga's serial port cannot normally work with a split baud rate like 1200/75. This problem can be overcome by clever software. Y2's *Ruby Comm* is claimed to be the only package capable of such a feat – although *SuperText* does seem to.

While observing this point, you should be very careful if you intend buying a second hand modem; probably the cheapest way to get started. Many of the older models in circulation were supplied free by Micronet and are only suitable for use with V23 services.

For a fistful of oncers, you can get access to extra speeds like V21 which will enable you to get onto more or less all of the popular services. The main advantage of V21, although it initially seems slower than V23, is that the upload speed is 4 times faster. This means sending messages you have prepared off-line (to save the telephone bill) can be as much as four times faster.

For a few pounds more, you can get closer to the cream of speeds, V22 and V22bis. Often, too, modems supporting these much higher speeds offer many more features beside the basics.

Most of these expensive modems support at least a subset of the Hayes modem language; some even add extra commands. The advantage of Hayes is its wide acceptance by the software industry. Commands take the form of a two letter command start, AT (attention) followed by a list of what the user wants the modem to do. As an example, the D command tells a Hayes modem to dial a number, ie: ATD 0642 820999. The Hayes command language is so popular among communications software you should not consider buying a modem which does not support it: if you can afford the extra outlay, that is.

At the top of the heap, the best modems support what is called MNP error correction/data compression. MNP is supported at no less than nine different levels but it is unlikely you will find support beyond level two this side of £500. That said, very few services currently support MNP protocols: until they do, buying such a modem could be a waste of money.

One final word of warning. No matter which modem you get, make sure you get a lead suitable for your Amiga. Do not make do with a 25-way pin-to-pin IBM type: the Amiga's serial port is non-standard and the wrong lead can do serious damage. Also, if you have an Amiga 1000, remember the 25-pin D-connector is MALE, not FEMALE as in the A500/2000.

The Software

If there is one advantage to owning an Amiga it has to be the vast amount of useful software available in the Public Domain, and communications is one area where this is particularly handy. No matter what your needs, it is almost certain there will be a package to suit yours. Among the very best is the colourful shareware package *Access!* but some of the many others can be found on 17 Bit's Comms Disk 444.

With few exceptions, Amiga PD comms packages share something in common: they cannot support Viewdata screens or the 1200/75 split baud rate necessary for many of these services. The only PD package supposed to support 1200/75 is the excellent Viewdata offering *SuperText*. Nevertheless, doubts have been expressed recently as to whether the program is PD or not: 17 Bit software have, therefore, withdrawn the program until the doubts have been resolved.

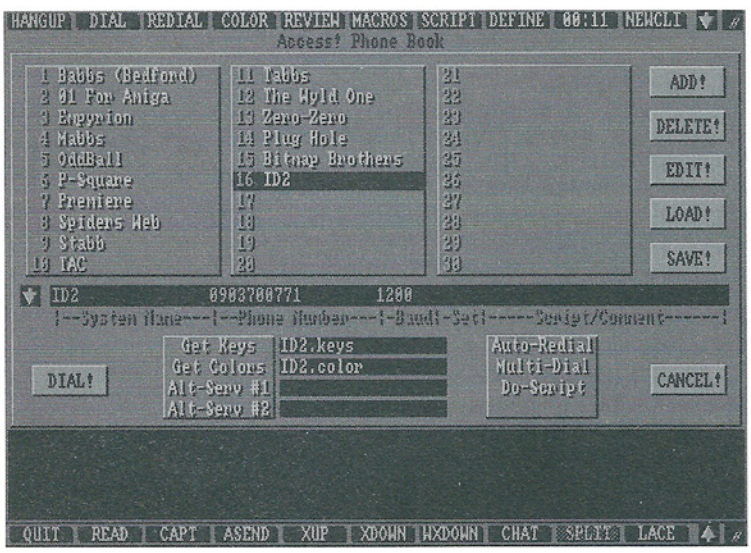
If you want a complete package supporting both Viewdata and the more normal scrolling terminal on one disk then you must turn to the commercial sector. Currently there are three packages vying for places here: *K-Comm II* from Kuma, and *Ruby Comm I* and *II* from Y2 Computing.

K-Comm at £29.95 is the cheapest, but simplest alternative. Although adequate, it does not support the 1200/75 split baud rate or the downloadable software from Micronet/Prestel. Y2's *Ruby Comm* series at £69.95 and £99.95 respectively, do support both the split baud and downloadable software, and many other features too, according to Y2.

One other option – although not general purpose terminal software – is Compunet's custom software from Ariadne. The good news is, you only pay the £20 for the software if you decide to join Compunet. When it works, this must be one of the easiest to use since it is geared solely to the Compunet service. All you need to do is tell it which modem you have and select Connect. An autodialling modem does the rest for you.

THE SOFTWARE:

Below is pictured *ACCESS!*, an excellent example of the kind of software available in the Public Domain.



The Services

Micronet: started in 1982 to coexist with Telecom's Prestel service, and is the largest of the Viewdata databases with over 250,000 pages of information at your fingertips and over 80,000 users nationwide including Prestel. Historically, it was only possible to access Micronet at 1200/75, but due no doubt to popular demand it is now possible to access the system at 300 and 1200 baud full duplex – like the rest of the civilised comms world.

Prestel and Micronet are a delight to use because they are largely intended for non-computer-literate people – travel agents and so on. They work on a system of pages. To access any page all you have to do is enter a # followed the page number, and end with a *. For instance, #0* takes you directly to Page 0 which is the main index.

The * character substitutes for the numeric keypad's Enter key which is not fitted to custom Viewdata terminals. This allows you to use the Return key while entering information into forms while on-line.

Apart from the obvious computer based aspects of Micronet – which are not too good for the Amiga at present – you also have access to the vast range of facilities afforded by Prestel, such as Teleshopping, British Rail timetables, theatre bookings and so on. Micronet subscribers also have the cheapest access to the excellent multi-user game *Shades*. It plays very much like *MUD*, the original on-line game; of which it is said "You haven't lived until you've died in *MUD*."

MicroLink: is the largest and most businesslike of all the public access bulletin boards. It was started several years ago by Manchester-based Database publications, and therefore received an awful lot of publicity in some of the computer press: Database's own! For this reason, Microlink is probably the fastest growing BBS in the UK. Unlike Micronet et al, Microlink is based on a simple monochrome scrolling terminal, 80 columns wide.

The facilities offered by Microlink are so numerous there is not room to mention them all here. They do include many services vital to today's business and serious home computer. They include FAX, e-Mail and Telex, as well as a translation service of English to any language, and even financial and business news.

At the time of writing, Microlink have just taken a giant step and left their faithful carrier Telecom Gold, to run off with Istel's Infotrac. In classic style, the move to Istel has been surrounded by enough hype to launch a large battleship. Sadly, initial reports from the fledgling service do not look too promising.

Compunet: is the largest Commodore-specific, multi-access database system. What makes Compunet special is its purpose-written software, which – although making the system appear almost like Viewdata initially – is just the gateway to an extremely powerful system. Unlike Viewdata, Compunet uses a high-resolution screen with 16 colours, the effect of which is, well, stunning. Of the boards discussed here, Compunet are proud to be the most controversial too – as a glance at any late-night Partyline conference will prove. For this reason, they call themselves "The Live One. . ."

Initially, Compunet is the toughest of the three systems to get to know since it uses a system of pages (or frames) which, unlike Prestel, are accessed rather like a directory. The screen is split into two windows: one is used to control your movements around the database, the other displays information contained in each page. Once Compunet enters interactive mode – for the Partyline conferencing or multi-user games – other windows appear allowing you to send messages on-line.

At present, the Amiga's Compunet software suffers from a few serious flaws which tend to detract from this otherwise excellent system. Not least, the software has a nasty habit of dropping into the land of Gurus at the slightest provocation, usually in the middle of some crucial chit-chat. Even so, Compunet's facilities – and thoughtful design – put it at the top of the pile for the Amiga owner.

What's a BBS?

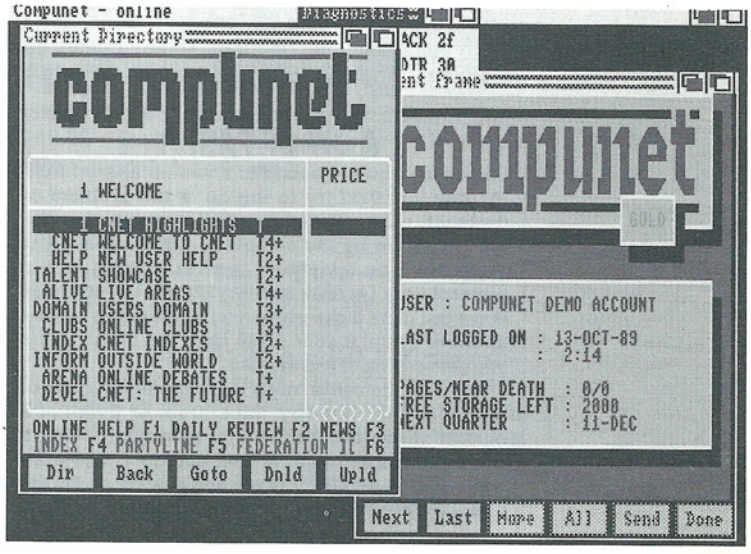
The idea behind Bulletin Board Systems (BBSs) came from America (doesn't everything?) and dates back to the 1970s. Like all the best ideas, this one is simple: a central computer, accessed by modem, is used to store messages for people to read, just like a notice board.

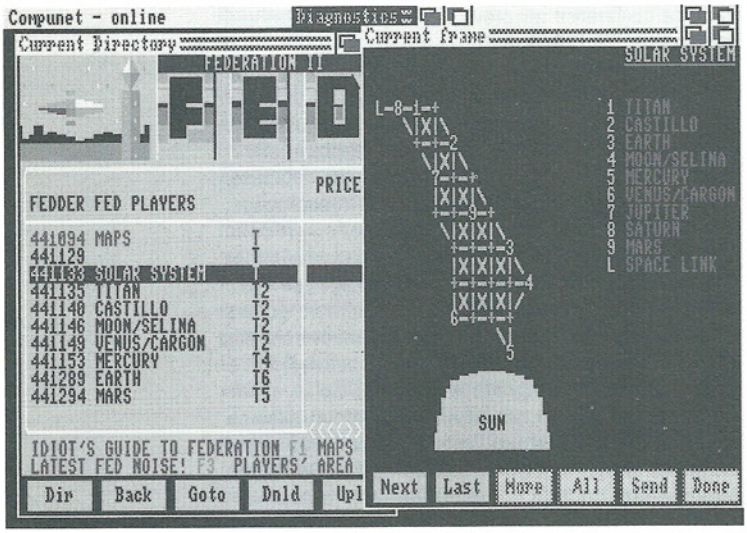
Since the early days, the idea of the BBS has been transformed from a simple messaging service to a fully interactive computer system. With improved software and technology, it is possible for users to either "post" messages on the board for everyone to read, or just send messages to each other. This latter is called e-Mail (electronic mail) and has seen the adoption of the term "mailbox" used for individual users' identity codes: you place e-Mail in people's mailboxes.

From this basic idea, systems have been developed to enable you to send mail and receive mail through the international Telex system. Surprisingly perhaps, it is

THE SERVICES:

Compunet is the largest Bulletin-Board service with an Amiga-only bias.





ON-LINE GAMES:

You can play games via a modem against real live human opponents. Weird!

cheaper to buy a complete Amiga system, modem and subscription to Telecom Gold or Microlink, than it is to buy a custom-built telex machine! It is even possible to send a FAX in much the same way. However, as the current system stands it is only possible to FAX pure ASCII text. Of course all these services – except e-Mail – cost money.

Downloadable Software

One of the most popular area of all BBSs are the libraries of downloadable software. Apart from some Viewdata systems, like Micronet which has its own system, most systems use one of several standard methods for transferring software.

The most efficient method in common use is Xmodem: it is fast and reasonably safe because all data is subjected to rigorous checksums. By definition, Xmodem is designed to transfer binary (8 bit byte) files, and some systems – like Telecom Gold and Micronet – cannot support it because they only transmit 7-bit bytes.

To get around the 7-bit trap, some systems have resorted to expanded ASCII. This involves coding every byte into a two-byte hex number, thus sending twice as much, in effect. The file can be converted to binary later by a simple BASIC program.

Advanced systems like those used by the new Microlink do transmit the full 8-bit byte, and therefore support Xmodem. Some even support other file transfer protocols. Ymodem batch and Kermit are typical examples, but in addition to supporting binary transfers, both these can transfer filenames as well. This way you can download 20 or more files with one simple command: the transfer does the rest. Similarly, the new system used by Micronet can build all the necessary sub-directories automatically; you will need *Ruby View* to access Micronet's telesoftware, though.

Games On-Line

The history behind on-line games is a little cloudy (or should that be MUDDY?) The first proper multi-access game was the *Multi-User Dungeon* or *MUD* and lived on Essex University's mainframe. By today's standards, though, *MUD* looks a little crude, although it still maintains its appeal largely because it was first. If you want to play *MUD* now you will have to wait, because the version which was on Compunet has vanished for the time being.

But worry not, because where there's a will... everyone jumps on the bandwagon! Today all of the major BBSs have some form of on-line game. Micronet was the first to start with *Shades*, their answer to *MUD*. Compunet on the other hand supply the option of *Federation II* (a space trading adventure) or – by the time you read this – *Realm*. Not to be outdone, even Microlink have *Bloodstone* (and a version of *Federation II*).

A lot can be said about these games, but they do have a few things in common. First, they cost extra to play. Prices vary greatly but are typically around £1.50 to £2.00 per hour connected. Second, these games are very addictive: it is not unknown for users to spend hours on the 'phone with predictable results when the bill arrives. Lastly, although most on-line games are adventures of one sort or another, you are playing against REAL people, as well as "mobiles," the characters supplied by the computer. Fans of *Dungeons and Dragons* are invited to try *Realm* which, according to its author, "is the closest thing to true role playing yet."

The Last Word

Whichever system you choose, the comms bug will get you in the end – that much is inevitable. Whether you use your Amiga for playing the latest in games or for writing your latest novel, there is a BBS out there with something for you. As the comms revolution quietly sneaks in and overcomes us, it is not surprising the pundits are suggesting we will lead an increasingly sedentary lifestyle. Whatever happens, the modem and the BBS are here to stay: if you can't beat 'em...

A BIT OF PARITY

Something you are bound to come up against from the day you first try to log on is the problem of protocol; not behaving yourself in public, but the settings used by the computer. BBSs usually list themselves as telephone number, speeds, and a protocol code i.e: 0642 820999/V22/8N1. The sticky bit is the last three digits which refer to the BBS's comms software setup. If your setup does not match theirs you get screens of useless junk.

Briefly, the codes mean the following: Number of data bits 7 or 8; parity None, Odd, or Even; and number of stop bits. For most purposes, try 8 bits, no parity, 1 stop bit (8N1). If that fails try 7 bits, even parity, 1 stop bit (7E1). These settings are by far the most common and should cover most situations.

When is an Amiga NOT an Amiga?

The Amiga is a versatile machine, sure enough – but did you realise it is so versatile that it can pretend to be a whole heap of other things? All you need is the right kind of hardware or software. In some cases this means an 'emulator', which allows the Amiga to pretend it is another kind of computer. In other cases it's a clever bit of electronics that allows your Amiga to do something you wouldn't expect it to be able to. So when is an Amiga not an Amiga? When it's...

A MACINTOSH

One of the most adventurous, most impressive and most popular of all the emulators is A-Max from Entertainment International. It is popular because it allows your Amiga to pretend it's an Apple Macintosh and to run Mac software. Macs are a good deal more expensive than Amigas, feature an extremely easy-to-use WIMP system for running programs and handling files, and are blessed with a great deal of very high-quality software, especially for Desktop Publishing and graphics.

There are three main drawbacks to A-Max. First, to emulate the Mac's very high-resolution monochrome screen display A-Max runs in Interlace mode, which flickers like crazy and can be unpleasant to use. Second, to use A-Max you must get hold of an Apple Mac ROM chip and operating system disk, which is not at all easy (although you can now buy A-Max with the necessary chip) and is of dubious legality. Third, A-Max cannot run all Mac software: the protection systems of some mean they won't run on the Amiga.

The latest version of A-Max comes in two different card variation to plug inside the Amiga 2000 and includes several enhancements over the basic unit, which is a grey box that plugs into the back of the Amiga. The new A-Max 2 has the great advantage of hard drive support – anyone who has used a Macintosh will tell you that it really needs a hard drive to be viable. The original A-Max costs £134 without Mac ROM, A-Max 2 is £169.95 without ROM, £269.95 with and A-Max 2 Plus will cost £249.95 without or £349.95 with from Entertainment International on 0268 541126.

OR A PC

However impressive it may be to own a Macintosh, there is no doubt at all that the industry standard set by the IBM PC and compatibles is the most useful to be able to tap into. One way to do this is enable your Amiga disk drives to read and write PC disks so that you can transfer files to and from PCs and Amigas – and also, incidentally, to and from more the modern Macs. The best way to do this is with a utility called *CrossDOS*, which runs as a background task enabling you to save

you have to do is specify your drive as, say, pc0: rather than df0: when telling the Amiga where to save to. *CrossDOS* is 100% efficient and foolproof. It costs a mere £29.99 from Power on 0234 273000.

The other way to tap into the PC pool is to buy a hardware-based PC emulator. These are more or less a PC on a PCB and are available both for the Amiga 2000 and the 500.

The 2000 version is the famous Bridgeboard, manufactured by Commodore, which slots into the 2000 internally and comes in many diferent PC varieties. It is excellent, but expensive, costing a four-figure sum which is actually in excess of the price of a cheaper PC.

The Amiga 500 PC card, the PC Powerboard, is a relative newcomer. It is made by KCS in Holland and sold over here by Bitcon (88 Bewick Rd, Gateshead NE8 1RS) at a price of £299 which includes handy extras like MS-DOS v4 and PC GWBasic. The board slots into the 'trapdoor' underneath the Amiga and contains a PC CPU, the 8086 chip. It runs at a very good speed and maintains many benefits of PC use.

WHEN IT'S A BBC MICRO

The BBC Emulator is a software-only emulator that enables the Amiga to run a large amount of BBC software. It was originally conceived as part of Commodore's strategy to take over the market that was being conceded by Acorn's ageing 8-bit machine, particularly in primary schools. It is an excellent idea because much of the educational software written for the Beeb is very good indeed.

For the most part *The Emulator* works well, but because it only works with legal 6502 programs it will not necessarily run all BBC software, particularly games. It is available from Commodore (0628 770088) or as part of the Class of the 90s educational pack.

OR EVEN A SPECTRUM!

Yes, believe it or not, there is a Spectrum emulator for the Amiga. And also believe it or not, it doesn't run as fast as a real Spectrum unless you run everything in mono. Sound pointless? Well, not entirely. It includes a special interface which enables you to load Spectrum programs straight from tape and save them out to Amiga disk, so if you used to own a Speccy and would hate to bin all those 8-bit classics, it could be handy. Only problem is we do not currently know of a UK supplier – the unit is manufactured by Digimail SRL of Mllan, Italy who can be phoned on 39 02 426559.

A DIFFERENT AMIGA...

No, not an Amiga emulator for the Amiga. This is a new kind of Amiga that even Commodore have very little to do with. Checkmate's A1500 is basically a recase of the A500 with a separate keyboard and a nice, compact box for the CPU and internal disk drives, but apart from the fact that it looks a sight smarter, the recase has a couple of advantages. Tha case is sturdy metal – Checkmate rode a large motorbike over it to test it – and puts the joystick ports and disk drives (yes, there is space for two internal disk drives) at the front. It includes room internally for genlock or MIDI interface cards, as well as allowing for expansion units to contain other cards. The A1500 can be bought as a kit so you can fit your own A500 into it, or you can send your computer off and they will convert it for about £200. Phone 081 923 0658.

WHEN IT'S A FILOFAX

Day by Day from Digita (0395 270273) is a diary planner that runs on your Amiga. It includes monthly and weekly planners to help you keep track of important dates in your life. You can store and recall information at the touch of a key.

One problem is that it's not exactly portable like your average paper-type personal organiser, so it's really only useful if you spend a lot of time at your computer and use it every day – at work, for instance. Sadly it has another slight problem in that it is difficult to edit entries – you virtually have to re-type them.

A FAX MACHINE

Fax machines – for the uninitiated, gadgets that transmit pictures down the phone line and print them out at the other end – are becoming an increasingly large part of modern telecommunications. Let's face it, they're dead handy for those things that you just can't do over the phone, like sending long printed documents or diagrams. Only problem is, Fax machines are very expensive so not many people have them in their own homes.

Well, now you can be one of a priveleged and sophisticated few. Fast FAX from Microdeal allows you to turn your Amiga into a full-featured Fax machine for the relatively low price of – wait for it, wait for it – £699.

This may sound like an awful lot of money, but if you do run a small business based around Amigas it could prove a good alternative to buying a separate Fax machine. You can buy Faxes a fair bit cheaper, but not with the range of features that Fast FAX offers.

Fast FAX enables you to transmit and receive mixtures of text files and graphics files in one easy set of commands. It stores Faxes internally, so you have the option whether to view them on-screen or to print them out to paper. Over a thousand names, numbers and addresses can be stored in an associated address book to make dialling easier. A scheduling system means you can set the machine up to send a large number of Faxes to different places at different times while you do something else entirely.

All in all, this is a very powerful piece of hardware and software. The price may seem steep, but a dedicated Fax machine offering the same facilities could set you back thousands of pounds. Microdeal, manufacturers of Fast FAX, are on 0726 68020.

A TELETEXT TELEVISION!

Microtext is an adaptor unit that plugs into the back of the Amiga and allows it to receive Teletext signals from the BBC's Ceefax and ITV's Oracle services. It also comes with an added bonus – to receive the Teletext signals, which are in with the ordinary TV signals of the respective broadcasting companies, it also has to act as a TV tuner. So all you have to do is plug the unit in, attach a TV aerial to the back and you have an Amiga TV.

The software is powerful at manipulating Teletext pages, too. It stores the last 16 pages you looked through away for you, so to review them you do not have to wait for them to be received again. It can save Teletext pages either as IFF files or in a special format that allows over 800 to be packed onto one floppy disk.

Pages can be printed out or can be read out to you using the Amiga Narrator device. Moreover Microtext can be set up to record pages for you while you are not there – it would be possible, for instance, for it to print out a regular TV schedule every day and when you get home from work, there it is waiting for you. Good stuff and, considering it can replace a television, a bargain at £143.50. Available from Microtext on 0705 595694.

AN ASTRONOMER

If you're the sort of person who glimpses an occasional episode of Patrick Moore's *The Sky at Night* and wishes to learn more about the mysteries of the heavenly bodies, then you might find *Distant Suns* of interest. This remarkable piece of software plots pictures of the night sky and points out for you whatever you ask it to – planets, stars, constellations – with their names.

Cleverly, the program will produce a map of the night sky viewed from any point on the earth's surface and at any time or date. You can even specify how much ambient light there is in the atmosphere to obscure your view of the stars – so if you are in the middle of the city and want to know what that bright star to the south-west is, the program will tell you.

Distant Suns costs £59.95 from HB Marketing (on 0753 686000) but even at that slightly dear price it is an excellent product, informative educational and very entertaining indeed.

A GAMBLER

Two programs that will help you make your fortune betting. The first is for the noble sport of kings, horse racing, and is called *The Tipster*. The idea is that you enter data for all the horses' past form from the famous Racing Post and specify what the going is like – the program will then pick you out a few likely winners, rating the starters according to their likelihood of winning. The second program, called *The Punter,* tries to do a similar trick for the football pools. Both are available for £29.95 each from West Country firm TAM Marketing, who can be contacted on 0392 215485.

A PSYCHEDELIC LIGHT SHOW

Trip-a-Tron is one of the world's most bizarre programs and entirely typical of its famous hippy author, Jeff Minter. Its sole function in life is to produce weird and interesting visual displays in a host of bright, psychedelic colours. Swirling patterns can be created in real time or set up in sequences. Unfortunately, the program does not support a full PAL screen or really make use of the Amiga's colour graphics capabilities. Costs £29.95 from Llamasoft on 0734 814478.

Great Subscription Offer

If you want to get the very best out of your Amiga, then you'll want to get Amiga Format. Every month, Amiga offers an incredible package:

Big magazines

Issues as large as 284 pages crammed with definitive coverage of the full range of Amiga activities – from games to music, from DTP to programming, from serious software to graphics.

Superb reviews

Authoritative and easy-to-understand reviews of all the best new products, with painstaking comparisons and clearly-stated conclusions.

Latest news

Amiga innovations from around the world, including reports on new Commodore products.

Reliable buyers' guides

We'll help you make all the right choices of essential products.

Stunning design

Amiga owners are sophisticated people and so *Amiga Format* is a magazine you'll be proud of!

Coverdisk

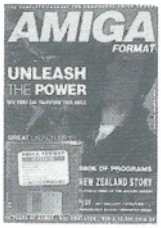
Yes, every issue of *Amiga Format* carries a free disk packed with software; playable special versions of major new games from leading software houses such as Mirrorsoft, Ocean, Activision and Psygnosis. Vital utilities backed by expert tutorials in the magazine. Handy programs to help you get more out of your Amiga. Astounding graphics and artwork taking the Amiga to the very edge of what's possible. At just £2.95 *Amiga Format* is simply unbelievable value and an irresistible way of making the most your Amiga.

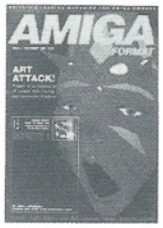
Guarantee

If you are not delighted with your subscription you may cancel at any stage and claim a full refund for all unmailed issues.

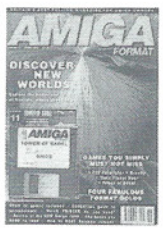
SAVE £4.50

And get two disks full of handy utilities and demos absolutely free!





Use this special card to subscribe to Amiga Format and you will receive two disks which complement this book – free of charge! And, in addition, you will also save £4.55 of the normal subscription rate for 12 issues of Britain's biggest and best magazine for the Amiga! Don't delay, act now! Phone our credit card hotline on 0458 74011 or return the card below *toute suite*!



12 issues of Amiga Format plus 2 unique disks for only £35.40!

Get Amiga Format delivered to your door every month and get the very best out of your machine. Every month you get a superb cover disk plus over 200 pages featuring:- the latest news, superb reviews of software and hardware, reliable buyers' guides . . . and much, much more besides.

Yes I would like to take advantage of this special subscription offer

12 issues of Amiga Format, including the two disks to complement my book, for the all-inclusive price of £35.40

Method of payment *(please indicate)*

☐ **ACCESS/VISA Card number** ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

☐ **POSTAL ORDER** **Expiry date** .....

☐ **CHEQUE** *Please make cheques payable to* ***Future Publishing Limited*** *and post in an envelope, with this card to :*

AMIGA FORMAT, **FREEPOST**, SOMERTON, SOMERSET TA11 7BR

Signature ..... **Date** .....

Name .....

Address .....

.....

.....

.....

.....**Post Code** .....

Telephone .....

Offer closes June 21st 1991

AF/GMO/1090

Public Domain

If you aren't already using the PD libraries, then you should be. Not only can they offer a whole lot of free stuff that's almost as good as the stuff you pay for, but also there's some invaluable little bits out there that you just can't get any other way. Useful tools and utilities, games, cartoon-like animations, even whole Acid House albums on disk – it's all out there for you to enjoy.

The trouble with having a brilliant graphics and sound computer is that you have to feed the darn thing. And this, as you've no doubt discovered, is an expensive business. But fortunately for the tight (or empty) of pocket there is a way to feed your Amiga without selling your shirt. Public Domain, or PD.

Now then, Public Domain is just what it says; it's software which is in the public domain, or to put it another way, copyright free. The thing is, you can get a copy of a PD program either by buying it, or you can copy it from anyone if they have it, and you'll be perfectly legal. There's no copyright to infringe, see?

Why do they do it?

What kind of man spends weeks thinking of an idea, typing a program in, testing it, correcting the mistakes, compiling, debugging, testing, and all the rest, only to give the program away at the end of it? They must be out of their tiny minds, right?

Nope, wrong. they're just really into the machine, mate. The kind of people who release a program into the public domain are people who want to see their name in lights, or people who earn enough from programming serious software not to need the money (or indeed all the hassle of marketing a program) themselves.

Or sometimes they do a simple program and it grows and grows with each revision into something similar to a professional program. Or maybe they write a demo, just to show off just how flippin' skilled they are. Either way, the idea is to get a program to you and not make any dosh out of it, and it's just because they love to do it that they don't expect any pay-off.

Two of a Kind

There are basically two types of PD software: utilities (utils) and demos. Utils are where a guy will write a program for his own use and distribute it to his friends to use too. It might be a conversion program for converting graphics from one format into another. Or it might be a program which does something to disks to mend them if they get errors on, or optimise them so they run better. Anything like that.

Either way, the utility writer knows that the commercial viability of the program is zero, but by putting it into the public domain he will become famous and his name will be spoken in hushed tones the world over. Most utils start up as freeware and end up as shareware, where the user pays for updates etc.

Demos have a far more sinister past, but serve a similar purpose – making their makers famous. Once upon a time there was a computer called the Commodore 64 – yes, it's a long way back, but bear with me, all right? Anyway, so there were certain people who, for fun or profit, cracked the copy protection on games and called themselves crackers. (Judges and policemen have other names for them, 'criminals' mainly, but sometimes 'felons', 'jailbirds' and repeat offenders are called 'recidivists'.)

Anyway, they cracked the games and compiled them all onto one disk with a little intro on the front with silly names, like the MaxPax, Animal Crackers, The Cracksmen etc. These intros were just simple screens with text on and with a bit of music, perhaps. Then, more and more, as they hacked the games and programmed the intros they got so good at coding they forgot the

cracking completely and concentrated on the intros themselves. About the time that demos were born, the Amiga came along and the already thriving demo industry turned its attention to this new machine. The intros of various cracking teams were gathered onto disks by new coders, who then put their own demos on the front of those. The megademo was born, and nowadays these often stretch over up to three disks!

And so to the present, where demos form the lifeblood of PD, and are a whole new artform. It goes like this: a guy buys an Amiga, and begins collecting demos. He compiles disks of other coders' PD demos and does his own intro. Then he gets so good he joins a coding 'team' and codes some stunning megademos. Then the team do a totally stunning demo and then promptly sink from sight. They are next seen coding games and programs for commercial companies. Quite a lot of commercial companies take notice of demos, and you'll find a lot of popular games coded in Europe are done by ex-demo artists.

What-Ware?

To confuse the issue still further, not all PD is totally free – in other words, it is not all the type of free software called 'freeware'. There are different varieties, but mostly the non-free type is 'shareware'. This means that you can try out the software for a while and if you like it you are supposed to send a fee, usually quite small, between £5-£25 or something like that, to the author. Shareware is normally of slightly higher quality than PD or freeware, and sometimes the authors are expecting to earn quite a lot out of it.

Some PD authors do in fact make a bit of money out of shareware, which is a very nice, mellow and Californian way to go about things. In spite of the fact that quite a lot of people are bound to use shareware without paying the fee, there are benefits, like upgrades, documentation and contact with the author. Registered users get newer versions sent to them automatically in most cases, as well as printed manuals.

Although this process very rarely works, due to the innately mean nature of mankind as a whole, there are some interesting and sometimes just plain bonkers variations. 'Beerware', for example, was a concept whereby if the user got a lot of use out of the program he was to send a six-pack of beer to the author! Now there's an idea we have a great affinity with...

The Best in PD

So what's hot and what's not in the PD field? There are certain disks which are useful, some which are just fun and some which are just amazing. There are great utilities which every Amiga user no matter how technical must have, like *Disksalve*, and some which are nice little twiddles which make life easy, like *SID*. Here is our definitive list of PD items which have caught our eye, and this should give you a taste of what's around so you can start your own PD collection. Also remember that the disks that come with this book contain some of the best.

ANIMATIONS

Demos as we know them today originated as either music or graphic animation demos. In the early days, demonstration versions of certain proprietary graphics programs were favourite, especially the likes of *Videoscape 3D* by Aegis. Exponents of this particular program were few and far between, because it takes a certain type of mind to operate a program as complex as *Videoscape*. But some did, and indeed still do.

Originally all the very best *Videoscape* animations were either by Allan Hastings (the author of *Videoscape*) or Leo Schwab. Leo was a real Amiga character, often to be seen at shows wearing a velvet cape and looking decidedly odd. The story of how the *Berserk* animation came about is probably an interesting folk tale based on real events, but here's the way I remember it.

At one particular show, they showed a video of the now-famous Pixar cartoon *Red's Dream,* where a unicycle is seen juggling some balls. This was great, thought Leo, and so he went back to his hotel room, where of course he had his trusty Amiga set up, and had a late night hack attack. Next morning he proudly showed off his own version of the unicycle juggling the balls.

Rather than being congratulated by Pixar for his cleverness he was severely reprimanded for copying a Pixar trademark. More than slightly miffed about this, Leo went back that night and changed the animation to be an Amiga 'boing ball' juggling three unicycles. The next morning the animation was on every stand at the show, and there was absolutely nothing Pixar could do about it.

After that Pixar came in for a lot of stick, and even Allan Hastings had a pop with his *Car* animation. A unicycle strays across the road in that path of a famous Allan Hastings object, the red Lotus sports car. More recently, a German bloke called Tobias Richter has popularised *Videoscape* once more, with a huge mound of *Star Trek* animations like the amazing *Fleet Maneuver.*

Only in the last few months, though, Tobias has paid tribute to Allan Hastings with his brilliant *Chase* animation. A road full of Allan Hastings Lotus objects stretches out before us, and a police car chases another car through the traffic. The cars are all Allan Hastings' original design except for the police car, which has a flashing siren on the top. It's not going to be long before a new program comes along to oust *Videoscape* as the primo 3D program, but until then there will be plenty of people willing to work out their 3D objects on graph paper!

GAMES

Many writers try their hands at games, and I'm not quite sure why these products are not sold commercially, as they are usually very high quality. *Steinschlag* is a version of the popular falling brick game, *Tetris,* and a very good version it was too. Shame about this one is that the owners of the copyright to *Tetris* have recently clamped down on this otherwise perfectly legitimate copy, so the likes of Fred Fish have been asked to excise the games from their libraries. Ours is not to reason why, I guess. Another game which has its roots in commercial

products is *Battle Force*. This is a very complex game based on the popular *Battletech* fighting robots Role Playing Games by FASA. You may recall that Infocom and Activision had a crack at doing *Battletech* games recently, with good but not wholly great results. This version is very much closer to the actual role playing game itself, and will satisfy any real *Battletech* buff for realism. A tad complicated for your average point and shoot merchant, but a real corker for the strategists.

Tobias Richter also made a game, with a predictable *Star Trek* bias, and very good it was too. There is also the most stonking *Star Trek* trivia game too, (called *Trek Trivia*) with over nine data disks of the hardest questions ever asked on *Star Trek*. As there are no *Trek* games on the Amiga except in the PD, these are essential playing for the Trekkers among us. (Beam me up, Scotty).

There are so many games it's impossible to talk about them all, but there are literally types for all tastes. Text adventures, graphic adventures, 3D vectors, arcade games, puzzle games, you name it.

FRED FISH

Many of the games and utils I've mentioned are gleaned from the Fred Fish Disks. Fred has been collecting PD and releasing it since time began (about 1985) and now has about 400 disks of utils, games, and generally neat stuff, Amigawise. His disks are available from all the major libraries in the UK, and form the backbone of many a power PD collection.

To see what's on the Fish Disks, try a copy of Aquarium, which is a nice PD database system specially created for the Fish Library and tells you everything you need to know as well as letting you search for certain types of program.

GRAPHICS

There are a great many graphics utils on the Amiga, and in most cases a program can be found to do almost any task you want – to create new graphics, turn graphics from one form to another and even to subtly transform or treat them in some way.

Tracer is a PD ray-tracing program which, although quite limited in what it can portray, actually has some very powerful features. You can map IFF graphics onto the surfaces of objects as you trace them, creating some very lifelike effects.

Claz and *IFF2PS* are two, quite different, programs which convert normal IFF files into Postscript files. Postscript is a graphics definition language designed by Adobe Inc and what it means is that instead of being a graphic representation of the picture you want, like the IFF bitmap type picture is, the file is actually a set of instructions for the printer to draw the picture. So the file is a text based list of instructions rather than a map of the pixels. Spooky, huh?

Why would you want to do this? Well, the quality of the output you get from a Postscript laser is about 6,000,000 times better than what you'd get on your scratty old Epson 9 pin, that's why.

On the American bulletin board service, Compuserve, they came up with an interesting idea for graphics, whereby graphics for all formats were converted to a common format for downloading, called GIF or Graphics Interchange Format. More and more GIF files are finding their way onto UK boards, and so the programs HAMGIF and AmiGIF now have more relevance than they did about 6 months ago. With these programs you can convert GIF files to HAM and any IFF file to GIF. This means that files meant for other computers can be used in Amiga programs. Pretty wild, huh?

And finally there are out and out converters, one of the most useful of which is *MacView*. This allows you to take a *MacPaint* art file and convert it to an Amiga IFF file, giving you access to one of the world's biggest libraries of graphics. So like I say, think up a way you'd like to tinker with your graphics, and there'll be a PD program to do it, guaranteed.

DISK UTILS

For the more techie amongst you there are a whole pile of useful programs for doing various tasks which otherwise would be impossible.

NewZap is a handy disk util which lets you examine and alter the contents of a file at will. Using this you can dive into a file and alter the text which appears, in a scrolly message for example, or even more funnily in the high score table of a game! This is easier in older, more badly-programmed games, but just think of the effect on your friends! Okay, so that's fun, but what about a more serious problem? What happens if one day you boot a program and find that it is corrupted? Complete disaster, right? Nope. All you need is *Disksalve*.

All this is is a more complex version of the old favourite DiskDoctor that appears on your Workbench disk, only more effective to say the least. All you do is put a formatted disk in one drive and the broken disk in the other and type "Disksalve DF0: to DF1:" and off it goes for about 20 minutes, searching for busted sectors and mending them, sometimes making educated guesses about what should be there. It's totally brilliant, and it's free!

ICONMASTER

If there was an equivalent of *DPaint* for the creation of icons, then *Iconmaster* would be it. With this very well-made piece of kit you can create icons or edit existing icons, load *DPaint* brushes, and paint in what looks like eight colours using only four. It's a very solid little program and is certainly the best icon maker around in the PD.

FILE COMPRESSION

Sometimes programs take up too much room, there's no getting away from it. On bulletin boards it seemed like an idea (to save people's phone bills) if the files they downloaded were compressed in some way, so that the users could uncompress them the other end and get at the programs.

Many compression or archive programs were created for this very purpose, like *Arc, Zoo, Lharc* and *Pkazip,* and all are still in use today. If you use comms then these are essential utils for getting at programs you get from BBs.

But what if you want code to take up less space on your disks and yet you want to still use the programs? Then what you need is *Powerpacker*. This shrinks a program or file in a special form that means when you use it, it automatically unpacks itself and runs normally. *Powerpacker* is fast becoming the standard program for compression, so much so that the latest version is a commercial product. The original version is still available in the PD, though.

TEXT READERS

When you click on an icon called 'ReadMe' or something, the text you see is being displayed using a program like *Muchmore* or *PPMore*. These text readers take a normal ASCII text file and display it so you can read back and forth through it on screen, rather than printing it out. This means you can send text files with a program on the disk rather than on paper. Neat stuff, eh?

SID

One of the biggest bugbears about using an advanced computer like the Amiga is that in order to utilise some of the higher functions you need to use the flippin' CLI. This is a bit scary to some and just plain boring to others, so some nice guy came up with the idea of a PD helper, a little interface between you and the Amiga.

SID is the jobby I'm talking about, and with it you can look at picture files, hear sounds, do all sorts of file housekeeping like copying, renaming and deleting, do directories, make directories, wash up, dry up and put away, all in one easy-to-swallow capsule. (Er, where was I again? Oh yes...) *SID* takes all the graft out of handling disks, and no serious Amiga user should be without it.

FRACTALS AND CHAOS

One of the most popular demos to do is the fractal demo. Some, like *Turbomandel,* draw the Mandelbrot set in double quick time, far quicker than any program you could write for yourself, and in any resolution. This is the preferred fractal engine and using it you can make any fractal picture you like, and very beautiful they are too. *Scenery* on the other hand, is a program which draws fantastic fractal mountains, and it was so good that the new version is once again a commercial product.

SCREENX

Another screen util which nobody should be without is *ScreenX*. This enables you to shift screens around and even save them to disk as IFF files for later. Brought to you by the maker of one of the world's favourite (wait for it, wait for it)...

...VIRUS KILLERS

Otherwise known as *VirusX 4.0*. The virus is one of the biggest problems facing Amiga owners in the Nineties. You really should have one, and use it every week, especially when you get some new demos etc. Make sure your system is clean before you put anything in it. By far the best programs around are the type that check your system every time you boot, like *Check Vectors* (*CV*) or *Virus Hunt* (*vhunt*). You simply insert the program in your startup-sequence and Bob's your uncle. Nothing can get through.

COMMS

Most of the programs used to communicate with bulletin boards down the phone line are PD, like *AZComm, Access!* and *JRComm* for scrolling text based boards, and *Supertext* for videotext-type boards like Prestel. All mod cons, most of them, but unfortunately shareware in the main. There's a good reason for this, and that is that they are flippin' brilliant.

DEMO CITY

And so to the demos. (Phew!) Trying to name all the best demos is like naming all the stars you can see from Blackpool, but let's have a browse around what's been happening and give you an idea of what to look for.

Scoopex are a popular demo crew, and their "Mental Hangover" is a megademo par excellence. I guess it won't be long before these guys do their own games, and that will be great and a shame at the same time.

In the same way, the "COMA" demo is one of the very best music type demos, and it looks and sounds like an acid house video transferred to the Amiga. The Rebels' "Subway" demo is nice too, as is the by now notorious "POI-POI" demo you may have seen all over the place at the 16-Bit Show.

Tobias Richter can be relied upon for a snappy *Star Trek* animation, so look out for those if you like sci-fi. Watch out for the "CeBIT" demo from Red Sector too, as that is one of the most original and best-coded demos I've seen for a long, long time. Also watch out for stuff by SILENTS as they have nice sense of design and always deliver good value.

The Crusaders are very good music coders, and their "Bacteria" demo is brilliant if you get a unbugged version. And finally, the "Horror Show" by Fraxxion is very horrible but very well done, being a bit of a video nasty on disk. There, that ought to get you going. Let us know your favourites, won't you?

Where Can I Get It?

The pages of computer magazines are FULL of ads from companies offering PD software, and because there is no copyright on the disks, there are more each day. You could set yourself up as a PD library simply by copying some PD disks and printing a catalogue. But you mustn't make too much money at it. Some PD houses make a profit on what they sell, under the guise of 'carrying charges'. The usual charge is about £2.50-£3.00, which, even allowing for the price of a disk and postage and packing, still leaves a profit for the seller. Most reputable libraries charge only £1.50 to £2.00, so be warned.

If you want to get some PD disks:
- Look at the press and see PD Library ads, or...
- Join a user group and feel the benefit of their library.
- You can even turn up to computer shows, and this is favourite with me, as you can try before you buy. Or...
- Find a mate who gets a lot of PD and copy his stuff.
- Buy a disk magazine which publishes PD on it and just lift the programs off it.

More simply, take a look at the large list of suppliers below, or browse through the following addresses. These are the people I buy from, and the service is first class.

NBS, 132 Gunville Road, Newport
Tel: (0983) 529594
One of the UK's demo specialists. They stock a wide range of demos and new ones are coming in all the time. The price is very attractive.

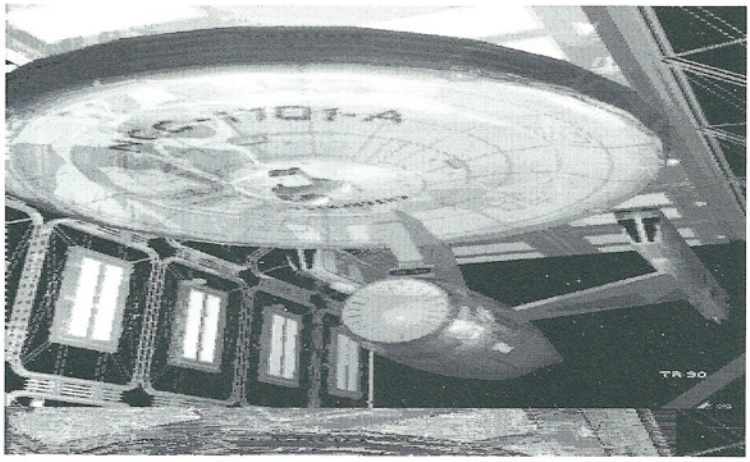
17 Bit Software, PO Box 97, Wakefield, WF1 1XX
Tel: (0924) 366982
Another entertainment specialist, with over 700 of their own disks, as well as the Fish Disks and other well-known libraries. Prices have recently dropped to £2.00 or any 10 disks for £18.00. One of the first PD houses to start publishing their own games.

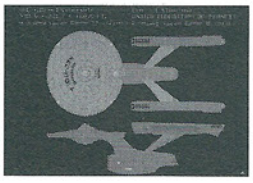
George Thompson Services,
Unit 1, Dippen, Brodick,
Arran, Scotland
Tel: (077082) 234
Veteran PD sellers, and distributors of all major PD libraries like Fish, TBag, and FAUG. Also agents for the disk magazine Jumpdisk, which never fails to amuse and delight.

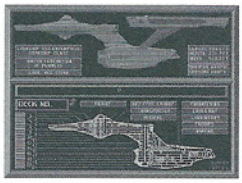
Softville, Unit 5, Stratfield Park, Elettra Avenue,
Waterlooville, Hampshire, PO7 7XN
Tel: (0705) 266509
A nice, big, friendly family business, who are always much in evidence at the various Amiga computer shows. They publish a very slick catalogue, and carry the Fish Disks, Amicus, PAN, Slipped Disk and FAUG libraries as well as their own SOF library.

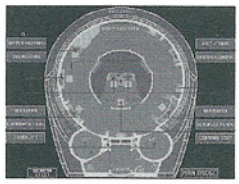
UKAUG, 144 Charles Street
Leicester, LE1 1LB
Tel: (0533) 510066
Very good national user group for Amiga, with an extensive members-only PD service plus extensive discounts on hard and software.

ICPUG, Membership Secretary
PO Box 1309, London, N3 2UT
Tel: 081-346-0050
The Independent Commodore Product User Group is the oldest user group for ALL Commodore computers. They have a massive library for all tastes, demos or utils. Again members-only.









SUPPLIERS

The following companies all contribute to the distribution of Amiga public domain software in this country. For their full addresses check the advertisements in the Amiga magazines or give them a ring on the numbers listed here.

George Thomson Services: 0770 82234, **Amiga PD Library:** 0742 750623, **Capricorn Computers:** 021 7070381, **Seven Seas PD:** 60 Canary Rd, Dungannon, County Tyrone, N Ireland, **Magnetic Media:** 0827 59566, **EMPDL:** 0602 630071, **Blitterchips:** 0535 667469, **Kad-soft UK:** 0249 817174, **Amiganuts:** 0703 785680, **Purple PD:** 0279 757692, **Crazy Joe's:** 0709 829286, **Nova:** 0295 262029, **NBS:** 0983 529594, **Softville PD:** 0705 266509, **Sector 16:** 0865 774472, **Senlac Software:** 0424 753070, **Premier PD:** 15 Croxteth Rd, Rainford, **WCA** 0792 772745, **New Image PD:** 40 Appleby Gardens, Dunstable, Bedfordshire, **Beat This Amiga PD:** 5 Fullarton Drive, Troon, Ayrshire, **EPROM Services:** Freepost, Leeds LS27 8YA, **Scorpion Systems:** 5 Lower Raven Lane, Ludlow, Shropshire, SY8 1BL, **Sagittarian PD:** 081 520 3858, **Arakis PD:** 20 Ashwood House, Victoria Road, Hendon, London NW4 2BD, **Recoil PD:** 1A Bern Close, Woodcote Side, Epsom, Surrey, KT18 7HU, **Start Computer Systems:** 091 564 1400 ext 206, **Supervision:** 0983 812867, **Power Domain:** 21 Sylvanus, Roman Wood, Bracknell, RG12 4XX, **Deeper Domain:** 081 204 3954.

Workbench Masterclass

The following pages are crammed to bursting point with a collection of useful and interesting tips for making everyday use of the Amiga more simple. Many of them have been carefully selected from the Workbench pages of *Amiga Format*, a section of the magazine that shares the same aim of enlightenment, others have never appeared in this form. Browse through, pick up on those that interest you and put them to use!

Switching between Kickstart 1.2 and 1.3

We are often asked whether we know of any add-on boards that hold both Workbench and extras in ROM so that they are instantly accessible as soon as you turn on your machine. Certainly we haven't heard of such a device. The nearest you will come to these requirements are the Kickstart boards that seem to be so popular in the States. These boards allow more than one version of Kickstart to be resident in your machine at the same time, so you can switch between them, which is very useful for older games that were coded a shade illegally and will not run under Kickstart 1.2. One such example is the simply-named 'Change Kickstart' board from George Thomson Services (0770 82234) which costs £55 including whichever Kickstart ROM you don't have.

User Groups

A user group can be a very useful way of learning more about your machine and finding solutions to your Amiga problems. The UK's largest Amiga users' group, the UK AUG, is based in Leicester. The AUG publishes a regular bi-monthly newsletter packed with useful information on all aspects of the Amiga, including BASIC and assembler. Contact Yuri Large at the UK AUG on 0533 550993.

Changing the CLI Prompt

The CLI's PROMPT command is a fun one to use for customising your Amiga system. Rather than the boring old '1>' prompt, you can get the CLI to say anything you like instead, for example 'Yes?'. Simply type

```
PROMPT "YES?"
```

If you like to have two or three CLIs on the go at once, you can arrange for the number of the current one to be displayed by inserting %N in the prompt string:

```
PROMPT "%N) Yes?"
```

to give you '1) Yes?', '2) Yes?' etc. To revert to the standard prompt, use PROMPT "%N>"

Using Diskdoctor

The Amiga can be really pernickety with disks at times. How often have you put a valued disk in the drive only to see the dreaded message, "Disk is not readable – use DISKDOCTOR"?

Curiously, the DISKDOCTOR program isn't mentioned at all in the Amiga manual's index, which might lead you to suppose that you need to buy it separately. Not at all, DISKDOCTOR is a stunningly useful utility on your Workbench disk which can recover most corrupted disks. However, DISKDOCTOR can only be run from the CLI, not the Workbench:

1. Start up the CLI by clicking on the Shell icon.
2. Type DISKDOCTOR DFO: and press [Return].

You are now prompted to insert your suspect disk in the disk drive. Do this and press [Return]. DISKDOCTOR now checks your disk, and if it finds any damaged sectors will report a 'hard error'. When it has checked the whole disk it will reorganise the files to avoid the bad areas and write them back to the disk.

Because of the secure way the Amiga stores its data, DISKDOCTOR can usually recover most files from a disk. However, once a disk is known to be suspect you ought not to trust it again. Format a fresh disk and copy all your files onto it from the damaged one.

Changing CLI Command Names

There's nothing special about the names the Amiga has for its CLI commands, they can be anything you want. When you type a command like DIR at the CLI, the Amiga goes away and looks on the disk for a file called DIR. If it finds one, it runs the program in that file.

Most AmigaDOS commands are kept in the C directory of the startup disk. So, suppose you are used to a CP/M system where the command to delete a file is ERA (for erase) rather than the usual DELETE, no problem:

Get to the CLI prompt (click on the 'CLI' icon in the System folder of your startup disk); Type

```
CD C
RENAME DELETE ERA
```

and from now on the command ERA will delete files for you. You can undo the change merely by renaming the file back again. This renaming trick works for any of the commands whose files are in the C or SYSTEM directories and the new names can be almost anything you want them to be.

Creating Workbench Icons

One of the most confusing aspects of using the Amiga is that of Workbench icons: it seems that only a privileged few really understand this archaic art. Luckily, if you have Workbench 1.3, you will never need to get your hands dirty with all the complex jargon that Amiga technical people have to endure, because Commodore have seen their way clear to provide a handy little tool which takes the pain out of icons.

The wondrous little program in question is the IconX command that you'll find in the 'C' directory of your Workbench 1.3 disk. IconX allows you to run any program from Workbench that can usually only be run from the Command Line Interface (CLI).

IconX works by reading an ASCII batch file that contains all the commands that you would usually enter at the command line. To use IconX, create a batch file using a standard text editor and then find a data file that has an icon (a *DPaint* saved picture, for example). Copy the associated '.info' file across to your text file, giving it the same filename as your text file plus a '.info' extension (if your text file is called 'JOHN', the icon file would have to be called 'JOHN.info').

Next, using the Workbench menu's 'INFO' option, change the default tool to 'C:ICONX' (if you used a *DPaint*

icon then it will probably already contain ':DPaint' in the default tool field) and then select 'SAVE'. Now when you double-click on the icon, IconX will be loaded and it will proceed to execute your batch file. Probably easier than falling off a log!

Editing the Startup Sequence

A common problem is not being able to edit the 'StartUp-Sequence' file that controls the boot sequence of the Workbench disk. You may have tried ED and EDIT, but neither would even display the file. Are you entering the filename of the file to be edited when first invoking ED? If you enter the correct filename including the full path, there shouldn't be any problems at all. Try entering 'ED S:STARTUP-SEQUENCE' to edit the StartUp-Sequence of you boot disk. This should work.

Editing fonts from the Extras Disk

The Amiga fonts are always read from a logical device called FONTS: which is, by default, assigned to the 'Fonts' directory of your boot disk. To access fonts on other disks, you'll have to tell the system where your new fonts are using the 'ASSIGN' command. To make FED edit the fonts on your Extras disk, you would type 'ASSIGN FONTS: Extras:FONTS' (Note that there is a space between FONTS: and Extras). Now all you have to do is to run FED and you're away.

Making a Self-booting disk

To make a simple disk that will boot to Workbench, you'll have to create and S directory, a C directory and a LIBS directory. Firstly, copy the files 'LoadWB' and 'EndCLI' from the Workbench C directory to your C directory, and the file 'icon.library' from the Workbench LIBS: directory to the new LIBS directory on your disk.

Next, you'll have to create a 'StartUp-Sequence' file. This file, which must be located in the S directory, is a batch file that is executed by AmigaDOS when you first boot your Amiga. For the sake of example, just create a StartUp-Sequence that contains the following two lines:

```
LoadWB
EndCLI
```

The final step to making your disk bootable is to actually write a boot block to Track 0 using the AmigaDOS 'Install' command. If the disk to be made bootable was in Drive 1 and your Workbench disk in Drive 0, you would enter 'INSTALL DF1:'. You now have a bootable mini-Workbench disk which can be inserted at the 'Insert Workbench' prompt and will self boot.

Should I buy a 68010 processor?

It probably isn't worth upgrading your machine to a 68010 if you use your Amiga primarily for games. The 68010 won't speed up your disk drives and will probably not make a great deal of difference to the vast majority of games. However, for heavy number crunching applications, the 68010 will speed up operations between 8% and 50%. The vast majority of games software should work with the 68010 with no problems at all, because the 68000 series of processors are all upwardly compatible.

The difference between the 68000 and the 68010 where machine code programming is concerned is that you cannot use the 'MORE SR,ea' operation as this is a privileged instruction on the 68010. To get around this, you must use the exec function GetCC().

Accessing Fonts from the Extras disk

You can either copy all the fonts on your Extras disk to your Workbench disk, or alternatively, use the 'ASSIGN' command as detailed in the tip above, 'Editing fonts from the Extras Disk'.

Can a virus live in the battery backed clock?

The simple answer is no. The miniscule amount of RAM used by the battery backed clock would make writing such a virus impossible.

Is it possible to use the functions written on the front of some of the keys on the numeric keypad (NumL, PgDn, PrtSc, ScrL etc)?

Those funny little functions are in fact for use with the A2000 Bridgeboard PC emulators (don't ask me why the A500 has them!) When in Amiga mode, these functions have no effect whatsoever.

Is it possible for the BBC Emulator to read straight from BBC disks?

Unfortunately, the BBC Emulator cannot read BBC disks directly. However, it includes built-in software to allow you to port files across by connecting a lead between the Beeb's RS-423 and the Amiga's serial port. The lead can be bought ready-made and will only cost you about £10.

How do I find out how much space is free on a disk?

All Amiga Workbench disks have a little CLI command called 'INFO' which will tell you everything you want to know. To use it, just type INFO and press [Return] and the command will tell you the amount of space used and available on all drives connected to the system.

Speaking Text Files

If you have Workbench 1.3, then you may not have noticed a very handy little addition that enables the Amiga to read text files without having to use the system 'say' command (although it's still there if you need it).

Workbench 1.3 added a new device handler called 'SPEAK:' that can be used in a similar way to other devices such as 'PAR:' and 'SER:' to allow files to be redirected to them without the hassle of having to initialise data structures etc. The most common application for this is for CLI users who wish to have a text file audibly read to them (a bit like having a proof

reader on a disk!) For example, to copy a text file called 'Fred' to the SPEAK: device, you would type:

```
COPY Fred SPEAK:
```

Or alternatively:

```
TYPE > SPEAK: Fred
```

AmigaBASIC users can also use the SPEAK: device as an alternative to the standard 'SAY' and 'TRANSLATE' commands, to allow immediate access to the speech synthesiser. All you would do is to open a channel to the SPEAK: device in the same way as you would open a channel to the 'PAR:' or 'SER:' devices using the following command:

```
OPEN "SPEAK:" FOR OUTPUT AS #1
PRINT #1, "HELLO THERE"
```

Can I digitise colour images from a video recorder?

To be able to digitise colour images from video, you'll need a rather expensive piece of hardware called a composite signal decoder which basically splits a composite video signal into its red, green and blue components. Unfortunately, we haven't heard of anyone selling such a device for use with home video recorders. To digitise while the tape is running you'll need a real-time digitiser which grabs images at one fiftieth of a second.

However, there is a way of getting around this problem which will cost you absolutely nothing.

What you'll need is a video recorder capable of producing very steady paused frames. You'll need a black and white video camera with a tripod and an ordinary light bulb for use as a light source.

First, position the video camera just in front of your television where none of the edges can be seen. Next, position your light source above and slightly behind the camera. Finally, turn on your video recorder, locate the frame to be captured and freeze the picture ready for the digitising process to go ahead.

It's easy to grab the image: use the red, green and blue filter wheel included with DigiView to take three shots of the screen. You'll find that the results are surprisingly good.

Large RAM Disks

Those of you with more than a megabyte of memory can speed up disk copying by expanding the Workbench 1.3 'RAD:' device to a full 880K (same as a floppy disk). To do this, load the MountList file into Ed using the command ED DEVS:MOUNTLIST. Next, locate the mountlist entry for RAD: and, in particular, the line that reads 'HighCyl = 21'. Change this line to read 'HighCyl = 79' and then save and quit the editor. Finally, type MOUNT RAD: and you now have a recoverable (and bootable if you have 1.3 Kickstart!) extra disk drive that can be used in the same manner as any floppy drive.

A2000 Keyboard Extensions

External keyboards are all very nice, but why do computer manufacturers always make the connecting leads so short? Thankfully, you can extend the length of the A2000 keyboard very cheaply and, best of all, without ever having to snip a single wire.

The A2000 (and the B2000) keyboard uses a five-pin DIN type connector to connect to the main system box. This five-pin DIN socket is the same connector used by many audio, video and MIDI devices, so an appropriate lead shouldn't be hard to find. What you'll need is a lead that has a male five-pin DIN connector on one end and a female five-pin DIN on the other end. This should then be connected between the Amiga and the keyboard.

Bootblock Checking

There is a bootblock checker built in to Workbench 1.3 which may help in the fight against viruses. To use it, you must first enter the CLI and then just type INSTALL DFO: CHECK. The 'Check' option tells AmigaDOS to compare the bootblock of the disk currently within the internal drive with a standard 'clean' bootblock. If the bootblock appears suspect, then Install will return 'MAY NOT BE STANDARD V1.2/V1.3 BOOTBLOCK', else it will return 'APPEARS TO BE STANDARD V1.2/V1.3 BOOTBLOCK' if everything seems clean and healthy.

If Install thinks that the bootblock is suspect, all you have to now do is to type 'INSTALL DFO:' and the potential virus will be sent to live on the great floppy disk in the sky. Remember, though, that there are plenty of non-standard bootblocks that are not viruses, such as those on commercial games. Be sure that your disk needs a standard bootblock before using this.

Is it true that Commodore will soon release new chips for the A500?

Commodore are indeed developing a new set of custom chips in the form of the new ECS (Enhanced Chip Set) upgrade. According to Commodore Technical Support, the full enhanced chip set (Agnus, Denise, Paula and Gary) is still in development. The upgrade will allow, amongst other things, a new hi-res screen mode like a flicker-free interlace.

Even if you did get them early, you'd still need Kickstart 2 and Workbench 2, the versions used in the new Amiga 3000, to be able to use them. The ECS will not actually give your machine any extra memory, either. The current custom chips can only access the first 512K of memory (chip memory) but the new ECS allows the custom chips to access a further 512K, therefore raising chip memory to a full megabyte. To take advantage of this, you will have to increase the amount of RAM in your machine by purchasing a RAM expansion (such as Commodore's A501 512K RAM board).

How do I tell if my machine has the new ECS Agnus?

The easiest way to test whether you have a 1 Mb Agnus is to enter the CLI and type avail. If the amount of chip

RAM available is greater than 500K then you have an ECS Agnus (make sure no other programs are running when you do this as they could swallow up Chip RAM).

Any programs that are graphically or sonically intensive will benefit from the new Agnus. For example, your sound sampler will be able to capture considerably longer samples and you'll be able to run programs such as *Deluxe Paint* in high resolution mode while also running a program such as *Professional Page*.

If software is written to abide by Commodore's guidelines then the increase in Chip RAM will be transparent to the application. In theory, all applications programs should automatically take advantage of any extra chip RAM available without the need for modification. Many applications, particularly something like *Professional Page*, will be made considerably more useable by the presence of 1 Mb of chip RAM.

Using a monitor as a TV

So you've got yourself an Amiga plus monitor and access to a video recorder: how would you like a free TV thrown into the bargain?

What you'll need is a pair of leads with phono connectors on one end and the appropriate connectors on the other end to connect to the 'Video Out' and 'Audio Out' sockets on your VCR. First of all, just connect a lead between the VCR 'Video Out' socket and the 'CVBS/L' connector on your 1084 and then do the same with the 'Audio Out' and 'Audio' connector on the VCR and Monitor respectively. Once everything is connected up, pull down the front panel on the 1084 and press in the little button labelled 'CVBS/RGB'. Now when you play a tape on the VCR, the picture will be displayed on your Amiga monitor. If the video display seems to become corrupt when you turn on the Amiga, try unplugging the SCART lead that connects the Amiga to the monitor.

If you also have an aerial lead plugged into the VCR, while a tape is not running you'll be able to watch *Neighbours* on your 1084.

Is a RAM disable switch needed on a RAM expansion?

Some games software is written rather sloppily and therefore doesn't always work if your Amiga has extra RAM. As a result, having a RAM disable switch can be very useful to allow you to use these games without having to resort to removing the board itself. Fitting a RAM expansion to your machine, by the way, shouldn't invalidate your warranty.

Is a C64 Emulator worth buying?

The simple answer to this question would be 'yes'. Unfortunately, it's not that clear cut. Although ReadySoft's emulator will run the vast majority of software (including games), it is considerably slower than a real 64. If you wished to use the emulator to run business software, then it would be worth the investment, but for games you'd be best advised to save your money and try and pick up a secondhand 64.

The 64 Emulator is both a hardware and software based emulator. The vast majority of the emulation is handled within software, but an additional hardware add-on allows you to connect C64 disk drives (including the incredibly speedy 1541!), therefore allowing you to read and write C64 disks directly from your Amiga.

Can I connect several A590 hard drives together?

If you connect additional SCSI drives to the A590, you will have to set DIP switches on both the A590 and the extra drive so that the Amiga can differentiate between them. Apart from this, you shouldn't have any problems.

Can I run games with a hard drive attached to my Amiga?

The designers of Kickstart 1.3 were a clever lot and they have therefore already taken this problem into account. When you turn on your machine with a hard drive attached, the machine will first check to see if a bootable disk is in the internal drive, and if one is found, your Amiga will then boot from floppy instead of hard drive. If no disk is found, control is transferred to the hard drive.

More Samples in Sonix

Here's a quicky tippette for those of you wishing to take advantage of expansion memory when using Aegis' excellent *Sonix* music package. The way to use extra samples on an expanded Amiga is to force the *Sonix* program into fast memory. But how to do this?

Simple. What you must do is to copy the program 'FASTMEMFIRST' from your Workbench disk across to the *Sonix* program disk. Next, edit the *Sonix* StartUpSequence (to be found in the 'S' directory) so that FASTMEMFIRST is always loaded and runs first, before anything else happens. This will then force the *Sonix* program into Fast Memory.

Simplifying Second Drives

The addition of a second drive to the Amiga is viewed by many as more of a necessity than a luxury. Unfortunately, because drives are automatically configured by the operating system, this uses working RAM. What's wrong with autoconfiguring? I hear you ask. Well, because some aspects of disk reading and writing are handled by the Blitter, adding external drives uses up valuable chip RAM.

Each disk drive requires a 30K buffer for file management. While 30K may not sound like a great deal, once it has been allocated, it cannot be released. Fortunately for the adventurous among you, you can avoid the hassle of having to unplug your external drives every time by fitting an on/off switch. The switch breaks the line that informs that an external drive is connected to the system, therefore the Amiga ignores it.

What you'll need is a single-pole, single-throw switch (SPST if you prefer) and a soldering iron. Firstly, unplug the drive and open up the connector and locate pin 21 (SEL1) and then cut the wire, leaving enough on each side to connect a switch. Next, solder a switch between

the two ends and mount it somewhere nice and safe. Finally, reassemble everything carefully and then you can plug in and go.

Workbench 1.3 Tricks

Three undocumented features exist in this update, all of which are quite useful. The first is a pseudo-command name CLEAR, which if entered normally from the keyboard simply clears the screen: but the word CLEAR can be used in a command file to produce a CLS, avoiding the use of the ECHO "*ec" set up. CLEAR is in fact an alias for the following involved line:

ECHO "*E[0;oh*E[J"

With the SHELL up and running, enter REVERSE to produce an instant window change to blue on white. Entering NORMAL changes you back again. As before, both commands are Aliases for ECHO strings, both of which can be used in Workbench 1.2 as follows: Enter Ed Reverse to bring up the Editor; input the following line, and Save it with ESC then X:

ECHO "*E[0;OH*E[41;30m*E[J"

Typing EXECUTE Reverse activates the effect. To utilise the NORMAL command, proceed as before but enter ED Normal and input:

ECHO "*E[0;OH*E[-0;31m*E[J"

Type EXECUTE Normal to return to white on blue.

Using the CLI Assign Command

Imagine a situation involving your most-used CLI disk, which for the sake of reference, we'll call Workdisk. On it you have a series of Directories concerned with the types and numbers of screws, nails, bolts, etc, that you keep in old jam jars in your garden shed. These Directories are names: Screws, Bolts, Nails, Tacks, and are tested within the first Dir. You find, for whatever reason, you are constantly accessing the Tacks Directory, either to Edit it, or peruse its contents, and your command line looks something like this:

ED Workdisk:Screws/Bolts/Nails/Tacks/Filename

A tedious tarra-diddle if ever I saw one. Enter stage left one knight in shining armour, the Assign command. Simply input the following line:

ASSIGN Tacks: Workdisk:screws/Bolts/Nails/Tacks

The transformation is now complete, and now access to the Tacks Directory is simplicity itself. To read a file named Littletacks in the Tacks Directory enter: Type Tacks:Littletacks. The reason that the above works is because you have created a new Logical Device named Tacks which will be treated just as if it were a disk. If you enter Assign <return> a list of all the Logical Devices recognised by AmigaDOS will be listed, and on it will be details of the Tacks: Device. This ASSIGNment however is lost when the Amiga is switched off, or reset, but could be made permanent by including the instruction in the Startup-sequence file. To remove the newly ASSIGNed device without a reset, enter 'ASSIGN Tacks:'.

Explaining Lazarus

Occasionally bad disks that require the Workbench DiskDoctor treatment are renamed 'Lazarus', or on re-formatting the disk, it often displays the message 'All Data on LAZARUS will be lost, do you want to continue?'. You may well be asking what the hell is Lazarus? Well, Lazarus was the chappie that Jesus supposedly brought back from the dead. When DiskDoctor rescues a corrupt disk, it automatically renames the disk to Lazarus. Think about it for a while and you'll soon realise that this is another classic example of what is commonly known in the trade as a 'programmer's joke'.

Locking Hard Drives

Protecting important data on a floppy disk from accidental erasure is a simple process: just flick the write protect tab to the correct position and your data is (fairly) safe. But what do you do when you have a hard disk? Try as hard as you might, you'll never find a write protect tab on your hard drive!

Luckily, if your hard drive is formatted under the new Fast File System that was introduced under Version 1.3 of the operating system, then you'll be glad to learn that there is a way of protecting your valuable data. Any Fast File System drive or partition may be temporarily protected against deletion using the Workbench 1.3 Lock command.

The lock command allows you to set the write protection status of drive or partition, which will remain locked until the system is rebooted or you turn the lock off yourself. Optionally, you can even assign a four character password to the locked partition so that only you can then unlock it. The syntax of the Lock command is LOCK <FFS DRIVE/PARTITION> [ON/OFF] <PASSWORD>.

For example, if you wanted to lock your hard drive without a password, you would simply enter Lock DH0: ON. To unlock the drive again, just enter Lock DH0: OFF. If you wanted to lock your drive with a password, you would enter Lock DH0: ON FRED, where 'FRED' is the password to be used. To unlock the drive, you would then have to enter Lock DH0: OFF FRED. Trying to enter just Lock DH0: OFF on a password protected drive, for instance, will not work.

Cancelling a Deluxe Paint Quit

Unlike most packages, when you select the QUIT option in *DPaint*, the program will not give you the option of cancelling the operation. However, if you have made changes to your art since it was last saved, then *DPaint* will give the option of saving your artwork before exiting.

But what do you do if you accidentally select Quit and want to get back to *DPaint*?

Although *DPaint* doesn't actually have a Cancel Quit option, there is a way around this. When you select Quit, *DPaint* will display a requester allowing you either to drop straight out, or to save your work and then quit. If you select Save, *DPaint* will display a file requester. Now just select 'Cancel' on the file requester and the entire quit operation will be aborted.

The CLI Which Command

You probably already know that AmigaDOS allows you to set up 'Search Paths' that it uses to find programs. When you enter a command at the CLI (DIR for example), AmigaDOS has a list of directories that it will search to find the command that you wish to be executed. As default, these directories are set to the C directory and the current directory. Once you start adding your own search paths, it can easily become almost impossible to keep track of where your commands are stored.

As always, AmigaDOS has a solution to this problem in the shape of the Workbench 1.3 command WHICH. The Which command searches the resident list (created by NEWCON:), the current directory and the AmigaDOS command search paths for a user-specified file. If the file is found, Which will then display the complete pathname where the file is to be found. To use the command, just type WHICH <Filename>, where 'Filename' is your command.

What is a Copper List?

A 'Copper List' is a list of instructions that control the operation of the Amiga's Copper graphics co-processor. The Copper is a simple, but very powerful co-processor that carries out its operations according to the position of the scanline on the monitor. It is this chip that allows the Amiga to display multiple screens with different resolutions and colour palettes.

The Copper has its own programming language which consists of three commands: WAIT (Waits for the scanline to reach a particular part of the screen), MOVE (Moves a 16 bit value into a hardware register) and SKIP (skips the next instruction if the scanline has already reached a particular area of the screen). A Copper List is basically a program built up from these three commands. Although these commands seem a little limited, a great deal can be achieved using them. A typical Copper List effect is multi-coloured horizontal bands on the screen.

Converting HAM pictures to 32 colours

Although HAM is all very nice if you want to impress your friends, if you wish to work with HAM pictures seriously within a package such as *Deluxe Paint*, you'll have to convert the pictures into a more useable format.

The best way of converting pictures between HAM and 32 colour mode (and just about every other display mode) with minimal loss of picture quality is to use one of the two big image processing packages available for the Amiga, *Pixmate* from Progressive Peripherals and Software, and *Deluxe PhotoLab*, from those nice people at Electronic Arts.

Converting a HAM picture to 32 colours with *Pixmate* is simplicity itself. Firstly, load in your HAM picture and then press the right mouse button to bring up the menu strip. Now just enter the 'Color' menu and select the 'HAM to 32' option. After a few seconds, your picture will be converted before your very eyes.

Achieving the same results with *Deluxe PhotoLab* is a bit more involved. Firstly, run the 'Colors' program on your *PhotoLab* program disk and then load in your HAM picture. Next, bring up the menu strip and select 'Sort On –> Population' from the 'Color' menu. This will sort the 16 HAM colour registers according to which are used most. Next, select 'Set To –> 320x256' from the View Modes menu if your HAM picture is non-interlaced, or 'Set To -> 320x512' if your picture is interlaced.

After checking to make sure that the operation you have selected is really what you want, *PhotoLab* will ask you the sensitivity of the colour reduction algorithm: for best results, select 'High'.

Using the CLI CMD Command

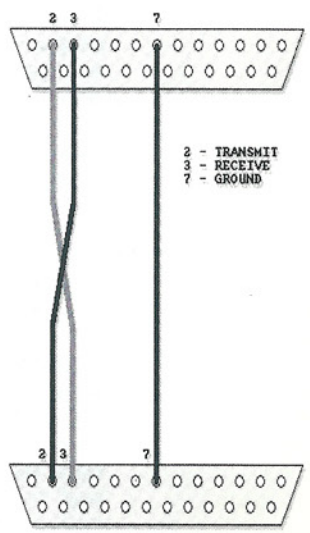
The CMD command is a little 'patch' program that is used to redirect what would normally be send out to a parallel or serial output device (such as a printer), to a separate disk file. This can be particularly useful if you wish to print out several files in the shortest amount of time. Using it, you could load each file into your word processor, print it out, load the next, print it out etc. All these files would then be sent to a disk file that can be taken along to another Amiga and printed out in no time at all, complete with all escape codes, the works.

CMD can be run from either the Workbench or from the CLI. For best results, the command is best suited to

What is a datalink or null modem cable?

A null modem/datalink cable is simply a serial cable that provides unbuffered communication between two machines (regardless of model or make) that support the RS-232 connector. Quite a few companies offer them for about £15, but you could make one yourself for a lot less than this.

All you need are two 25-pin connectors (of appropriate gender) and a length of cable containing at least three separate lines. Now just solder up the three lines as shown in the diagram below. Note that two of the lines actually cross (pin 2 on connector A goes to pin 3 on connector B and pin 3 on connector A goes to pin 2 on connector B).



the CLI. The Syntax of the command is CMD <Device Name> <Output Filename> [OPT s/m/n] (the OPT parameter is, er, optional). The Device name can either be serial or parallel (note that you cannot use PAR: or SER:). The Output Filename is the filename of the file that the output is to be written to (obvious really).

The 's' option tells CMD to ignore what is called the printer 'short initial write', which is basically a reset signal sent by the printer to inform the printer driver that the device is ready to receive data. This signal isn't needed for text files, so always specify the 's' option.

The 'm' option is used if you wish multiple files to be written to the same file, one after another. If this is not specified, CMD will overwrite the last file that was written. You can break out of this by pressing <CTRL> + <C>.

Finally, the 'n' option enables notify mode. Notify mode is used to keep you informed of progress during the file transfer.

Is there any way to 'call up' a directory into a word processor?

If you need to print out a listing of the contents of a particular directory (or include it within a document that you're working on within your word processor), what you must first do is to obtain the directory listing using the CLI command 'DIR'. Using output redirection, it is possible to send the output from DIR to a text file. If you typed DIR > DF0:DIRTEXT SYS: OPT A, a text file called 'DIRTEXT' would be written to the disk in the internal drive. This file will contain an ASCII listing of the entire contents of your boot disk. If you then type 'COPY RAM:DIRTEXT TO PRT:', the listing will then be printed.

Using Extras Printer Drivers

Life with Workbench 1.2 was a joy for printer owners – if you needed to install a printer, all you needed to do was to load 'Preferences', enter the 'Install Menu' screen, select the printer you required and that was it – all the printer drivers you required were immediately accessible. However, Workbench 1.3 is a different beast altogether.

Although the mechanics of installing a printer are almost identical, Commodore (in their infinite wisdom) decided that it would be a jolly good thing to remove the printer drivers and put them on the Extras disk instead, making them totally inaccessible to Preferences. What are you to do?

The answer lies in a little utility that Commodore so thoughtfully provide called 'Install Printer' which (surprise, surprise) is used to transfer the printer driver you require from the Extras disk to your Workbench disk.

Will a plastic screen help interlace flicker?

The plastic screens are available for many different makes of computer, including the Amiga, and their sole role in life is to cut down screen-glare to a more usable level. They might make interlace easier on the eye, but they won't stop it flickering. There are basically two types available – Mesh and Polarised filters. The best type to go for is the Polarised filter, but they do tend to be rather expensive. The cheaper mesh variety do a similar job, but picture quality does tend to be degraded. If you require such an item, then Cavendish Commodore Centre sell a filter called Jitter-Rid for £15.95. Cavendish can be contacted on 0533 510066.

The only real way to solve interlace flicker currently is to buy a Flicker Fixer card at a cost of about £200.

Will ECS solve interlace flicker?

In a way, the Enhanced Chip Set will indeed fix the interlace problem – but only if you have an expensive multi-sync monitor (just like the Flicker Fixer!). The ECS does not completely rid the Amiga of interlaced screen modes, it just adds new (non-interlaced) screen modes to the existing ones. For video work, Interlace is very important, therefore removing it altogether would be a big mistake by Commodore.

Most software will not immediately be able to take advantage of the new ECS screen modes and will therefore have to be re-issued in an ECS-compatible form. However, some software, for example *ProPage* and A-Max, will take advantage of ECS immediately.

Are 68020 and 68030 cards worthwhile?

Processor cards are really only of use if you use your Amiga for particularly complex number crunching applications such as Ray Tracing, Solid Modelling etc. For such applications, the time taken to generate the final image is hampered by how fast the processor can perform the necessary calculations. With the addition of a maths co-processor such as the 68881 (or the faster 68882), things really start to cook. Processor cards are expensive beasts, therefore they really are only worth buying if you are truly serious about your number crunching applications.

A cheaper solution is to treat yourself to one of the 16 MHz 68000 cards that are available from companies such as Third Coast Technologies. These cards consist of a faster version of the 68000 that is already installed within your Amiga. Some older software will not work with '020 and '030 cards, but all software will work with a 'turbo-charged' 68000. These cards are also considerably cheaper than even the cheapest '020 card. Third Coast sell their 16 MHz CMI board for just £180. Third Coast can be contacted on 0257 472444.

These days, most games are written to abide by strict timings that remain the same regardless of the processor used. However, some games that involve complex mathematics and particularly 3D routines (*Virus* or *Interceptor*, for example) are enhanced by the addition of a faster processor.

Virus Advice

Although the common 'boot block' virus is practically extinct, the IRQ parasite virus still continues to wreak havoc throughout the Amiga world. 'Parasite' viruses work by attaching themselves to the front of other

programs. If the virus hasn't already been loaded into memory when you run the infected program, IRQ will be brought to life before running the actual parent program.

If you get a warning from a virus killer that this type of virus is in memory, normal procedure is to check the programs within your C and root directories. However, tracking down infected programs isn't as easy as it may first seem...

Although tracking down infected programs is usually a straightforward task (as long as you have a program such as the PD killer, *KV*), there are often cases where the infected program can be disguised. This can happen if an infected program is packed using a cruncher program. If the program was infected with IRQ before crunching took place, the crunching process could well hide the tell-tale signs that allow such viruses to be tracked down. However, when the crunched program is run, the de-cruncher that is attached to the crunched program will decrunch both the program and the virus.

If you can work out which cruncher was used to pack the program, it may well be worth your while to decrunch the program, run it through your virus killer and then recrunch it. Recently packed programs are probably crunched using the excellent *Power Packer* utility that is available from most PD libraries.

Using PAL screens on programs that don't run in PAL

Pal Amigas are wonderful – while our cousins across the pond have to put up with a maximum vertical screen resolution of 400 lines, we Europeans have access to a whacking 512 lines! Not only are screens displayed in a higher resolution, but for applications such as DTP, those extra lines can be a real lifesaver.

Unfortunately, not all software supports a PAL resolution screen – games and many older serious packages are the main culprits. While this is not a particularly great loss for games players, it can be a real pain for serious applications. For example, what's the point in using a video titling package if your text can only appear in the top two thirds of the screen?

There is, as always, a way around this problem which should make most of those NTSC packages work with a full PAL resolution screen. The solution comes in the form of a little known PD program called *OverScan,* which can be found on Fish Disk 133. Once run, *OverScan* tells the operating system to try and open every window and screen that would normally have only stretched to 200 lines, to a full 256 lines (or 512 if in High resolution).

Immunising Workbench

Workbench is without doubt the most used of all program disks that you're likely to own for your Amiga. Chances are that when using your Amiga, you'll load Workbench eventually. However, what happens if your Workbench disk becomes infected with a virus? Basically, you've got problems, as that virus will eventually find its way onto any disks that are inserted after Workbench is loaded. There is a way to make your Workbench disk check that it is always clean of viruses, using the enhanced Install command on 1.3 Workbench. All you have to do is to edit your Workbench StartUp-Sequence file and add the following lines:

```
Echo "** Checking for Bootblock Virus...."
Install DF0: CHECK
IF WARN
    Echo "*** VIRUS FOUND ***"
ELSE
    Echo "Workbench bootblock is still clean."
ENDIF
```

If a virus is found while Workbench is booting, wait until the boot process has finished, remove the Workbench disk and TURN OFF your Amiga and load your favourite virus killer. If you just re-install the disk using the virus-infected disk, chances are that the virus (which will be in memory) will automatically write itself back to the disk as soon as it thinks you are trying to erase it.

Stand-alone NotePad

So you want to create a bootable disk that will automatically load and run the Workbench NotePad program, eh? Here's all the info you need to create your own NotePad disk.

The first thing you must do is to load Workbench into your machine. Once the Workbench screen appears, double click on the Workbench disk icon, then double click on the System drawer to get to the CLI icon. Once the CLI icon appears, double click on it and the CLI will spring to life.

First of all, we need to format a disk that will be used to hold the NotePad program. At the CLI, enter the following command and press Return.

```
Format DRIVE DF0: NAME "NotePad" NOICONS
```

After a few seconds of disk access, the Format program will ask you to insert the disk to be formatted. Now is the time to remove your Workbench disk and insert your blank disk. Once you've done this, press Return and the formatting process will begin.

After what will seem an eternity, the disk format will finish and you will be returned back to the usual CLI prompt. Remove the disk, re-insert the Workbench disk and enter the following commands (press Return after each):

```
Copy C:CopyIMakeDirIInstallIEd RAM:
Path RAM: Add
```

You have now set up your working environment to allow you to copy files to your new NotePad disk without having to constantly swap disks. Now enter the following commands to start constructing your NotePad disk (don't forget to press Return after each):

```
Copy DEVS:clipboard.deviceIprinter.device RAM:
```

```
Copy DEVS:parallel.devicelserial.device RAM:
Copy DEVS:system-configuration RAM:
Copy LIBS:icon.libraryldiskfont.library RAM:
Copy SYS:Utilities/NotePad£? RAM:

Copy DEVS:Printers/<Printer Driver> RAM:
```

In the last command, the <Printer Driver> should be replaced by the filename of the printer driver that you use. In most cases, this will probably be EpsonX.

If everything went OK, you're ready to start transferring the necessary files to your NotePad disk. Remove your Workbench disk and re-insert the disk that you have just formatted. Now enter the following commands:

```
MakeDir DF0:S
MakeDir DF0:LIBS
MakeDir DF0:DEVS
MakeDir DF0:DEVS/Printers

Copy RAM:NotePad£? DF0:
Copy RAM:£?.device DF0:DEVS
Copy RAM:£?.library DF0:LIBS
Copy RAM:system-configuration DF0:DEVS
Copy RAM:<Printer Driver> DF0:DEVS/Printers
```


Once again, the <Print Driver> must be replaced with the filename of the printer driver that you copied earlier. Once all disk activity has ceased, you're ready to configure the disk ready for use. Enter the following command:

```
Install DF0:
```

All that now remains is to create a StartUp-Sequence file that will tell the Amiga to load NotePad every time the machine is booted from your NotePad disk. This is achieved by entering Ed DF0:S/StartUp-Sequence. After a second or so, the CLI text editor will appear. Just enter the line NotePad and press Return. To save your StartUp-Sequence to disk, press the Escape key (an asterisk will appear at the bottom of the window), followed by 'x' and finally Return.

Your NotePad boot disk is now complete. To test it, just reset your Amiga with the NotePad disk in the internal drive and you're away. Note that this version of NotePad will only give you access to the standard Topaz font – if you want others you're going to need to create a FONTS directory and copy across the fonts that you require (speak to your friendly Amiga expert for help on this). Happy Word Processing!

Improving TV modulator signals

Anyone who uses the Amiga with a TV modulator will know that the picture quality is far from satisfactory. Although the Amiga produces beautiful screen displays, these are let down by the poor quality of Commodore's A520 TV modulator.

However, there is a way to improve picture quality substantially by channelling the output from the TV modulator into an aerial booster amplifier (intended for use with indoor TV aerials). These little devices can be bought for around £15 from most good electrical stores such as Tandy. The resulting picture almost matches that obtainable from a proper monitor.

Epson Printer Tips

Here's a couple of scorching hints to help you get a decent graphics printout from any EpsonX-compatible printer with your Amiga.

1. Check the current density settings within Preferences – if you are using density 1 or 3 then watch out, because the paper type setting affects the line-feed distance, leaving gaps between lines! If the paper type is set to single, then the line feed must equal the number of dots printed minus one third of a dot. The wrong value here can result in horrible horizontal banding, which can make your print-outs look pretty awful! The best way of working out the ideal setting for your printer is simple – just experiment.

2. Try checking the printing gap setting in the printer. Don't be put off by having to delve inside your printer – the results are worth the effort! On the Star LC-10, this adjustment is carried out using a small lever located at the left-hand side of the metal bar on which the print head travels. If in doubt about its location, refer to the manual that came with your printer.

This adjustment can make a surprising improvement in print quality. I have found that the different density settings in Preferences tend to require different gap settings to obtain good results.

3. Remember to use a white background colour or select 'negative' in Preferences in order to save wear on your printer ribbon (not to mention your ears!!)

Why won't my printer print in colour?

There are several reasons why your printer could be refusing to print in colour. The first possibility is the blatantly obvious one – have you got a colour ribbon in the printer, or is it just a normal black ribbon? Secondly, have you actually told the Amiga that you are using a colour printer? This is achieved using the Workbench Preferences tool. To check, load Preferences, enter the Change Printer screen and then click on the Graphic 1 gadget and you should see a screen display which will allow you acces to various options.

You'll notice that there is a box called Shade at the bottom left of this screen that contains four gadgets. The one that you are interested in is colour, which should be highlighted (click on it if it is not). Once you've done this, save off your new configuration and try to print in colour – if all goes well, your problem should now be solved. Note that you will have to carry out this procedure for all your boot disks (*DPaint* etc).

Why does my printer print # not £?

The problem with hash symbols is simple to solve. Somewhere on your printer you will find a row of DIP switches. These are used to configure various aspects of the printer. One of these DIP switches (pin 5, if my memory serves me well) is used to tell the printer to print either hash symbols or pound signs. Refer to the manual that came with your printer to find out exactly which DIP switch to flick.

Why is there such a large variation in price between RAM expansions?

Speaking very generally, there is very little difference between 512K RAM expansions. However, there are several things to take into consideration when choosing the one that is good for you.

Some RAM expansions offer battery-backed clocks that allow the Amiga to keep time even when it is turned off. Most people rarely use these, so it is simply as case of deciding whether your require such a facility. Usually, the lack of a battery-backed clock can knock about £20 off the price of a RAM expansion.

Another factor to consider is future expansion. If 1 Megabyte is enough for your needs just buy the cheapest 512K RAM board that you can find: otherwise you are advised to look for a board that offers further expansion. Quite a few boards come populated with just 512K but can be taken further by plugging in extra RAM chips.

How can I edit the RAM disk icon?

There are actually two sides to this problem. Firstly, how to actually load, edit and save the RAM disk icon and then how to actually display the new icon in all its glory.

Loading the RAM disk icon is fairly straightforward. When your icon editor asks for the filename of the icon to be edited, enter the filename 'RAM DISK:disk.info'.

Once you've altered the RAM disk icon, you'll want to actually view it. Simply saving the modified icon straight back to the RAM disk won't work – the Amiga will continue to display the old RAM disk icon. The answer is to save your modified RAM disk icon to your boot disk (Workbench in most cases) under a different filename ('SYS:RAMDISK.ICON' is a good filename.)

Next, you must major a quick change to your startup-sequence so that the icon is copied across to the RAM disk. Firstly, load the StartUp-Sequence file into a text editor and locate the line that reads 'LoadWB'. Once you've found the line, insert the line 'COPY SYS:RAMDISK.ICON RAM:disk.info' immediately before it and then resave the StartUp-Sequence under the same filename. Now when you reboot your Amiga, the RAM disk icon will always display your icon instead of the rather dull default icon, when Workbench finally appears.

How can I use a HAM IFF picture as a loading screen in AmigaBASIC?

Photon Paint and *DigiPaint* both produce HAM pictures which can be a real pain to use from AmigaBASIC. A better solution is to produce your picture within a non-HAM package such as *Deluxe Paint* and then use the 'Load/LBM' source code on your Extras disk (to be found within the Basicdemos drawer) to actually display it.

How can I grab Amiga screens in IFF format?

There are a number of screengrab utilities available. One such screendump utility is a PD program called *SnapShot* which is available within the Fish collection of PD disks. *SnapShot* works using 'hot keys' and is therefore not dependent on the Workbench screen being available. However, *SnapShot* will not grab screens from games. The only way currently to grab screens from games is to use one of the freezer cartridges from either Nordic Power or Datel.

Memacs Backup Warning

A word of warning to all Memacs users. The version of Memacs released with the Workbench 1.3 enhancer software does not alter the archive bit on the file just edited. This means that if you back up your hard disk incrementally, any files edited using Memacs will not get backed up until you do the next full backup.

Using the CLI List Command

One particular command that makes life very much easier is the little-used 'List' command.

Among the extra options added to List is the 'LFORMAT' option that will be particularly useful to those of you who enjoy fiddling with batch files. The option is very similar to AmigaBASIC's PRINT USING command, since it allows you to modify the output from LIST to automatically create script files. For example, if you had a command such as 'VILBM' that doesn't support wildcards, but you wanted to view all files that ended in '.IFF' within a directory called 'PICS', how would you do it short of typing every filename? Simple: you use LFORMAT!

LFORMAT is used to change the output format from LIST by using what Commodore call an 'Output Format Specification' string. When LIST starts, it inserts the filenames from the specified firectory into your format string which can then be redirected into a separate text file. Once the output text file has been created, all that remains is to run it using the Execute command.

The format of the output string is LFORMAT "string". To include the output of LIST within this string, you use %s to indicate where the filename is to be inserted.

Going back to our Vilbm example, all you would type to solve this problem would be LIST> RAM:MYSCRIPT PICS/#?.IFF LFORMAT "VILBM %s%s" and then once this has finished, you would then execute the script file by typing EXECUTE RAM:MYSCRIPT. What the first command would do is to search the directory 'PICS' for any commands ending in '.IFF' and the output the results to a file called 'RAM:MYSCRIPT' in the format VILBM <filename>. The number of occurences of %S dictates how the filenames are inserted into the format string. If there is only one %s, then only the filename is inserted,

two '%s's inserts the path and filename, three inserts the path, filename and path again and four inserts the path, filename, path and filename.

Using an Amstrad CPC Printer

Have you upgraded from an Amstrad CPC to the Amiga? Do you still have an Amstrad printer floating around? This handy tip will save you pounds by enabling you to use the Amstrad printer on your Amiga.

While the Amstrad DMP2000 is standard Centronics and can therefore be plugged into the Amiga's parallel port, Amstrad, in their infinite wisdom, made the printer largely incompatible with any machine other than a CPC.

If you have Workbench 1.3, you'll be pleased to know that your faithful DMP2000 can be called in for active service. to get things rolling, select the printer driver for the CBM MPS 1500 from the Preferences and save the new setting.

As an added extra, if you set DIP switch DS2-3 to the ON position, you will be able to print graphic screen dumps directly to your printer.

Quicker Booting from RAM

Does the loading speed of Workbench annoy you? It often seems to take an absolute age for Workbench to load. Wouldn't it be nice for the Workbench to load instantly when the machine is rebooted? Well, if you're lucky enough to have a 1Mbyte expansion, it is possible.

Hidden away on the Workbench 1.3 disk, you'll find a listing in the mountlist for the RAD: device. This device is in fact a powerful recoverable RAM disk that retains its contents even after reboot. If you have 1.3 Kickstart, you need only mount it once as the system will automatically call it each time you reboot. If on the other hand you're still using 1.2, then you'll have to mount it again every time you reboot. A further advantage of using RAD under Kickstart 1.3 is that you can even have the machine boot from RAM disk – truly impressive.

To access RAD, you'll first have to drop down into the CLI. Before you can start using RAD, it must first be mounted onto the system device lists using the MOUNT command. This is achieved by typing MOUNT RAD:. RAD will install if you've got enough memory. If you haven't got Kickstart 1.3, you may have to format the RAD disk before it can be used. This is achieved using the FORMAT program in your system drawer.

It just remains for you to use the CLI to copy the LIBS directory and the various commands required from the C directory into RAD, and to create a start-up sequence for your new boot device. Reboot your machine without a disk in the internal drive and after a few seconds control will be transferred to RAD.

Setting the Time when Booting

One very handy feature offered by the Amiga A2000 – and many of the RAM expansion cards available – is the inclusion of a battery backed clock. Unless you've got plenty of dosh, such a feature is a mere luxury and you are left with a system clock that dies every time the machine is switched off. Wouldn't it therefore be nice if the machine asked you the time when you first boot the Workbench? Yes, you've guessed it, it can.

Many AmigaDOS commands use 'templates' that show you the format for using the command. These templates are usually called up when you enter a question mark (?) as the only parameter. This can be used to your advantage for getting a response from the user while a disk is booting. For example, if you enter DIR ?, a template will pop up saying DIR,OPT/K.

To use this tip, you'll have to load your StartUp-Sequence file into a text editor and add the line, DATE ?. If you now save your StartUp-Sequence back again and then reboot, the Amiga will ask you for the time. Simple but useful.

Getting Along without a Mouse

Amiga mice are delicate little creatures; when one does roll over onto its back and die, the machine is left virtually unusable. OK, so you can play *StarGlider II*, but what happens when you want to use the Workbench? You'd be stuck, generally.

It is possible to get along without the mouse using some very nifty keyboard shortcuts built into the Amiga. The first thing you will have to do is to press down on the right Amiga key and keep it pressed down. You can now move the mouse pointer around using the cluster of cursor keys. That's all very nice, but what about the mouse buttons? No problem: while keeping the right Amiga key depressed, press the left ALT key for the left mouse and the right ALT key for the right mouse button. No problem!

Have you ever been busy typing away within your word processor when all of a sudden a requester pops up asking you to 'Insert Volume...?' Having to dig deep under the masses of printer paper to locate your mouse can be annoying to say the least.

Luckily, Workbench also features a keyboard shortcut which allows you to 'click' on either RETRY or CANCEL without ever having to disturb your mouse. While pressing the left Amiga key, press V for RETRY or B for CANCEL.

IFF formats

One source of confusion for many new Amiga users is the IFF file format and the jargon that surrounds it "OK, I know what an IFF file is but what's all this about ILBM files and what about SMUS and 8SVX files?"

Contrary to what you may think, IFF is not a single file format for pictures. It is in fact just a common method of storing different types of data that was devised jointly by Electronic Arts and Commodore-Amiga in the early days of the Amiga. You'll find all sorts of different types of data stored in IFF format; there's an IFF type for sampled sound, two-dimensional raster images (pictures to you and me!), animations and even music.

Each different IFF type is identified by its own individual four-byte string, called the IFF 'form'. For example, the IFF form for storing pictures is the ILBM file

and the form for sampled sounds is the 8SVX. The form of an IFF file is used by programs to identify the particular IFF type before it is loaded. The major IFF forms are as follows:

OLBM – Picture files
8SVX – Sampled sound
ANIM – Animations
SMUS – Music scores
FTXT – Text files

Programming the Power Light

The hardware designers at Amiga, Inc certainly got it right when they designed the Amiga hardware. Everything a programmer could possibly want to do could be handled by the hardware; there's hardware sprites, scrolling and even a programmable power light! Programmable power light? Yep, that's right, you can even turn the power light on and off under software control! As an example, try resetting your Amiga and watch what happens to the power light.

The LED on and off switch is actually controlled through one of the peripheral control bytes in the Amiga CIAs which is located in memory at HEX BFE001 (decimal 12574721). Don't worry about the technicalities, accessing this line is very easy indeed.

This peripheral control byte actually handles not only the power LED, but the mouse and fire buttons on a joystick. Because this byte is multi-purpose, only one bit is allocated to the LED; bit number 2. Programming the LED through Assembler is very straightforward and is achieved by the line:

```
EORI.B #02,$BFE001
```

Unfortunately, achieving the same effect through Amiga BASIC is a little more involved:

```
A = PEEKB (12574721) XOR 2
POKEB 12574721, A
```

The LED control bit is in fact a toggle and therefore to turn the light back on after you've turned it off is just as easy. All you have to do is repeat the same procedure a second time.

Setting Preferences on a Boot Disk

You all know how much fun customising your Workbench disk can be. From the Preferences program you can define a mouse pointer of any shape, however rude, change the screen colours to tasteful shades of pink if you require, and you can even ruin your eyesight permanently by turning interlacing on.

What do you do therefore if you want to use the same configuration on another boot disk? You could run Preferences on the disk and set everything up from scratch, but that could take an awful long time. However, there is another way. Hidden away in the DEVS directory of your Workbench disk is a rather obscure file called system-configuration. This file contains all the information about screen colours, shape of your mouse pointer, which printer you use, etc, and is read by the Amiga when a disk is booting. If this file does not exist, the Amiga reverts to the default settings (blue screen, white text, etc). If you want to use the set up from one boot disk on another, all you have to do is to copy this file across into the DEVS directory of the destination disk. It is as easy as that!

DigiView Tips

Those of you who are lucky enough to own NewTek's excellent DigiView Video Digitiser will be interested in the following selection of hints and tricks which will allow you to get the most from this powerful add-on.

• If you have a video camera other than that recommended by NewTek, you may have noticed that the filter wheel supplied with DigiView doesn't always manage to completely cover the camera lens. If you do have this problem, it is very easily overcome.

You could replace the NewTek filter wheel with proper photographic colour filters like those manufactured by companies such as Cokin, but these are astronomically expensive. The solution comes in the form of acetate 'disco' filters. The filters to look for are the ones that are cut from sheets rather than the pre-moulded variety. These can be picked up relatively cheaply and will probably cost you only £1.50 for a set of five different colours. another advantage of these filters, apart from their price, is that they are ideally colour balanced and should in theory produce better results than the official NewTek filter wheel.

• It is sometimes inconvenient to hold or place a filter between the camera and the subject. Try illuminating the subject with light from a 35mm slide projector using transparencies of red, green and blue acetate.

• If you notice dark or black discs or trails which seem to be fixed to specific areas of your monitor screen while displaying the output from your video camera, don't jump to the conclusion that you have 'burn-outs' on the video tube (many second hand cameras have this problem). Unscrew the lens and try a photographer's blower brush in case there is dust or hair on the front of the tube.

Making your Amiga say Hello

Wouldn't it be nice to be greeted in a civil and personal way by your Amiga every morning? The secret lies in the file STARTUP-SEQUENCE of your boot disk.

STARTUP-SEQUENCE is a text file in the S directory of the disk. When your Amiga starts up it automatically reads this file, which contains a set of command lines. These commands are ordinary CLI commands like ECHO "Workbench 1.3", which makes the Amiga display the text in quotes on the screen. One command in the file is LOADWB, which is the command to load the Workbench after the usual blue AmigaDOS screen appears.

The first thing to do is to make up a useful copy of the Workbench disk. The Amiga master disk is full to the brim, so you haven't got any room to create your own files on it. Make up your own working copy as follows:

1. Take a blank disk and copy the whole Amiga Workbench master disk in the usual way (put a blank disk in the drive and drag the Workbench disk icon onto it).

2. With your copy now in the drive, restart the Amiga.

3. Get to the CLI prompt as previously described.

4. Delete some useless files by typing very carefully:
   DELETE UTILITIES ALL [Return]
   DELETE DEMOS ALL [Return]

Now you've got room on the disk to start doing things. To modify the startup process as you want, first you need to edit the file. Luckily the Amiga has a test editor on its master disk. At the CLI prompt, type: ED S/STARTUP-SEQUENCE. You are now in the text editor; you can use the cursor keys and delete keys to modify the text on the screen. A fun line to add is to make your Amiga speak to you. Press [Return] to open up a blank line at the start of the file, then type in the following:

SYSTEM/SAY :Good Morning, O Superior Being. How can I be of service?"

Now save the modified file by pressing [Esc] and typing X (for eXit) and [Return]. You will be returned to the CLI prompt.

Wait for the disk drive light to go out, then reboot your Amiga. Hey presto, it speaks to you! The voice may be a little stilted, and you may find that spelling words phonetically gives you better results. Type 'servis' rather than 'service', for instance.

You can of course put any text you like inside the quotes of the SAY command, and have any number of lines of SAY commands.

Simpler Disk Copying with RAM

Only having one disk drive is a pain. To copy one disk to another takes half a dozen disk swaps, and every time you type a CLI command you have to put your boot disk back in the drive.

A good way around all this is to use the RAM disk. First, you need to understand what happens when you try to run a command on the Amiga: imagine you are at the CLI and you type DIR to get a directory of the current disk. The Amiga needs to find a file on disk called DIR, which contains the DIR program. It first looks in the current directory, and then the C directory of your boot disk. What this means in practise is that if you have a disk other than your boot disk in the drive, you will be asked to swap it.

It is possible to make the Amiga look for the commands in the RAM disk instead, so you need never swap disks to run simple CLI commands. With your normal boot disk in the drive, get to the CLI and type:

```
COPY C/DIR TO RAM:
COPY C/COPY TO RAM:
COPY C/CD TO RAM:
COPY C/DELETE TO RAM:
COPY C/LIST TO RAM:
COPY C/INFO TO RAM:
PATH RAM: ADD
```

Now if you want to work on another disk, just put it in the drive and type CD DF0:. This logs you onto the new disk in drive 0. Now you can use all the commands like DIR from the RAM drive without swapping disks. Of course, if there are other commands you use then you should copy the files for these into the RAM disk too. The final line, PATH RAM: ADD, is what tells the Amiga to look in the RAM drive for files.

It's a good idea to put these commands in your STARTUP-SEQUENCE file to save typing them in every time. Edit it by typing ED S/STARTUP-SEQUENCE. Now go to the end of the file, by using the cursor-down key, to just before the line which says ENDCLI. Type in the new lines as before. If there is already a line in the file saying PATH RAM: ADD then you needn't type it again.

If you want to be left at the CLI prompt when the startup process finishes rather than in Workbench, then delete the LOADWB line from STARTUP-SEQUENCE. Now save the modified file by [Esc]X, and re-boot to test it.

If you have removed the Workbench line from the startup sequence and then find you want the Workbench after all, just type LOADWB at the CLI prompt.

Cutting DigiView Distortion

A handy tip for anyone out there using NewTek's DigiView digitiser with a colour video camera. If you are suffering from colour signal distortion interfering with the digitiser (which normally expects mono input), and you aren't afraid to do a little wiring, then help is at hand. One small item will turn all your colour video signals into glorious monochrome. What you need is an 8-ohm loudspeaker as found in any old transistor radio.

1. Firstly, of course, turn off the power to the digitiser.

2. Get hold of a spare video lead and cut it in half. The cable will have a central core and a braided outer sleeve – strip an inch or two back from either side of the break.

3. Connect the central core from one half to one loudspeaker terminal, and the other central core to the other terminal. Join the two braids together (twisting them will do).

4. Check there are no short circuits – wrap some insulating tape around the braided join to make sure.

5. Turn on the power, and connect the video directly into the back of your Amiga monitor, if you have one. The colours should have faded or gone altogether. If so, the camera should now work better.

If nothing works, check your wiring, or else give up and go back to your old lead. It's worth saying that at video frequencies electrical components such as loudspeakers can appear as complex components and even those with identical impedances may give varying results.

Scribble! Shortcuts

The popular *Scribble!* word processor, as bundled with The Works package given away with recent A500 sales, has many different keystroke shortcuts. Mice and menus are all very well, but when you're typing away it's a real pain to have to reach for the mouse and click on menus.

[Shift] + Up arrow = up one screen
[Shift] + Down arrow = down one screen
[Shift] + Left arrow = beginning of document
[Shift] + Right arrow = end of document
[Alt] + Left arrow = beginning of line
[Alt] + Right arrow = end of line

The manual's list of key commands on lists a series of [Alt] keys – these don't work! Use the right [Amiga] key in place of the [Alt] key and they're OK. The manual gives an example of printing *Scribble!* in expanded text using the dot command .#0/0=%27[6W AND .#1/0=%27[5W at the beginning of a document, and then enclosing the text to be printed in 'ALT+G1' and 'ALT+G2'. This will not work for two reasons. Firstly, the dot commands should be .#1=%27[6w and .#2=%27[5w and secondly, the text to be printed should be enclosed using 'right AMIGA+g1' and 'right AMIGA+g2'.

Users of *WordStar* on other micros will be pleased to learn that *Scribble!* allows some of the same keystrokes:

[Ctrl]-V toggle insert on/off
[Ctrl]-R,C scroll up or down a page
[Ctrl]-Y delete current line
[Ctrl]-T delete to end of word
[Ctrl]-S,D,E,X cursor one character left, right, up, down
[Ctrl]-A,F cursor one word left or right
[Ctrl]-L repeat search
[Ctrl]-G,H delete character right, left

Extended Selection

'Extended selection' is a technique of mousemanship that all Amiga users ought to understand. When you click the mouse on an icon, the colours invert to show it has been selected. You can then drag it around, copy it and so on.

If you click on another icon, the first one becomes de-selected and reverts to its normal colours. However, if you hold the [Shift] key down and click on an icon, selected icons stay selected and the new one is added into the group.

One of the main uses of this is in organising your windows neatly with the 'Snapshot' Workbench function. You may have a disk whose icons are all higgledy-piggledy overlapping, and you want to arrange them in a particular order. You can drag the icons into beautiful serried ranks, but the Amiga doesn't remember the order unless you save it – if you close the window and reopen it the old mess comes back.

To save the neat version, first select all the icons in the window at once, using extended selection: click on the first one, then shift-click on all the rest in turn. Now from the 'Special' menu on the Workbench choose the Snapshot option – the positions of all the icons you had selected, ie. the lot, are saved for future reference.

Extended selection is also used when running some programs. For example, the slide show program Vilbm needs you to select all the picture files to be displayed, and then run the program. You would click on the first file to be shown, shift-click on the rest in the order they are to be displayed, then shift-double click on the Vilbm icon to run the program without undoing the previously selected files.

Copying files in Batches

It isn't necessary to copy all the files individually in the startup-sequence. You can copy more than one file at a time with a single COPY command, so a shorter startup-sequence is

```
MAKEDIR RAM:C
CD C
COPY DIRICDIINFOITYPE TO RAM:C QUIET
PATH RAM:C ADD
CD /
```

The interesting part is the third line – putting a vertical bar (to the left of the backspace key on the keyboard) between filenames forces the CLI to copy them all without the need to have a COPY line for each.

Infamous messages!

It seems to be almost common knowledge that the original developers of the Amiga – the Amiga Corporation Inc – left some hidden messages in the system software when they sold it on to Commodore. This is only evident in aged Amiga 500s. Just in case you get the urge to see these scurrilous notes, here's what you have to do.

Boot your Amiga up so you get to the Workbench screen. Click the pointer anywhere in the screen just to make sure it is active – the amount of free memory shows in the title bar. Hold down both [Shift] keys and both [Alt] keys at once. Press each function key in turn and you will see credits for the designers appear in the title bar. Now for the sting: you might need the aid of a third hand for this one! With the four [Shift] and [Alt] keys still held down, hold down [F1] and eject the Workbench disk from the drive. Keeping all five keys pressed, put a different disk back in the drive. Oo-err!

Using New Fonts

If you've managed to acquire a disk with some extra Amiga fonts on it, maybe from the Public Domain or from a commercial package with a surplus of fonts, you may experience difficulties getting some programs to recognise the new character sets. This is because when

the Amiga tries to load its fonts it always looks in the 'logical device' called FONTS: which in practise means the directory FONTS on the disk you booted with.

You can, however, make it look elsewhere for its fonts. For the sake of example, suppose that your new fonts are in a directory called NEWFONTS on a disk called MYDISK (you can see what a disk's name is by looking under its icon on the Workbench screen). Before you run a program – whether it's normally run from the Workbench or the CLI – open up a CLI window and type at the command prompt

```
ASSIGN FONTS:
MYDISK:NEWFONTS
```

Now you can close the CLI if you want to and run a program which uses fonts as normal by clicking on its icon – this certainly works with *Deluxe Paint*, as an example. When you choose the load fonts option from the relevant menu you will be asked to insert MYDISK in the drive and your new fonts will then be listed.

Quick Draft Printing

Even if you have a printer with front button controls which allow you to select NLQ print, 12 pitch text and so on manually, you will find that each time you print a document from your word processor, the settings are always over-ridden by whatever was set up in your Preferences. You could go into Preferences and change the settings, but here's a simpler method.

Set your printer up to the typestyle you want, using its front panel buttons. Assuming it is connected to the Amiga via the parallel port, print your document by going to the program's Save menu and typing PAR: as the filename to be saved. This sends the text directly to the parallel port, ie the printer. You may find your line breaks don't come out correctly – if your application program has a 'Print to Disk' option, use that instead, giving PAR: as the disk file name again.

This should work on most programs. If you get an 'illegal filename' message or something similar when you save to PAR:, try saving to 'PAR:DUMMY' instead – that fools programs into believing it's a real filename.

Incidentally, if you're using the standard ED editor to prepare a program file, the command SA/PAR:/ (or SA /PRT if you do want to go via the Preferences settings) prints your file for you without the need to quit ED.

Coloured CLI Prompts

How to change the colours of text displayed on screen using ANSI escape codes and the ECHO command, a technique that can be used with the PROMPT command for a pleasant effect. At the CLI, type:

```
PROMPT "*e[33;1m%N>*e[0m" [Return]
```

The '*e' escape codes in this string make your CLI prompt appear in orange text (the *e[33) and emboldened (the 1m), and the %N turns the prompt into the number of the current task, which is normal. The *e[0m reverts to white for the command line itself. This way you get a nice contrast between prompts and commands/responses.

Colourful Messages with Echo

Using a similar method to that described in the previous tip, it is possible to get all sorts of pretty effects with text messages displayed on the screen using the Echo command. The basic function of Echo is simply to print on the screen whatever text string follows the command. It can be used from the CLI if you want to get a hang of how it works, but its best function is in the start-up sequence to tell the poor old user, sitting there waiting for the Amiga to boot, what is going on.

For instance, a typical start-up sequence might involve creating a bootable RAM: disk, as described in another tip above. You could echo messages to describe this process by inserting a few simple Echo command lines into the sequence, as follows:

```
Echo "*ec"
Echo "Recoverable Ramdrive Autoboot V1.0"
Mount Rad:
Echo "*nMaking needed directories in Ramdrive"
Echo "Creating C Directory"
Makedir Rad:C
```

Here is a list of some of the more useful variations on the Echo command, which you might like to experiment with. Notice that the colours blue, black, white and yellow are used here to describe the usual, default Workbench colours: if you have altered your Workbench colours in Preferences, those will be used instead.

Command	Writing	Background	Effect
Echo "*c"			Clear screen
Echo "*n"			New Line
Echo "*E[1m"			Bold Type
Echo "*E[2m"			Italic Type
Echo "*E[3m"			Underline Type
Echo "*E[34m"	Blue		Change Colour
Echo "*E[35m"	White		Change Colour
Echo "*E[36m"	Black		Change Colour
Echo "*E[37m"	Yellow		Change Colour
Echo "*E[40m"		Blue	Change Colour
Echo "*E[41m"		White	Change Colour
Echo "*E[42m"		Black	Change Colour
Echo "*E[43m"		Yellow	Change Colour
Echo "*E[8m			Freeze Cursor
Echo "*E[0m			Reset All

Quick CLI on boot

If you want to get a quick CLI window, rather than booting up your Workbench and then running the CLI icon, just press [Ctrl]D repeatedly as soon as the Amiga's startup sequence gets going.

[Ctrl]D interrupts the execution of any command file (as run with the EXECUTE command) so it aborts the STARTUP-SEQUENCE file before the Workbench can load, leaving you with the CLI prompt.

Detailed DIRectories

The DIR command is one of the most used CLI commands, displaying all those files invisible from the Workbench icon screen. Typing DIR gives you a list of files and sub-directories in the current directory. However, there are three options:

DIR OPT A – 'A' is for 'All'

When DIR finds a directory, if the A option is in force the Amiga will list out all files in that directory, and all files in any sub-directories too. In other words, all files on the disk, from the current level down.

DIR OPT D – 'D' is for 'Directories'. This option lists only the directories, not individual filenames.

DIR OPT I – 'I' is for 'Interactive'. As the DIR command lists each file out in the current directory it pauses. Press [Return] to carry on to the next file, Q to quit back to the CLI, or DEL to delete the file – that's typing D-E-L, not pressing [Del]. Typing T will show a text file on screen.

These options can be combined – for instance DIR OPT AI will do an interactive directory of all files on the disk.

Selective DIRectories

Another good tip for using DIR is to get the hang of 'pattern matching'. A few examples will illustrate this:

DIR FR?D – the question mark is a 'wildcard' character. This command means, "list all files with four letters in the name beginning FR and ending in D, but the third letter can be anything at all." Files such as FRED, FRID or FR$D are listed if they are on the disk.

A '#' is used to mean "any number of the following characters", so #? stands for any number of any characters at all:

DIR FRED#? – This command would list any files beginning with FRED, so FREDA, FREDERICK, FRED.DOC and plain FRED itself would all match this. DIR FRED#? OPT A will find FRED . . . files in all directories.

DIR #? – This just lists out everything, since #? matches all filenames. (In fact the DIR command by itself lists all files, but the #? pattern can be useful in other commands, like DELETE #? to delete all your files.)

Faster Disk Access

Getting a DIR listing can be a slow process given the speed of the Amiga disk drives. If your disks are old, and the data on them is consequently very 'fragmented' (broken up into small blocks), you can speed up disk access by FORMATting a fresh disk and COPYing all the files onto it. The files are written in sequential order creating a tidy disk which DIR can scan slightly faster. You need two disk drives really: if you have an A500 and they are call DF0 and DF1, then

COPY DF0: TO DF1: ALL

copies all the files and directories for you, from the disk in the internal drive to the external drive.

Free Fonts!

Fancy some extra fonts for exactly £0.00? Boot up with 'The Very First' (the guided tour disk provided with A500s). As soon as the AmigaDOS window appears, tap [Ctrl]-D a few times to break into it and get a '1>' prompt. Type LOADWB and then ENDCLI. Now put your 'Extras' disk into the drive and run the font editor in the tools drawer, FED, replacing 'The Very First' disk when prompted. You can now load the new fonts on that disk (use the Project menu on the title bar) and resave them to a different disk. It is best to save them to the 'Fonts' directory of the disk you usually start up with, then any programs you use will be able to read the new fonts.

Saving corrupted disks

DiskDoctor, as supplied on the Amiga master disk, is a very good utility, but there is a snag. If the 'disk validator' is kaput, then the Amiga refuses to have anything to do with the disk, so data on the disk will be lost.

There is a way to cure this problem, but you'll have to use the CLI. Don't worry, it's not that difficult!

1. Start your Amiga with the normal Workbench disk, and enter the CLI by double-clicking on the CLI icon.

2. Type:

```
MAKEDIR RAM:L
COPY DF0:L RAM:L ALL
ASSIGN L: RAM:L
```

This copies the L directory (containing the disk validator) to RAM:. Next, the ASSIGN command forces the Amiga into using the valid validator in RAM: rather than the corrupted one on your bad disk.

You can now run Disk Doctor on your corrupted disk. Just type DISKDOCTOR at the CLI and put the bad disk in the drive when asked. After it has finished, make a copy of all the files on an undamaged disk.

If you've got a disk which refuses to load because the Amiga says it 'can't be validated', then you can fix this by copying the validator onto it. Assuming you've done the above commands to get the validator into RAM, then put your faulty disk in the drive and type

```
CD DF0:
COPY RAM:L DF0:L ALL
```

Now the Amiga should recognise the disk properly without needing any disk swaps.

Auto-booting disks in BASIC

This tip is geared for people who are starting to write in BASIC and would like a 'stand alone' disk on which to write their masterpiece to save disk swaps and more importantly save time!

The sequence is easily followed and has been tested to ensure correct operation; the tip is written for single drive users and would be a good deal easier for users with 2 drives. Total time is about 3 or 4 minutes, and at the end of it you get a disk which will auto-boot into BASIC. 'Green' Amiga owners might also get some insight into altering the startup sequence.

1. Insert Workbench disk after turning on.

2. Once the screen goes blue, hold down [Ctrl] and keep pressing D until the CLI prompt '1>' appears.

3. Type:

```
FORMAT DRIVE DFO: NAME
BASICDISK (any name will do instead of BASICDISK)
```

4. Follow the prompts and disk swaps to format the disk you want to become your BASIC work disk. When it's finished put your Workbench disk back in the drive.

```
COPY DFO:C RAM:
ASSIGN C: RAM:
(Put in your newly formatted disk)
INSTALL DFO:
MAKEDIR DFO:C
MAKEDIR DFO:S
COPY RAM: DFO:C
```

5. When drive light goes out, reset the Amiga. As before, when the screen truns blue hold down [Ctrl] and keep pressing D until the '1>' prompt appears. Type:

```
COPY DFO:C/COPY RAM:
(Put your AmigaBASIC disk in the drive now).
RAM:COPY DFO:AMIGABASIC RAM:
(Put your newly formatted disk in the drive again)
RAM:COPY RAM:AMIGABASIC DFO:
ED S/STARTUP-SEQUENCE
```

6. A blank screen appears as you create a new file. Type:

```
LOADWB
AMIGABASIC
```

then press [Return]. Save the file by pressing [Esc], then type X and press [Return].

7. When the disk activity light goes out, reset the Amiga. It will 'boot' into AmigaBASIC for you. When you quit, you will have a fully functioning CLI. If you click the mouse on the Send-to-back gadget of the CLI screen you'll also get a standard Workbench icon screen.

Virus Cheats

Both the SCA and 'Byte Bandit' virus have 'back doors' which the programmers put in for their own convenience (in case they were hoist with their own petards!)

For the SCA virus, hold down the left mouse button during a three-key reset. If the screen turns green, instead of white, before the 'Insert Workbench' screen appears then the virus is in memory and the last disk you put in the drive is definitely infected. When the Amiga locks up because of Byte Bandit virus, press and hold down the following five keys in the printed order: left-Alt, left-Amiga, Space bar, Right-Amiga, Right Alt.

After a couple of seconds the Amiga should recover from its attack, and you will be able to continue what ever you were doing before the virus struck. If it doesn't, try it again but this time hold down the left-Amiga key instead of the Right-Alt key.

Once either virus has been detected the boot sector should be cleaned by running the INSTALL command from the CLI: double-click on the CLI icon (in the system drawer on the Workbench disk); put the infected disk in the internal drive and type INSTALL?. Follow the disk swap prompts and when the screen prompts you to enter the drive to be Installed, make sure the infected disk is in the drive and type DFO:. Turn your machine off to made sure that if the virus was in memory it is erased.

NOTE: Never 'Install' master disks of commercial software, like games. You're likely to destroy them.

For those new to the 'virus' debate, the SCA virus manifests itself by displaying a message, "Something wonderful has happened..." on the screen. After half a minute or so it starts to do bad things to your disk, so if you ever see this take your disk out of the drive as soon as you can and turn the machine off. The Byte Bandit virus doesn't harm disks, but just blanks the screen and lock up the machine so you can't do anything.

Protecting Files from Deletion

Have you ever accidentally erased an important file? To avoid such a disaster, AmigaDOS offers a powerful facility that allows you to protect any file from a whole host of various mishaps that can befall any unsuspecting file. Hidden with the 'B' directory of your Workbench disk is a mysterious little CLI command called PROTECT.

Each file on an Amiga disk has four flags that determine whether the file can be read, written to, executed or deleted. By changing the setting of these flags it is possible to stop any file from being accidentally deleted. The options for the command are:

R – Read
W – Write
E – Execute
D – Delete

To protect a particular file, you enter the filename of the file to be protected followed by any combination of these codes. For example, if you had a text file called LETTER.DOC that you wished to protect against accidental erasure, you would enter:

PROTECT LETTER.DOC RWE

Because the D code is missing from the RWE tag, the file, LETTER.DOC, will now be set so that it can't be deleted. The other three flags, RWE, are currently not implemented under the current release of Kickstart and are therefore ignored by the Amiga. This means you can't read-protect your files yet.

LISTing Useful Information

One of the major failing of the CLI command 'DIR' is that it doesn't give you much information about files – their size, creation date and so on. Fortunately, AmigaDOS does offer a more powerful alternative, the LIST command.

LIST is used to display all sorts of useful information about files such as creation date and file protection. The useful thing about LIST is that it also includes extensive wildcard support. The options offered by LIST are: UPTO, SINCE, S,P, NODATES and QUICK. Here's a few examples to show you the general gist of using LIST.

LIST TO PRT: Sends what would normally be displayed on screen to your printer.

LIST NODATES Displays a listing of all files without showing any dates.

LIST DATES Any guesses? Yep, displays all files with their dates. This is actually the default setting so if you nust enter 'LIST', you'll get the same results.

LIST SINCE 5-MAY-89 Another obvious one this, displays all files created since the 5th May 1989.

LIST UPTO 5-MAY-89 Complicated stuff this! I'm sure I don't really need to tell you that all files created before the 5th May 1989 are displayed.

LIST QUICK Lists all files without displaying any file information. The output is rather reminiscent of the DIR command for directories.

LIST S DOC Displays all files whose filenames contain the string 'DOC'. This is perhaps the most useful option offered by LIST. Multiple strings can also be searched for by separating each string with a vertical bar. For example, to list all files containing either 'ER' or 'SYS' you would enter LIST S ERISYS.

Long Lists in the CLI

If you get very frustrated trying to use the CLI to examine the contents of your disks on screen either because the whole list won't fit on the screen or you just want a quick look at a list you had on screen two minutes ago, then the obvious answer is to get a hard copy of the lists you want. But, sadly the Commodore manuals aren't very helpful – the information's there, but only just! In fact it's quite simple to print the results of a DIR command – you only need to add the redirect symbol > and state which to send it to.

For example, if you wish to have a printout of your current directory simply enter the following from the CLI:

```
DIR > PRT
```

You don't have to send the results to your printer right away. Sometimes it's useful to have a copy on disk. To store a disk's directory in a file called DIRECTORY, use

```
DIR > DIRECTORY
```

This opens (or overwrites if it already exists) a file called DIRECTORY which contains the results of the DIR command. At a later date you can

```
TYPE DIRECTORY
```

(to display it on screen) or

```
COPY DIRECTORY TO PRT:
```

to print it.

One thing to note about using redirection under AmigaDOS is that the actual redirection has to be at the start of all parameters for a command. Entering DIR DFO: > PRT: will not work. It should be DIR > PRT: DFO:.

The Console Device

One of the most neglected features available to CLI users is the Amiga console device. The console device allows you to redirect the output from most commands into a separate window, thereby avoiding cluttering up your main CLI window. This is achieved using the same technique as used to redirect output to any other Amiga device such as the printer.

For example, what would you do if you wanted a directory listing of a disk that was chock-a-block with files without removing what is already on the screen? Simple, you use the console device.

```
DIR > "CON:0/0/640/250/Disk Directory" DFO:
```

The above command will redirect the output from the DIR command to a window of dimensions 640 by 200 pixels. The text string is the window title.

Once the command has finished, the console window will be automatically closed and control returned to your main CLI window. To halt the display of text in a console window, just press the space bar and to continue, the back space key.

CLI Clock

Make sure that your Workbench disk has the Clock program on it – if not you'll find it on your main Workbench master disk, just drag the icon across. Now edit the start-up sequence; you'll need to open a CLI window, then type

```
ED S/STARTUP-SEQUENCE
```

(move the cursor down to it is just before the line saying ENDCLI, near the bottom of the file)

```
RUN CLOCK
```

(press [Esc] X [Return] to save and exit from the editor)

Now when you reboot you should find the Clock is always in view on the screen.

GameBusters

Hints, tips cheats and solutions for over 100 games. Many of the biggest and best games in your collection are covered in this section, including Batman, New Zealand Story, Rainbow Islands, Interceptor, F-29, Bomber, Dungeon Master, Space Ace, Dragon's Lair, Future Wars and many others besides. The tips are all in alphabetical order to make them easy for you to find, so go right ahead - have fun!

a

Aaargh!
Don't breathe fire or jump when fighting for the egg on the bonus level: just keep punching and you'll never lose.

Arkanoid
Select the level you wish to start on and press space. Now type DSIMAGIC and press [Space]. A capsule with DS wriiten on it should fall. Pick this up and press one of the following buttons for special effects:

D – Disruptor (splits balls in three)
L – Lasers
S – Slow ball
E – Expanded bat
B – Breach (sends you to next level)
C – Catch ball
F – Confront guardian

On the UK version it is also possible to access 33 further levels which are not on the coin-op. Simply press [F3] rather than [F1] for a one-player game and [F4] rather than [F2] for two players.

APB
Bored of pounding the same beat over and over again? If you push the firebutton and push forward on the joystick while the music is playing, you can select to start playing on any of the 16 levels. Now hit them streets...

Austerlitz
This superb wargame may be giving novices a few problems so take some advice from a veteran:

General Hints
1. Before you can get very far into the game you must understand the ordering system. A handwritten order is dispatched by a rider who takes it to the relevant corps commander while (hopefully) avoiding the enemy and any routing units. If received, orders are not carried out immediately – relevant commanders must be informed and their units may be several miles from the HQ. You may never know if your orders reach their destination or if they are misunderstood down the chain of command.

2. It is a good idea to ask for battle reports every 1/2 hour or so, especially from units which are heavily engaged. The corps commander will normally send a couple of messages with the rider who returns his combat reports, giving information concerning the status of his men. Even if the news seems irrelevant, you will learn more about how your troops are doing than if the corps commander only seldom sends a report.

3. Artillery is precious and should not be wasted. Royal Horse Artillery can move very fast – they can shell one target and abruptly change location to shell another. Move your artillery to high ground as soon as possible where it has a clear field of fire all around and is difficult to dislodge.

4. Do not try ordering units which are disordered or routing because they will ignore you. Routing units usually retreat away from the enemy, but are in danger of blundering into deadly artillery fire. Beware if they pass near your HQ because several important riders may be caught up in the rush and killed. Routs are worse than disorders and routing units may finally become disordered before they rally and can be ordered again. Keep a unit out of battle for a while when it rallies and when engaged, ensure allied units are ready to give support if necessary.

5. Surround stubborn enemy units instead of assaulting them head-on. This will ensure that no messages leave or reach the unit and it is completely isolated making it easier to destroy.

6. It is possible for 'Blitzkrieg' tactics to succeed. Your cavalry, while being supported by horse artillery, can penetrate the enemy lines. When the enemy is sufficiently weakened, he can be routed by the slower moving infantry and foot artillery units.

Hints for Napoleon
1. Davout's corps are several miles from the HQ and your riders will take time to reach him. He, with Merle, Fery and Margaron, are in danger of being cut off from the rest of the army. Order these corps as soon as possible or they will form a defence line and retreat if they can't hold ground.

2. Trielhard's divisions can form a rearguard to replace lost or routing units. At the end of the day, they can be used to charge the enemy off the field when he's weak.

3. Reinforce Lannes as he prepares to repel the attacks of Bagration, two miles to the east. He is heavily outnumbered with his 16 units facing Bagration's 24 and although an offensive line will need more men, he can defeat Bagration with minimal casualties when defending, especially on rough ground.

4. Girschkowitz, Puntowitz and Schlapanitz are usually the scenes of fierce battles so try to hold them if you can. Your troops can later regroup here. Remember, the terrain favours a defensive stance.

Hints for Alexander
1. The Austrian militia under Kollerwrath are poor quality and can be relied on to rout very easily. However, they are good cannon fodder and can be sacrificed to hold off artillery fire while you attack the enemy elsewhere.

2. Bagration is in a prime position to attack the northern French flank and if he advances fast enough (by smashing Lannes' corps) he can be a serious threat to the enemy HQ. Napoleon may even have to move the HQ further from his troops and waste valuable time reinforcing Lannes' troops.

3. You have enough forces to split the French army in half, possibly at Kobelnitz. If this is achieved, communications will be cut because all the riders trying to barge through your troops will be killed. Napoleon must now either send his riders on a long detour or try to break through your troops, both of which will be costly and time consuming. During this period the French commanders will use their own initiative and (hopefully) launch unsuccessful and uncoordinated attacks. It's doubtful the French can recover the position and victory should be complete.

Barbarian

You an Arnie clone? Still alive after all the years this game has been through? Don't wanna be dead? Try this one: after loading press [0], then [4], then [–], then [0] again, then [8] the [–] again. Then press [5] and finally [9] and, no matter what happens, Hegor just won't die.

Batman The Movie

On the title screen simply press type JAMMMMM (press [M] repeatedly) and the screen will flip over, now when you start the game you'll have infinite lives and be able to skip levels by pressing F10.

Battlehawks 1942

Flight simulators aren't the easiest things to get to grips with at the best of times, never mind while hordes of enemy planes are attacking from all sides. A player's guide is in order for such a game.

1. One useful thing to know is the promotion levels relating to the missions. Some ranks are only given to certain nationalities, but for the most part they're the same for both Japan and America. The ranks are, CADET, ENSIGN, ACTING LIEUTENANT, LIEUTENANT JUNIOR, LIEUTENANT, LIEUTENANT COMMANDER and COMMANDER.

2. Learn the characteristics of each plane before embarking on combat missions. While Japanese aircraft are generally more manoeuverable than their American counterparts, they don't have the same sturdy level of protection. Another point to remember is that the KATE torpedo-bomber has no front-firing weapons, so think twice before using this plane.

3. A plane won't necessarily burn up or disintegrate before it crashes into the ocean. Sometimes the pilot can be shot while still flying, so that his vessel will plunge into the Pacific with little apparent damage. Keep a look out for pilots attempting to trick the enemy by faking a crash – the sneaky devils!

4. On attack missions, it is sometimes better to devastate the enemy CAP before beginning your own attack run. Other pilots in your squadron should meanwhile have carried out their own bombing runs and eliminated some of the opposition. If they have, then life should be a lot easier, since damaged ships fire little or no flack. It is better to bomb an undamaged vessel, even if it isn't a carrier, because there is a good chance that ships already on fire will sink anyway. Also, your chances of promotion are much greater if several enemy vessels have sunk or been set on fire.

5. Torpedo hits generally do more damage than dive-bombing, because they hit vessels at a more vital point below the waterline. When torpedoing a ship, try to release the missile at the last possible moment. This will cause the maximum damage and means that the ship has less chance to manoeuvre and dodge the attack. There is a good chance that a ship will sink after just one hit using this tactic, especially if you are using the LONG LANCE type torpedo.

6. Bombers are formidable opponents, since all except the Japanese KATE bomber are armed with front and rear guns. These planes are vulnerable to attacks from the side, but this tactic isn't always possible. Another way to get them is as follows.

Fly behind and slightly below the enemy plane, as their rear guns won't be able to turn far enough to shoot you. Now when you get in range you should be able to pick them off with relative ease. If any planes break away from the formation to get away from your shots, then this will leave them open to a side attack. This technique is difficult to use against torpedo-bombers, as they fly close to the surface of the ocean while attacking.

7. The more explosions occur on the decks of ships, the more chance they stand of sinking. Hanging around blasting the decks of ships increases the possibility of them sinking, so it's a good idea to inflict as much damage as possible on the ships as quickly as you can, then at least one of the ships will have sunk by the end of the mission.

A CARRIER will normally sink after taking three torpedo hits. A BATTLESHIP can be sunk using a single torpedo, particularly if it is launched from close range.

8. If an enemy plane hassles you and causes problems, dive towards the ocean and any nearby ships – even if they're the enemy. You'll have to dodge the flack, but so will any planes attempting to follow you. They'll be so intent on firing at you that they won't avoid the flack and will get it in the neck from their own side!

9. Japanese pilots occasionally attempt kamikaze attacks on allied shipping. This is usually done for a couple of reasons – either they've suffered heavy losses early in the mission or they've missed with all their warheads. Occasionally, the pilot of a badly-damaged plane will aim it at a ship and bail out just before impact. A kamikaze attack causes so much damage that a ship may sink straight away. Tricky, but the squadron leader is often well rewarded. Remember only to adopt this tactic on the 16th ATTACK mission – just before retiring.

10. Here's a way to dive much quicker than usual – useful for getting out of tricky situations. Begin your dive as normal, then switch to the rear gunner. The altimeter will now spin round much quicker than usual until you switch to front view. This also works when objects in the distance seem to take a long time to arrive.

Battle Squadron

Type in CASTOR to become invincible and press the function keys to change weapons. If you type in ELECTRONIC you can access a cheat mode to change parts of the game.

Beach Volley

Just try entering DADDYBRACEY and pressing [F1] to skip a level on this nice jolly computer simulation.

Better Dead Than Alien

A very useful cheat mode can be accessed by typing in CHAMP on the title screen. Pressing the following function keys should now provide all manner of amazing weaponry with which to do over the aliens:

F1	Scatterbolts
F2	Multiple Fire
F3	Auto-Repeat
F4	Armour Missiles
F5	Stun
F6	Neutron Bomb
F7	Clone ship
F8	Shield
F9	Skip Level
F10	Extra Power Bars

To display instructions on the workings of the cheat mode, press [Help] then Fire. If the password is extended to the programmer's name CHAMPIE the program states proudly that the 'Supercheat' has been entered. Exactly what this does we are not at all certain...

Bombuzal

A few tips from programmer Tony Crowther:
An easy way to complete a level is to blow up all the bombs on the level first and then see which squares remain undanaged. These are the squares the player should aim to finish on.

When attemptimg to detonate a pulsing bomb, pick it up, as it is easier to see the bomb's size when it is held.

Remember that when you are teleporting a droid you are impervious to the effects of the monsters.

When teleporting from square to square you are invulnerable to explosions.

When teleporting, the explosions occur before you teleport, so if you are teleporting onto a mine it will be destroyed before you get there providing the square is in the blast radius and is riveted.

Switches have three phases: Phase 1 is Set, Phase 2 is On and Phase 3 is Off. Phase 1 can never be reversed after a switch has been set.

The mouse makes the game even more difficult and should only be used by experienced players.

When dealing with more than one nasty, try to kill them off as quickly as possible: use the dissolving squares and switches to make squares disappear beneath them.

A blind droid cannot activate switches. When using a sighted droid you may activate switches, but when the bomb blows up the droid will die.

And also the complete list of pass codes:

Level	Code	Level	Code	Level	Code
8	ROSS	16	RATT	24	LISA
32	DAVE	40	IRON	48	LEAD
56	WEED	64	RING	72	GIRL
80	GOLD	88	OPAL	96	SONG
104	FIRE	112	LAMP	120	TREE
128	SINK	136	BIKE	144	BIRD
152	TAPE	160	VASE	168	PILL
176	SPOT	184	PALM	192	LOCK
200	SAFE	208	WORM	216	NOSE
224	EYES	232	HAIR	240	SIGN
248	MYTH				

Bonecruncher

Here are some passwords which might just help:

Golemstench
Scarab
Web of Death
Underground
Deathchamber
Golems Cave
Hornslut
Slimehole
Bloodsmell
Bonepowder
Nightmare
Monsterbreed
Thunderstorm
Creepy Cave
Liquidation
Megahaze
Strata Gem

Carrier Command

An interesting cheat mode. Pause the game from the main view screen and type THE BEST IS YET TO BE including the spaces. The game restarts and displays "Cheat Mode Activated" in the message panel.

Now when the game is paused, pressing [+] or [–] on the numeric keypad toggles Manta invisibility. Flying craft are no longer vulnerable to air attack, although collision with large objects is still fatal.

Once a course has been programmed for the Carrier, Mantas or Walruses engage autopilot and click on Pause. To avoid slogging around in real time you will now find that pressing [3] on the keypad and unpausing

again takes the corresponding craft directly to its destination. Likewise, pausing and pressing [2] replaces lost shielding and tapping [1] refuels the craft in question. [9] shows the current difficulty level and [6] brings up the programmers' test palette!

Champions of Krynn

You've donned your armour, given yourself a ridiculous nom-de-plume and sat yourself down in front of your Amiga to set forth on your quest, only to fall foul of the first creature you meet. Don't despair – here are some hints to help you on your way.

Characters

To achieve any level of success you really need to operate as a knight. The best combination of characters is usually Fighter, Knight, Ranger, Cleric, Red Mage and White Mage.

When you first create a new character, choose the best armour class, as all the other attributes can be modified on the main screen, including your hit points.

Caravan

Buy and ready the weapons you need and set off. Head towards Throtl and you will come across a caravan that is under attack from Draconions. Attack the marauders using magic whenever possible. Once you have achieved victory, you will be asked to escort the woman back to the outpost. Agree to the task and once inside the outpost visit the hall to train your characters. Once your team has worked up enough of a sweat, go and visit the Commandant.

The Tomb

Once all the training has been done and you've seen the Commandant, leave the outpost and head north-west where you will find the tomb. Enter the tomb and undertake the tests of honour, fear and battle. Once you have completed the final test, you can leave the tomb. Watch out though, as you will meet and have to do battle with some Draconions.

The hardest test you will confront is the battle test. Always use the Knight for the tests and act as a true Knight does, taking the honourable option every time. Foe example, when you find the treasure room, don't try to steal anything!

The test of fear is simple. All you have to do is walk into the fire-rings. Don't worry even if your hit points are down to one, as you will be healed after the test.

The Ogre's Base

As soon as you enter the tomb, turn right and enter the first door on the right. Here you will receive some useful information. Always try to be polite and greet any ogres you meet. The first few will attack you anyway, but don't get disheartened, as all the ogres will greet you afterwards.

Explore the camp thoroughly using the map and once you've checked everywhere go to the ogres' meeting. When they ask you, tell them about the assasins. The letter you should have will corroborate your story, so they will consider you allies and join you for the big fight. Shouldn't do any harm to have such weight behind your ranks!

Throtl Town

The Commandant at the outpost will request you to go to Throtl to save Camaron. Go to Throtl and head to where Camaron is to be found. Beware of the first person you meet, since he's a spy. When he asks to join your band, show him the respect he deserves and attack him. Once he is out of the way you can head off towards Camaron, allowing anyone else who wishes to join to tag along.

When you find Camaron, he will tell you that you need to get a key. Once you have found the map, head up the main passage until you find the 'secret' passage. Go through and head for the temple. Take out any hostile creatures you may encounter and head for the stairs to the second level.

Chariots of Wrath

A simple tip to gain infinite lives. When first instructed to press the fire button, push the joystick forward. On the first breakout screen you have to collect all the diamonds to completee the screen. On the second breakout screen there are some dummy diamonds, so don't worry about collecting them all.

Chase HQ

Can't quite get the speed as high as you'd like to catch those villains? Well just press the [Space] bar a few times just as you start to send your speed up to about 900 km/h. If you don't think that you get enough turbos for this extravagance, then press the [Space] bar several times when the music on/off screen appears to get some for free.

Chasing criminals seems easy, doesn't it? That clock keeps ticking down though! It doesn't help if you keep spinning off the track, either, so use the [Z] and [X] keys to steer and you should stay on the track. If the bad guys still manage to speed off into the sunset, then type GROWLER while holding down the fire button and left mouse button. Now if you press [T] the clock will reset.

Continental Circus

Got those "left on the grid while everyone else screams off into the distance" blues? Then follow this advice for a fast grid start. When the FIRST red light comes on push and hold the joysick forward. When the SECOND red light comes on release the joystick. As soon as the green light flashes on, push the joystick forward. The faster your reaction time, the quicker you will accelerate.

Conqueror

If you are having a little trouble with Rainbow Arts' superb tank-battle simulator have a shuftie at these official hints from the developers themselves (nothing but the best for our readers, doncha know).

■ German tanks have a worse hill-climbing ability than both American and Russian tanks. This point determines strategies for both divisions – if you're playing as the Germans, a good tactic is to wait at the top of hills and rush down at the enemy when they approach, whereas if you take control of the allies, then it's a good idea to escape by heading up the steepest hill, so as to slow down any pursuers.

■ The program actually works out the angle of incidence of any shot, and uses the data to calculate the most effective use of armour. Therefore an oblique shot on a tank will have more armour to penetrate than a 'square on' blast. So if you are under attack, try to make sure that the enemy have to fire angled shots, but if you are attacking, then try to get a good, straight (that is 90 degrees) shot to do the most damage.

■ Front armour is the best defence on all tanks, so always try to face the enemy straight on so as to present the toughest face. For this reason, you should also try to attack enemy tanks' flank or rear where they are less protected.

■ One of the most sensible tactics to use (the computer player employs this) is to form the heavy tanks into groups and leave the light tanks to reconnoitre. This means that the lighter, faster tanks can act as your 'eyes', giving advance warning of enemy manouevres (they can also run away quickly!) The tactic they use, when under the auto-driver, is to run away from anything they can't shoot, reporting the sightings to your force. You can then move the heavy boys in to tackle the situation.

■ When using map firing, always remember that any shells fired will take about 30 seconds to hit the ground, so try to judge where the enemy tanks will be when the missiles strike and aim your guns there. Be warned, however, that computer-controlled tanks don't look for map fire, so keep clear of the area until all the shells have landed.

■ Don't go for a whole bunch of heavy guns; instead try to build a balanced tank-force. Light tanks are useful for reconnaissance and also as an emergency reserve, whereas heavy tanks are good for straight head-to-head battles. Medium tanks combine the advantages of both light and heavy vehicles, but lack the speed and firepower of the others.

■ Don't forget to use your drone tanks! Direct one to hold an enemy tank's attention while driving your tank to the rear from where you can unleash a powerful attack. Watch out when doing this, though, as the computer tank has two objectives – to both defend itself and attack any player tanks. Thus it will turn its strongest armour towards the most powerful gun and take out the lightest enemy tanks.

The Tanks

Various tanks are useful for different things, and experienced players will be able to utilise the individual strengths of each. Here are some notes on the strengths of different tanks:

CHAFFEE – very fast and cheap.
M36 GMC – Also very fast and has a good gun, but has fairly weak armour.
SHERMAN FIREFLY – Good gun, medium speed and adequate armour.
PERSHING – Has the same gun as the M36 with medium speed, but has the advantage of good armour.

PANZER III – Very cheap, but not particularly good at any one thing.
PANTHER – Excellent front armour, a good gun and average mobility, but the side and rear armour are both weak.
TIGER 1 – Excellent all-round armour and good gun.
KING TIGER – Best armour and gun of any tank, but travels slowly.

T34/76 – Good all-round armour (as with the other Russian tanks), good gun but has average speed.
KV1S – Better armour than the T34/76, but has the same gun.
KV85 – Has a better gun than the KV1S.
JSII – Excellent armour and gun and has good mobility.

Cybernoid

Raffaele Cecco's classic shoot-em-up is another tough cookie that benefits from a good dose of the cheats. Press the [Space] bar once on the title screen, type in RAISTLIN and then press [Space] again. A warbling noise and a message signify that the cheat mode is active.

An endless supply of Cybernoids will now be available and, as if that weren't enough, pausing the game and pressing [N] transports the ship straight to the start of the next level.

Cybernoid II

To gain infinite lives simply type NECRONOMICON on the title screen.

Defender of the Crown

Hold down the [K] key until the game has loaded. This simple little trick provides you with 1024 knights in your home army and a further 1024 in your campaign army. Your sword-fighting ability will also improve greatly, so opponents can usually be despatched with two strokes.

Denaris

To enter the training mode, simply press [Z] after Game Select, plug the mouse in the second joystick port and press the right hand mouse button while the game loads.

Dogs of War

To become invincible in this strange *Commando* clone,

type in TIMBO while playing, then press F5. The enemies' bullets will no longer harm you.

Double Dragon

On the title screen type in RU CALLING MY PINT A POOF? and press [Return]. Pressing [Delete] kills your opponent.

Dragon's Lair

I bet a lot of people bought this to "demonstrate the power of their machine" then failed to get very far at all. Here is a way to get the game to play right through as a demo, allowing you to show off the whole game in all its glory. Just as the credits finish, press and hold [ESC], right and left cursor keys, [N] and [7]. The screen will then flash signifying the demo has been activated. Now press the fire button and off it goes like a Disney cartoon for you to enjoy.

Dragon's Lair – Complete Solution

How to defeat Singe and bring Dirk out in triumph. Try to perform each action just as Dirk has finished the last one. Remember that many scenes are played twice, the second scene simply being the mirror image of the first.

Disk 1

The Drawbridge

When the tentacles approach, swing the sword. As they dodge away, push up to climb through the hole.

Room

After the 'Drink Me' sign flashes, the door will flash. Immediately push right to go through.

Disk 2

Dirk enters either a Cave or a Room with a monster in.

Cave

If entering from the right, go left, right then left as soon as the steps flash. If entering from the left, go the opposite way.

Room

If the door is on the inner right-hand side, as soon as the tentacle drops down press fire, then push up, right, down, left and up. If the door is on the inner left press fire, then push up, left, down, right and up.

Disk 3

The quest continues with either whirlpools and rapids or a room containing a cauldron.

Whirlpools and Rapids

Simply move left and right away from the whirlpools. The rapids, on the other hand, need more precise timing. If the first whirlpool encountered was on the left, Dirk will arrive at the rapids on the left and vice versa. Push left and up to go on to the next screen, then up again. Do the opposite if entering on the right. This manoeuvre must be repeated four times to get through.

Cauldron Room

Watch Dirk walk over to the bottles on the table. As he picks one up, a monster appears, grabs him and the screen changes. As soon as it has changed, press fire to lop the dragon's head off.

Disk 4

The Knight

If the knight is holding his sword in his right hand, move right, left, up, left, right left and left. If the sword is in his left hand, on the other hand, then move left, right, up, right, left, right and left. When a close-up of the knight appears, press the fire button. Timing is essential on this section: attempt to make the next movement just before Dirk lands on the floor.

The Balls

This bit is fairly simple. Just press down when the small ball passes Dirk and repeat this for all six balls.

Disk 5

The Room

Keep pushing up until Dirk has left the room. This scene occurs twice.

The Dragon's Lair

A pile of moving objects appears. If they are on the right, go right, then left and down. If they appear on the left, then move left, right and down. On the next screen press down to catch the falling objects. Finally, keep pressing fire when the Princess says "Use the magic sword".

Disk 6

The Final Battle

Move down to avoid the clutches of the Dragon. Then move either left or right, as necessary, towards the Dragon's head. When Dirk has taken the magic sword, press down to avoid the Dragon's attack. Do this three times and, as the scene changes, press the fire button to throw the sword at the Dragon and kill him.

Drakkhen

Here are some tips from the programmers themselves.

■ When you find yourself outside, it is still possible to escape from a monster. It is very easy but you must be quick. The method is as follows: when the monster appears, press the [RETURN key], you will automatically do a half turn, then take advantage of this and run away... beware, if you stay in the same place the monster will return.

■ To help guide you in the exterior world (outside dungeons), note that the sun rises in the east and, of course, sets in the west. Following a disaster, the moon can be found in the south. The moon will not move. Another way of guidance is observing the shape of the mountains. For this method it is best if you draw a small plan to help guide you when you move.

■ Beware! Certain monsters are poisonous, for example, certain spiders, snakes and maybe even the scorpions. If you have been stung by their poison you will not die by the sting, but your life points will decrease rapidly until you are dead. After each fight you must check the fitness of your character. If you see the word 'poisoned', drink the flask (if you have it). If not, you must look for it immediately. You can also escape this stinging situation by using the healing powers of the group.

■ When you are with Hordtkhen, the dragon prince of the first dungeon you encounter, go immediately to the sister Hordtkha who can be found immediately due south. With a little luck you will find the temple. It is the magic place where you can recuperate life points.

■ Again with our friend Hordtkhen, to de-activate the field of magnetic forces, all you need to do is press the button which can be found under the triangle with the point on top. Then you can take the path to the left – be careful not to be too aggressive and you will find information. The door which you will see to the left of you is the door for the kitchens and the cellars. Take a torch from the kitchen, if you have the intention of going down to the cellars however, be careful. The door is locked with a key that be found somewhere in the dungeon. And be extra careful because a snake lurks in the kitchen and the cellars and it's poisonous.

■ When you are with Hordtkhen, you can enter the armoury (the right hand door at the entrance), but only at night because the guards are sleeping. Once inside you can help yourself to the arms that are there (swords and shields).

■ If your magician has enough experience points you are going to benefit from quickly made spells. You can for example use magic to quickly explore an unfamiliar dungeon. It is dangerous and unnecessary to send all your troops to explore. For this type of situation the invisible spell is also useful. Using all this you will be well prepared for the dangers.

■ Do not attack everyone you meet. You will follow many paths and meet many strangers who are a vital source of information. Saving a situation can only be carried out if your characters have come to a stop.

Try this tip if your characters all seem to be Mr Puniverse fodder. Get into the character generation section and enter the character name as 31415927. All the character values will be slightly increased.

When you are next asked for your name, enter SUPERVISOR. Now play the game and press [Ctrl] when you are standing around outside. A menu will appear giving a list of locations to go to on the left, then a list of numbers followed by three columns of abbreviations. Clicking on a location transports you directly there and clicking on a monster makes it appear.

Dungeon Master

First a list of spells for the subterranean adventure.

POTIONS

VI – Increased Health
YA – Increased Stamina
YA BRO NETA – Increased Vitality
YA BRO DAIN – Increased Wisdom
OH BRO ROS – Increased Dexterity
FUL BRO KU – Increased Strength
ZO BRO RA – Increased Mana
VI BRO – Poison Antidote
VI BRO – Shield
ZO VEN – Poison (for throwing)

MISSILE SPELLS

FUL IR – Fireball
OH VEN – Cloud of Poison
OH KATH RA – Explosive (similar to Fireball)
DES EW – Kills Spiritual Beings (eg Ghosts)
DES VEN – Poison

OTHER SPELLS

YA IR – Shield
OH EW RA – Enables you to look through solid objects
FUL – Light
FUL BRO NETA – Spell Shield
ZO – Opens some doors
ZO RATH KA – Zokathra Spell
YA – Stamina potion
VI – Healing potion
FUL – Light
ZO – Opens some doors
YA IR – Magical group shield
YA BRO – Magical shield
VI BRO – Poison cure
OH VEN – Cloud of poison
FUL IR – Fireball
DES VEN – Poisonball
DES EW – Weakens non-material beings
ZO VEN – Poison potion (Ven bomb)
YA BRO ROS – Magic footprints
YA BRO DAIN – Wisdom potion
YA BRO NETA – Vitality potion
OH EW RA – Magical sight (X-Ray vision)
OH KATH RA – Lightning bolt
OH EW SAR – Invisibility
OH IR RA – Long-lasting light
OH BRO ROS – Dexterity potion
DES IR SAR – Darkness
DES IR RA – Long-lasting darkness
FUL BRO KU – Strength potion
FUL BRO NETA – Fire shield
ZO KATH RA – Magical plasma
(for attaching gem to fire staff)
ZO BRO RA – Mana potion

Creatures

Not surprisingly, the main problems you will encounter are the creatures of the dungeon, so here is a run-down of the bogie-monsters you may come across.

MUMMIES (Levels 2,3 and 8)
On Levels 2 and 3, just use weapons as they're easy to kill. On Level 8 use magic, because it is faster.

SCREAMERS (Levels 2,3 and 4)
Easy enough to kill with axes. Use them as fighting practice and as a useful food source. Near the end of Level 4 there is a regenerating room.

OGRES (Levels 3 and 4)
These blokes can do serious damage to low-level characters. They carry clubs which they drop when they're killed.

ROCK MONSTERS (Levels 3 and 4)
These are hard to destroy, but luckily they move slowly. They poison adventurers, so use poison or fireballs against them.

GIANT WASPS (Levels 4,5,6 and 11)
Quite fast and inject poison into you. Throw fireballs at them and try to avoid hand to hand combat. Level 11 is rather crowded, so a few high-level fireballs are needed. Be prepeared to go off and sleep for a while.

GHOSTS (Levels 4 and 8)
Silent and fast, these can pass through doors. Use DES EW spell to destroy them.

PURPLE WORMS (Level 4)
These are wicked little tykes. They hang around in pairs and are quick to pursue and poison you. Be ready with some high-level fireballs to deal with them.

SLIME CREATURES (Level 5)
These slimey creatures use magic, so do the same in return with a DES EW spell. They are slow in pursuit.

SLOW COUATLS (FLYING SNAKES) (Level 6)
Fast moving and poisonous, they can be killed with a combination of one high-level fireball and combat.

SKELETONS (Levels 6,8 and 10)
Can be fought with straight combat – which provides a good chance to test your skills. They carry falchion swords and wooden shields.

BEHOLDERS (FLOATING EYES) (Levels (6 and 10)
These fight using lightning bolts, so reply in kind. They are the only creatures capable of opening doors.

STONE GOLEMS (Level 7)
Only five of these are on the level and they move slowly, but they take a lot of fireballs before they co-operate.

DEFORMED PIXIES (Levels 8 and 10)
These don't do a great deal of damage, just cause a nuisance by stealing whatever is in your characters' left hands and running off at great speed. They giggle just as they are about to steal an item, so loose off a fireball or give them a quick whack with a melee weapon to take them out. Any items stolen by these bandits can only be retrieved once they are dead.

GIANT RATS (Level 9)
Straight hand-to-hand combat or magic will turn these into chicken drumsticks.

RUST MONSTERS (Level 9)
These may look like the AD&D Rust Monsters, but they don't turn your characters' armour to rust. They can be killed by striking them with whatever you have. They do their fair share of damage, but luckily there aren't too many of them about.

LITTLE MAGES (Level 9)
These look like the Jawas from Star Wars and fling some pretty powerful magic about. They are quite easy to kill, but have the annoying habit of transporting to beside you or behind you when they are hit.

GIANT SCORPIONS (Level 10)
Watch for the sting in the tail and dispose of them with a fireball. They vary in toughness, so watch out for surprises.

WATER ELEMENTALS (Level 11)
Those frothy puddles aren't as harmless as they seem! They just might sneak up behind you and send you squiffy. They can also wash under doors so dispell them with a DES EW or two.

ETHEREAL TRIFFIDS (Level 12)
These fade in and out od existence. Use fireballs when they're solid or DES EW when in their ghostly form.

GIANT FOUR-LEGGED SPIDERS (Level 12)
Fireballs and weapons are effective enough against these deformed arachnids.

CHAOS KNIGHTS (Level 12)
These nasty swines attack in pairs with two swords apiece. In and out attacks through doorways are effective with high-level fireballs. Don't worry about cursed armour – it's more effective against other knights.

FIRE ELEMENTALS (Level 13)
These immobile plates of coals flare up whenever you approach them. Use DES EW spells to reduce them to their flat, shiftless state.

DEMONS (Level 13)
Nifty with the fireballs so counter attack in the same manner. Be prepared to make a run for it occasionally.

LORD CHAOS (Level 13)
The boss-man himself. You need the firestaff to get anywhere with him. Start off by throwing flux cages everywhere. If he stands in one, go up and fuse him in the cage.

RED DRAGON (Level 14)
This is the only creature on the level. It can be avoided, snce it is quite slow moving, but it's pretty heavy with the fireballs. If you do take it on, be prepared to spend quite some time in combat.

Now for some tips on negotiating the levels.

LEVEL 2
Have two or three bashes or chops on all the wooden doors. One has a keyhole, but can be knocked down instead. This will leave you with a spare key which can be used on a variety of doors.

LEVEL 3
Trolls breed in the creature cavern. There is one last door near the stairs going down, which contains rock monsters. Open the door, kill the monsters and sleep. There is a button on the left wall. Click it and get away as quickly as possible, as two very tough blue trolls emerge from the secret door that the button opens. Try to lead them into another room and close the door on them.

LEVEL 4
Almost all the rooms with doors contain breeding purple worms, so beware. Occasionally, there are worms that wait until you reach a certain part of the dungeaon before they breed, so when you go back they'll be waiting. If you're having difficulties, remember that the purple worms are afraid of the Staff of Claws.

LEVEL 5
The only things to really watch for on this level are the flying snakes. A couple of EE (fourth level) fireballs should take care of them.

LEVEL 6
The riddle room is the one with only one floating Tentacle-head. Pull the lever and PUT (don't throw) something into the transporter. The door should now open. When the man calls you a coward, go his way last as it is a trap.

GENERAL TIPS
If you are reaching a critical level due to starvation, nip back up to Level 4 and kill some worms for food.

Behind the door in the place with lots of screamers is their breeding area. They only breed when you pass the room with the green boots. You'll know when they've bred, as when you go back the path is blocked by a rock monster, so ALWAYS remember to close doors behind you for safety.

Always climb down pits when you can, as there is usually something nice hidden down there – like armour.

Elite
That cheat screen in full! To start the cheat mode type in SARA when first prompted for a start-up password, then enter the correct code. During the game press [*] to bring up the hacking screen. All you have to do now is alter the appropriate bytes to get the desired effect:

Byte	*Value*	*Result*
18	FF	More money
19	FF	than you
1A	FF	can shake a
1B	FF	stick at
1F	46	Maximum fuel level
21	04	Maximum number of missiles
22	01	Large cargo bay
2B	01	Fuel Scoop
2D	01	Escape Capsule
2F	01	Energy Bomb
30	01	Energy Unit
31	02	Naval Energy Unit
32	01	Docking Computer
34	01	Galactic Hyperdrive
3A	01	Retro Rocket
3C	01	ECM Jammer (activated by [L])
3E	01	Cloaking Device (activated by [Y])
89	01	Unhappy Refugees
8D	01	Secret Document
97	00-08	Mostly Harmless rating
9F	10	Mission 1
9F	20	Mission 2
9F	31	Mission 3
9F	40	Mission 4
9F	50	Mission 5

Cargo can also be obtained in this way, but since the above items make the player incredibly rich and unbelievably well equipped it is a shade pointless to list.

Eye of Horus
In the credits section of the game type SPAM and the game will start. You will now have infinite lives and you will not need colour coded keys to be able to use the locked lifts – this means that you can easily access most of the game. If you want to meet Set, he is through the blue locked lift.

Falcon
If you should find yourself running low on ammo, press [Contro]l and [X] during the game and watch those extra 500 watch those extra 500 cannon rounds and 9 extra sidewinders clock up on the instruments.

If an engine is lost at any stage during a mission, try these tips to cheat failure. Rather than eject and risk capture, wait for the RPM counter to reach zero then pull

the nose up while pressing the [Help] key to stabilise the plane. If the airspeed is still not zero, bank left and right to lose any last vestiges of forward movement. If the HUD display is out, press [7] on the numeric keypad to bring up an alternative airspeed indicator.

Keep holding the [Help] key to maintain a level flight and the wait until the Falcon touches the ground. Press the [Escape] key and choose 'End Misson' from the pull-down menu. A helicopter should now pick up the surviving pilot.

Federation of Free Traders

Faancy loads of credits? Follow these steps.

1. Load game and press [F8], then Net to gain access to Network. Then HELP (return) and your trading name. When asked for a new name, type 'Y' and note the code sequence.
2. Exit Net (type Q), then QUIT (return), then BACKSPACE to exit station. Locate a friendly ship and lock on.
3. Press F8, then Net, then your code then 'T'. If it's friendly you'll establish transmission.
4. Ask trader if he's selling (be persistent!)
5. When he offers something, offer him 1 credit then LOGOFF.
6. Hit 'T' again and ask again if he has anything to trade – persist until he does, but don't barter.
7. When he has offered, hit any Alpha key (a-z) until he asks if you want his goods or not.
8. Now hit 'Y' and transaction will be completed.
9. Check your credits by hitting 'I' and space to see what goods you have in the hold. Any problems, re-establish contact and go back to Step 5.
10. Repeat Step 5.
11. When you make your bid, make it high (5,000) credits.
12. Trader will inform you that you don't have enough credits and exit.
13. Re-establish contact and ask if he wants to buy – make sure you DO have something.
14. He'll ask for confirmation, just press 'Y'.
15. When he asks how much say 10 credits.
16. When transaction is complete, check inventory – especially your credits!

Fighter Bomber

All that 'coming up through the ranks' dross is for crawly boot-lickers. To gain access to any of the missions at the beginning of the game, simply type in BUCKAROO as the pilot's name.

If you're having trouble refuelling, then follow this simple advice: Press [U] (for Waypoint) to get the fuel-plane's position, then choose Sidewinders as a weapon and press [S] to lock on (the plane has to be within radar range). Switch to cannons, otherwise the plane will avoid the lock-on. You will now be able to refuel easily.

Landing isn't that difficult as long as you take your time and follow these instructions. Line up in front of the runway, making sure your horizon is level and steady, drop the gears, put the airbrakes and wheelbrakes on and press [G] for slow speed. Make sure you don't land on the front gear and switch off the engine as soon as you have touched down.

Fish

The first three parts could be slowing you down so here are some tips to get you through to Hydropolis.

Part 1

Tell Rod to make the coffee and then get the tapes from the bin, the tape bin can be found in the cupboard in the secondary control room. Set the amplifier fader in the control room to a suitable level and clean the tape heads with the cleaner. Play the tapes in the player and the producer will storm in and sing the combination to the cabinet in his office. Get what you find inside it and you've solved the first part of *Fish*.

Part 2 – The Abbey

Get dressed and pick up the torch from the rubbish in the cab. Head east until you get to the abbey and find your way to the catacombs. Open the sarcophagus lid and find the ceremonial cord. Go back up to the ruined transepts and turn off your torch. Drag the pew past the hippier until it's beneath the arch; you can climb up this by standing on the pew. Tie the cord to the gargoyle and climb down again. You can pull the cord and collect the gargoyle. Put it in its rightful place. Get the grommet from the chalice to complete part 2. You may have to do this several times thanks to the hippier interference.

Part 3 – Exploding Parrots

Timing is critical in this part so don't waste any time. Go south-east to the smithy and free the budgie. Return to Mickey (mind the bird) and get the disc from the stump when he leaves. Return to the smithy and get the tools, gloves and mould. Wear the gloves and place the disc in the crucible. Hold it in the fire with tongs and pour it in the mould when it melts. Take this to the cool glade avoiding Mickey and anywhere wet. Let it cool for a few turns. When this is done smash the mould with the hammer and lo and behold, HYDROPOLIS!

Flying Shark

One of the best cheat modes ever, this: it not only gives you megaweapons, but also provides a real Acid House experience! First job is to get onto the high-score table, which could be the really difficult part. Once the table appears type in the following three-letter codes, but hold down [5] on the numeric keypad while typing the last letter of each:

Effect	Code
Acieeed!!!	RLH
Full fire power	JGL
Unlimited lives	KDJ
Invulnerability	RAB

Descend first ladder down. Go left. Descend first ladder down. Go right. Descend first ladder down. Go right. Descend first ladder down. Go left. Descend first ladder down. Go left. Descend first ladder down. Go left past symbol. Descend first ladder down. Go left, descend first ladder. Go right, descend first ladder. Go right, descend first ladder. Go right and up first ladder. Go right and up first ladder. Go right and up first ladder. Go right and up first ladder. Go right and down first ladder. Go right and down first ladder. Go right and down first ladder. Go left and down first ladder. Go left and down first ladder. Go left and down first ladder. Go right and down first ladder. Go left. Keep going, and down first ladder. Go right to computer room. Enter.

Use card on console on left (you should now have about 2 mins 30 secs left). Quickly exit room and go left and up first ladder. Go right up first ladder. Go left up first ladder. Go right up first ladder. Go right up first ladder. Go right up first ladder. Go left up first ladder. Go left up first ladder. Go left down first ladder. Go left down first ladder. Go left down first ladder. Go left down first ladder. Go left down first ladder. Go left up first ladder. Go left up first ladder. Go left up first ladder. Go right up first ladder. Go right past symbol up first ladder. Go right up first ladder. Go left to exit... ***Happy ending!***

F-29 Retaliator

This is one helluva flight/combat simulation, but is it ever tough? This cheat could be useful for flyers.

Load up F29 and enter your name as THE DIDY MEN (with spaces) on the enrolment screen. Click on the Colonel icon and press Return. Select the battle area as per normal and select mission control. Accept a mission (without selecting one) then go back and select a mission. Now start the game and play as normal.

When it becomes time to land, just press Enter on the keypad and the plane will land automatically.

There's nothing worse than finding yourself stranded in mid-mission with no weapons! To avoid this, simply enter your name on the enrolment screen as CIARAN, then load up your pilot's log. The name should now read OCEAN OK. Now you can fly any mission with infinite missiles and cannons.

Gemini Wing

Want to choose what level to start on? Load the game, press [P] to bring up the password system and enter these codes:

LEVEL 2= MR WIMPEY
LEVEL 3= CLASSICS
LEVEL 4= WHIZ KID
LEVEL 5= GUNSHOTS
LEVEL 6= DOODGUYZ
LEVEL 7= D GIBSON

Just before you're about to be killed for the 4th time, press the left mouse button, to bring up 2nd player, and keep pressing the fire button until you're killed; you'll then reappear at the bottom of the screen.

Ghouls 'n' Ghosts

Type in KARENBROADHURST (no spaces) and a 'cheat on' message will appear. When you start the game you will now find that the collision detection has been removed.

Gnome Ranger

There's an odd, but very convenient bug that rears its head when you are in the shop. Give Cap any two of the objects that you are holding, then take the backpack. Type 'PUT (any object in the shop) IN BACKPACK'. Then do the same for any other object in the shop: you will find that you can take every last object in Cap's shop.

After making friends with the eagle, ring the bell and ask the eagle to go into the witch's garden, get the peg and go and open the kennel door. Now go into the garden and follow the dog. You may – no, you will – find something to your advantage...

Goldrunner

Pressing and holding down [F5] for a few seconds during play will give you an indestructible ship. Pressing [I] moves you on to the bonus screen, while [U] gets you off it again. By continually hitting [I] and [U] it is possible to skip through all the levels.

Great Giana Sisters

Pressing the keys that make up the word ARMIN during the game will allow you to skip levels.

Empire Strikes Back

Hold [Help] while typing in XIFARG ROTKEV. Let go of the Help key and the words 'Cheat Mode' will appear on the screen. Pressing any key between [1] and [–] will play one of a number of different speech samples. Hit return to get back to play proper.

Hard Drivin'

This race game has quite a few strange "features". This one allows you to qualify for the head-to-head race against the Phantom Photon with ease.

At the start, turn the car around 180 degrees. The display should show the WRONG DIRECTION message. Head off under the bridge until you get to a split in the road. Take the right hand branch and keep going until you reach a checkpoint. Go through and turn the car through 180 degrees until you're heading the other way. Go back through the checkpoint in the right direction and you should hear a ping. Keep going to the finish and once under the bridge let the clock run down to zero. You should now get a message telling you that you've qualified for the race.

Another quirk is that if you select manual gear control and start the game as normal, you can get to top speed, shift into neutral (N) and carry on around the track at full pelt. There are a few extra details though. For one you don't get any score, but you can't skid!

Hawkeye
Having survival problems? Press [DEL] while playing the game and when you've lost all your lives, you'll find you jump to the next level instead of dying.

Helter Skelter
Not a very widely-known game this, so if you're lucky enough to own a copy and can't find the secret codes then here is a list of them:

Level 11 – SPIN
Level 21 – FLIP
Level 31 – BALL
Level 41 – GOAL
Level 51 – LEFT
Level 61 – TWIN
Level 71 – PLAY

Heroes of the Lance
A few tips from someone who knows what he's talking about: cue Pete Austin of Level 9.

Only three of the seventeen spells are actually needed: Cure Light Wounds, Web (to paralyse dangerous-looking opponents for dissection at leisure) and Dragon Breath (with which to fight Khisanth).

None of the treasures, potions, scrolls etcetera that are found are actually needed.

Fight everything but Hatchlings: run at these and dodge into a doorway.

Raistlin jumps farthest.

Save your position before circular doors.

To finish: Goldmoon throws her staff at Khisanth (she can't throw it at any other time) and then you should get a fighter to run past the dying dragon to win.

Hollywood Poker
Make life easier in this slightly sleazy game. Load the game as usual and when the drive light goes out press [Control/Amiga/Amiga] to reset the machine. When the game loads for the second time you will find the two girls in the first round are much easier to beat.

Hunt for Red October
When your nuclear drive shuts down, round about day seven, you'll keep having to surface to re-charge the batteries. It is all too easy to run them dry while you are underwater, in which case you're stuck. But you can survive: save the game immediately when the drive packs up, load the saved game and switch to nuclear drive. You should be able to complete your journey this way.

Hybris
Load the game and wait for the high-score table to appear. Type COMMANDER and press Fire to begin the game. Press [F10] during the game and your ship will glow, which signifies that you are now invincible with unlimited energy and smart bombs. press [F2] to [F6] to get the five different add-ons and [F9] to skip a level.

Ikari Warriors
Qualify for the high score table and enter your name as FREERIDE. You'll now be able to play with complete invincibility in either one or two player mode.

Infestation
It's all very well buying a game with fast 3D graphics and involving gameplay, but what if you can't even get into the complex to see them? Never fear, help is at hand...

To gain access to the complex, simply find the terminal on the surface (the coordinates are about 90,30) using the MMU and plonk yourself in front of the screen ready to 'interface', if you know what I mean! When the screen asks you for an access code, type in KAL SOLAR and the on-screen message should tell you that the transporter has been activated. Now zoom back to coordinates 50,50 (next to one of the radar towers) and enter the transporter in the direction of the arrows. The screen will dissolve and you will reappear inside the complex. Now to get them alien egg thingies!

Your suit uses Oxygen and battery charge at a rapid rate, so keep your helmet up and power off as much as possible. However, always check the atmosphere and radiation level of a room while protected by your suit before chancing the elements, and make a note of poisoned areas and vacuums for future reference.

Most of your travels will be via the ventilation ducts, which are all covered by gratings. To get into them you need a screwdriver, which is in the hangar at the top left of the complex. Go and collect it and go to the network at the top of the map (using the transporters) and pick up the lift card. Go to the lift in the middle of the map and go down to Level Six. Make your way to the cooling system and switch it on so that it prevents the reactor from overheating too quickly. Now go for the eggs!

Interceptor
For extra missions, type in [2] for free flight and then, before you choose what aircraft to fly, type [6] [7] [8] or [9]. The plane will appear way off the map and you must work out what you have to do next!

If you should fail, by any bizarre accident, to qualify for the later missions, then try this POKE by Richard Bedding of Peterborough. Save this listing onto disk. When prompted for the log disk, insert the POKE disk instead.

```
10 PRINT TAB(10) "Interceptor POKE by Richard Bedding"
20 PRINT: PRINT "Insert the Interceptor log disk in Drive 0:"
30 PRINT "Press any key"
30 WHILE AS=""
40 AS=INKEYS
50 WEND
60 PRINT: PRINT "Please Wait"
70 OPEN "R", #1, "df0: config", 1
80 FIELD #1, 1 AS B$
90 LET B$=CHRS (1)
100 PUT #1,2
```

```
110 FOR N=22 TO 27
120 PUT #1,N
130 NEXT N
140 CLOSE #1
150 PRINT: PRINT "Finished"
```

A slightly riskier version of the mission-access cheat: note that this one involves taking off the write-protect, so could endanger your copy of the game.

Load the game as normal until asked for LOG DISK. Remove the original disk and make sure it is write-enabled. Replace it into the machine and press return. You will now have access to all the missions.

Interphase

Most 3D games have some sort of object viewer, so where is the one for *Interphase*? All you have to do is start the game and type in 'Fenny' (remember to use [Shift] for the F). A message should appear telling you that the code has been accepted, in which case use the left mouse button to cycle through the objects.

It Came from the Desert

If you're overrun with insects then either get to the louse doctor or call Rentokill. On the other hand if they're only giant ants then have a shuftie at these playing tips.

All the evidence must be collected and analysed by Dr. Wells by June 9, otherwise the doctor either dies or leaves town.

The following table gives the dates, main sources and relative tips to use for specific evidence:

DATE	LOCATION	PART(S) FOUND	TIP
June 2	Jackie's Car	Body, Fluid	1
June 3	Home Base	Body	2
June 4	Cook's Stud Farm	Cast	
	Police Station	Tape	
June 5	Ore Plant	Tape	3
	Quarry	Fluid	
	Neptune Hall	Fluid	
June 7	Ore Plant	Cast	
Any 1st	Ant Encounter	Body	4
Any 2nd	Ant Encounter	Fluid	4

The Four Tips

1 – Jackie's Car isn't found unless you are in your house on the morning of June 2. Let Jackie into your house and select 'Take Jackie to Car.' Once you are at the car you will find the fluid, but to find the body part you must select 'Investigate Scene Further.'

2 – This body part is delivered to your house by a neighbour. To get it you must be at home on the morning of June 3 and answer the door.

3 – You are given the tape the second time you go to M-2 on June 5. The first time you are stopped by an ant.

4 – To collect either of these pieces you must kill the first ant and then go on to destroy enough ants to scare off the rest.

General Tips

To collect the body part and the Fluid on the first day, first go to JD's farm, then go to the South-West Cone. If you do this without answering the door first, you can take the evidence to Dr. Wells for analysis.

By June 6 the ants will go into hiding and all ant activity stops until the main ant attack on June 9.

Mines three, four and five, the pump-stations, the North Cone and the North-West Cone are all dead-ends and nothing ever happens there. Ignore the strange lights you hear about – they're red herrings.

The nest is below M-1, but it is impossible to enter before the main ant attack.

To beat Ice at playing chicken drive on the left-hand side of the road and steer to the right at the last minute – but DON'T press fire. Ice should steer around you. It may take a few attempts until you get this right, as it is quite difficult.

Winning a knife-fight is one of the easiest sections. All you have to do is repeatedly stab and swipe by pressing fire and up followed by fire and right. Get it right and your opponent rarely hits you.

Try to avoid fire-fighting wherever possible, as it's the hardest of the sub-games – so don't pick up the red rock at the start!

If you stay in hospital you may miss a vital piece of evidence, so here are a couple of methods of escape:

1 – Grab a wheelchair as soon as you can and take it down the lift. Barge past any nurses or orderlies and rush past the guards.

2 – Sneak your way from room to room towards the elevator or stairs. Once downstairs carry on sneaking until you get to the bottom right hand room. Walk up to the guards and get their attention before going back to the right hand room. The guards should go past, leaving you to sneak out of the room and rune through the doors.

Towards the end of the game the mines and South-West cone may be destroyed. If this happens you can only get into the nest by plane. Fly to M-1 gassing any ants on the way. When you reach the mine fly a little to the left and turn around to land on the dirst track. Now you are ready for the nemesis!

Jumping Jack Son

Here are the codes for the higher stages:

Level 5 – ROCKNROLL
Level 9 – NOISES
Level 13 – ELVIS

Kick Off

When playing against a friend and you score a goal, shout 'YEAH!' really loudly and punch the air. This is very effective for upsetting your opponent!

The Kristal

Try these tips to make your life a little easier.

1. When fighting an opponent, move to the left of the screen and keep your finger on the fire button and the joystick up (head chops), and you should defeat him within minutes.

2. Defeat all the opponents in each planet then save the game (it will make it easy for you to complete the game) e.g. each time you start a new game load the saved game and then you don't have to fight any more opponents.

3. Here are the items that you can take from some of the characters for your own benefit.

Kring = 25 Skringles
Princess =Ring of Belz
Gloop = Invitation
Beggar = Pommel
Hippy = Flow
Strell Noto = 25 Skringles
Aunt Polly = 5 Multipep tabs
Mervin = Transmitter

Kult – Complete Solution

Go to The Noose, use Solar Eyes, jump on the left rope, push lever, push eye (under the lever), pass through trap door. Go forward, go forward again. When told 'Don't move', click on 'accept'. When asked 'Why are you in this mountain of madness' click on 'tell truth'.

Use zone scan, lift stone slab, take flask, go through left passage, go forward, go through trap door, go through door into passage, go through passage, go to Saura's repose. Go to In the Presence of God. Go to Placating the Powers, when challenged by first woman, click 'attack'. When challenged by the second woman, click 'PSI powers' then click 'brainwarp' then click 'give flask to drink'. Pick up sacrificial blade, click 'PSI powers' then 'Sticky Fingers' to get through trap door.

Go forward, go forward (you should now be in the cavern with Ash and Norma Jean), go right, go forward, go right, go forward, go through trap door, click 'PSI powers' then 'solar eyes'.

Go to The Master's Orbit (there shouldn't be anybody about), and into The Master's Eye, inspect the Master of Ordeals, search him, take the whistle and whistle with it.

Look into the deep cavity, take egg, go out, go through passage and into ring, go through passage in outer wall, go left, go left, pull bolt, pass through bars, use 'sticky fingers' to go through tunnel at top of screen, go up, go through In the Presence of God and into the Threshold of Truth. Attack woman, put the egg into the opened mouth on the statue. Inspect the lectern, use PSI-shift to get the statuette from the top left of the screen. Go through the passage, go through In the Presence of God and into Saura's Repose. Put statuette in niche, put monkey into 'the tunnel', go to In the Presence of God, zone scan, go into passage, push lever.

When challenged by Zorq, click 'PSI powers' then click 'extreme violence', click 'PSI powers' then 'brainwarp' then click on Harssk, use PSI shift to close the trap door NOT the lever, click 'wait', click 'possessions', click 'sacrificial blade', click 'throw' and click on Harssk – now watch and read.

Manchester United

If you press the left mouse button during the game, then the two player mode will be activated, so that you can beat the trickiest of teams with ease – they just stand around doing nothing.

Marble Madness

Leave your marble stationary at the beginning of Level One for a pleasant surprise!

Complete the Level Three maze and jump off the ledge. You will receive a jump bonus and be transported to the secret Water Level.

Menace

A cheat mode involving some social comment from Dave Jones. When the level has started, all you have to do is type in XR3iTURBONUTTERBASTARD. Now pressing keys [1] to [6] on the keypad will skip to the various levels. The [Help] key will replenish those fading weapons and [Return] will take you to the end-of-level guardian.

Microprose Soccer

Keep banging them goals in with these tips.

■ First, change the banana kick power to high on the control panel. When playing the game, always pass to the forwards with a full-powered kick to NW or NE depending on where you are.

■ Once you have the ball, try and run at the goalie's box at an angle (either NW or NE) and blast the ball in at full power from just outside the box.

■ Then again, you could try getting to the edge of the goalie's box and wait for him to rush at you – then just move as far right as possible and position yourself for a banana shot into the back of the net.

■ Also when it's raining and your opponent is running aat your box, run directly behind him and do a sliding tackle – hopefully the ball will go skidding into your keeper's safe hands.

■ Finally, if you get the chance, when your opponent is attacking, move your goalie out to block him and grab the ball – saves a heck of a lot of goals that one!

Millennium 2.2
Here's a handy tip to help you start out.

When you start making your solagens and have a Mk2 or above, you will start to get attacked. Instead of going straight to the defence dome go to energy and shut off your most powerful solagen and change it for a Mk1. Now go to the defence screen and deal with the attack. At the end of the attack you will find that the solagen has been destroyed so go back to energy and put on your most powerful solagen. Make sure you have a few spare Mk1s so you can change as soon as you're attacked. By using this tip you'll not only save time, but will have a constant power source for the really big production items, and if you go straight to defence there's always the possibility of letting the solagen become damaged even if you stop the attack.

Navy Moves
The access code for Part Two is 786169.

Nebulus
John Phillips' maddeningly addictive platform game can be a little bit tough when you only have three Pogos with which to survive. Here's a little hint from a helpful chap called... oh! John Phillips!

Select the required mission and then type HELLOIAMJMP on the title screen. Not only does Pogo now have infinite incarnations, but also pressing F1 to F8 will access the unfinished towers on that level.

New Zealand Story
The cheat for the original version of the game is MOTHERF**KENKIWIBASTARD. Many people will have received their copy of this cute 'n' fluffy 'n' cuddly conversion with the Batman Pack. The cheat for the original version doesn't work on these plastic-enclosed later versions, so here's a correct one.

As in the original cheat, press [Del] and then [M], then enter FLUFFYKIWIS to get infinite lives – a +9 should appear at the bottom of the screen accompanied by the sound of the book if the cheat works. Pressing [Help] should also allow you to skip levels. Yes, much cleaner, that. None of that filthy language.

Ninja Spirit
Press [F9] to pause and then press all the lettered keys in one go. The game will now restart without you having to press [F10], but with the added bonuses of invincibility and infinite time. Can't be bad... unless you've got small hands and can't reach all the keys!

Ninja Warriors
Try these handy cheats.
Put [CAPS LOCK] on and then type the cheat you require and then turn [CAPS LOCK] off.
THE TERMINATOR – Body parts explode when you die.
MONTY PYTHON – Enemies walk on backwards.
SKIPPY – Enemies bounce.
A SMALL STEP FOR A MAN – Moon gravity. Jumping baddies jump right off the screen.
STEVE AUSTIN – Pressing S during play toggles slow motion on and off.
KYLIE for an Aussie TV mode.
CHEDDAR gives infinite lives.

All of the above cheats can be combined if you are feeling really silly!

Obliterator
When you walk through the entrance, keep the left mouse button pressed and continually move the mouse up and down. Drak should then keep walking towards you, which is in a downwards direction. This allows you to walk through space and go down to the next level avoiding any aliens, which often helps avoid tricky situations. But remeber – do not let go of that mouse button until you are near the floor of the level.

Operation Thunderbolt
Think of it – the plight of the captured hostages just because you can't get past the helicopter on Level Two. Never fear! Here is a way to storm through those Arabs without a scratch.

First get a high score and enter your name as either WIGAN NINJA or EDOM TAEHC. This will give you infinite men. If, on the other hand, you think that the game's too easy, then enter SPECCY MODE for a much harder mission.

Passing Shot
To serve an ace every time, follow this advice...

As the ball is coming down on the serve make sure you can see part of the circle around the ball when you hit it. If you are serving from left to right use a slice, and if your are serving right to left use a lob. This technique can be difficult to begin with, but it can be successful with just a little practice.

Peter Beardsley's Soccer
Continual tapping of the fire button while in possession of the ball prevents opposing players from tackling.

Pipemania
You know the feeling – you are just about to get a high score and all that running fluid makes you want to go to the toilet. Never mind, here are the pass codes to the higher levels:

GRIP	**TICK**	**DOCK**	
OOZE	**BLOB**	**BALL**	**WILD**

For a 4000-point bonus, you must get the flooze to cross itself five times (that is, pass through the same squares a total of five times). This is a difficult trick, so remember not to be too flash and to wait until the end of the pipe to try it out!

Platoon

Type in HAMBURGER on the title screen and then press keys [F1] to [F4] if you want to be taken to various points of interest within the game.

Prison

If you've bought this game from Krisalis and are being sent stir crazy, then follow these tips intended for the discerning escapee.

1. Standing next to an object to pick it up isn't good enough – you have to be right in front of it.

2. The red light to the right of and below pocket one will light up when you enter a screen where there is something hidden.

3. A very important point – SAVE THE GAME REGULARLY!

4. Search packing cases AFTER killing the droids.

5. In the room containing the booby-trap, search the unit to the left of the one that explodes. Here you will find a detonating device. Pull the RED wire to disarm it.

6. Search the unit to the RIGHT to find the explosives.

7. Drop the explosives on the rubble blocking the door, remembering to get out of the way!

8. Jump two mines and one hole to find the room containing the stooge.

9. Trade the Jewel found under the bed for a vending token.

10. Wear a tie and go to the nightclub to find a plank.

11. Place the plank on the edge of the large hole and jump the gap.

12. Put the token in the vending machine, choose INNER CITY as the destination and take the ticket. Now give the ticket to the guard.

13. Find Plug Two and take it up the first lift to open the door. Get Plug Three to open the locked door on Level 1.

14. Take an object and wonder around the park until you meet a stooge.

15. Go to the agreed place at the correct time while carrying another object and swap it for the combination. Enter the Vault and collect the credit.

16. Go South-West from the Bank and search near the dustbin.

17. Go past the teleport to find something useful.

18. Take it to the secretary and insert it. I know it sounds rude, but that's what you do!

19. Go up in the lifts and search there. Use the credit to teleport to the next section.

20. Find the Vibe-o-Mat and the Fuel. Arm it and drop it near the row of mines. Now take the right-hand lift in the building and search there.

21. Find the room with a grille placed in the left hand wall. Fill the Torch with fuel. Light the Torch and burn away the Grille.

You will now be in Part Two of the game.

Questron II

Not one of the most up-to-date games available, but still has its fair share of followers. If you are a fan that hasn't a clue what to do, then follow this solution.

The first step of the quest is to arm and protect yourself. You need money for this, which can usually be obtained be gambling at the Wizard Squares. Octapoint is about the cheapest place to buy. Ropes and hooks are useful, since you can't pass mountains or climb pits in the dungeons without them. Stock up about 3000 food – this should last you on your quest, but you will need to restock if you are killed. It's also a good idea to keep your money in the bank in case you are killed.

The second step is to visit the Hall of Visions in Redstone Castle. Use the Gold Key to unlock the door and then speak to Mesron.

Next go to Seacrest or Lyton and stock up on Hit Points. Visit Octapoint for Magic Missiles and Fireballs. Enter the Rivercrest Tomb and find Morle, who will then ask you to find the Orb. However, this can't be done until you've returned the Wand of Power to Mesron. Take Morle's key, escape from the tomb and enter Redstone Castle. By the way, it may be a good idea to take the Amulet and the Chalice of Arvyl from the tomb at this point.

In the North Western part of the Castle is the room of maps. Near this room there is an area which you can enter with the Brass Key, which contains several chests. Raid these for the Emerald Key, the Copper Key and the Unicorn Horn.

Go back to the Rivercrest Tomb and unlock the Emerald Door. Then find the Wand of Power, which will increase your hit points by 200 each time. However it is limited, so use it carefully. Return to Redstone Castle to collect the Orb and then visit Mesron – BEFORE you give the Orb to Morle. He will then make you a scout, so you can use the maps in the Redstone Castle Map-room. Stock up with the Bread of Life, then visit the Holy One in Rivercrest Cathedral (you must be carrying the

Moonstone Amulet) and give him the Chalice of Arvyl. Keep returning until you have 99 Bread of Life, which will give you 100 Hit Points each time. Stock up on everything else and then visit Morle, who will teleport you to the Realm of Sorcerers.

Find the fortress and raid it for its keys. Probe the depths of the Dungeon and make your way out, taking two keys with you. Go to Twilight Cathedral and enter the Tomb. Visit King Kelfar in the Fortress and accept his gift. Simon the Stooge is also in the Fortress, so visit him and allow him to use his spell on you.

Visit Mesron in the Hall of Visions, who will then tell you a town is under attack. It is too late to do anything for the town so don't bother visiting it. Speak to Mesron again and he will tell you that Seacrest is under attack. Go to Seacrest and fire a spell at Mantor (he's the figure in red). Visit Mesron and he will make you a Knight. Hit points can now have a maximum of 65535.

Visit the Dungeon of Dispair and use the Black Key to unlock the door. Make your way into the depths of the Dungeon to the Concave below Level Eight. Don't attemp to rescue Morle or kill Mantor (when you find him). Instead, get inside the circle and cast the Destruct spell from the Evil Book of Magic. And (to coin a phrase) "Thu-thu-thu-that's all folks!"

Raider

Having trouble making it through the game? Try starting on a higher level! And here are the codes: SHOT, DYKE, HIGH, LINK. PEAR, KILN, BAND.

Rainbow Islands

Geting the Diamonds

You can blast baddies till you're blue-indigo-violet in the face, but the key to the game is collecting diamonds – but you knew that of course. Most important is collecting them in the right order – red first and violet last – because this reveals the secret room at the end of each island. So what are the best methods for doing that?

There are two basic ways of turning creatures into diamonds: killing them by crumbling a rainbow near them or destroying them with magic stars. However, you also have to make the diamond land on the correct part of the screen, which is split into seven vertical strips – red on the left through to violet on the right. The baddies spin in the same direction as they were moving when they were killed and if they fall too far out of view off the bottom of the screen they will disappear.

It's important to remember that bad guys don't have to be underneath a rainbow when it is broken, just near enough to it. This is very valuable because you can shoot rainbows underneath things without alerting them to your presence or risking getting shot. With things that can't fly or shoot on the first couple of levels, it's easy to trap them under a rainbow and stomp on them with ease.

The Seven Bosses and Secret Rooms

By revealing the secret room you can avoid having to kill off the boss on each island. You can either try to jump straight into the door or kill off the boss and then go in, thereby getting more bonus points, but don't get killed or the door disappears.

Insect Island
You should not have too much trouble killing the spider without losing a life and in the secret room you will find speed-up boots – which, like all the other powers in the rooms, you will have even after losing a life or credit.

Combat Island
Once again it's worth going for the kill on the helicopter as well as going through the door, behind which you will find permanent double rainbows.

Monster Island
Dracula is one of the toughest bosses and worth avoiding if you think you might die, particularly because the bonus you get in the room is permanent fast rainbows. Just leap straight up the middle of the screen and get in the door before Drac even appears.

Toy Island
The jack-in-the-box who whirls around the screen is also worth giving a miss. Once again you can just leap into the door before he appears and get the wings that await. These are important because the next island has a lot of areas with few platforms where flying up is very useful.

Doh Island
Our old friend Doh is a doddle if you have the wings – just float next to him and pile the rainbows in. You can do it before he even gets a shot off. It's another important room to get into because it gives you a continue option for the last two islands – without it you would not be able to use remaining credits. There is also a warp to level seven option, but that deprives you of an important bonus from level six.

Robot Island
Another tough boss because of the lack of platforms, but if you learn his pattern it isn't too bad. Trouble is, after getting this far, do you really want to take the risk? No, me either. Behind the door is the very useful fairy, who makes surviving the last island and getting the diamonds a lot easier.

Dragon Island
When you're this close why bother with the dragon, just get into that door for a massive score bonus and the congratulatory screens.

The Crucial Codes

At the top of each secret room you will find a row of eight symbols. They correspond to letters which, when typed into the title screen featuring the colour cycling rainbow,

will give you a special bonus for the game.The codes you get from each of the seven rooms are as follows:

Island 1 – BLRBJSBJ – fast feet
Island 2 – RJSBJSBR – double rainbows
Island 3 – SSSLLRRS – fast rainbows
Island 4 – BJBJBJRS – hint A
Island 5 – LJLSLBLS – hint B
Island 6 – SJBLRJSR – does very little!
Island 7 – LBSJRLJL – continue on all rounds

Hints A and B also pop up during play, but only tell you about collecting the diamonds. When you have typed the code in on the rainbow title screen, click up a credit and an icon should appear in the bottom left of the start screen – as the red bottle has in our screenshot. That is then operative throughout the game, but you will have to re-enter a code after all the credits have been used up.

Rally Cross Challenge

Here is a cheat for Anco's amusing little race game. On the fifth track (Loco-Motion), drive around the track until just before the wooden level crossing. Now turn the car 90 degrees and drive along the railway tracks at full speed. When you reach the end of the tracks the race will end and the option page will appear, giving you 28 race and tune-up points as well as a variety of medals.

Return to Genesis

Bit of a difficult game, this. Try typing WASP.ASM on the title screen and then pressing [F5] for invincibility. Easier?

Rick Dangerous

Making it easy: enter 'POOKY' on the high score table and any level completed can then be skipped by means of a handy level-select screen.

Roadwars

Choose the single-player game and make sure you're controlling the craft on the right. The computer plays on the left. Make sure the computer gets all the drones. In this way it will be there to help you out during later stages of the game. Angle your gun to the left of the track for the first screen.

When lives start running low, bring the player on the left side back to life by pressing [F1] and then destroy your craft. Press [F2] to revive yourself and knock the other player off the track. This brings the computer back into play. Continue this process until you reach Satellite Street. Revive Player 1 and kill yourself before the end of the Street. Bring yourself back, just in time to finish the level. You should have two lives remaining with which to finish the first bonus round!

Robocop

Robocop may have been one of the best-selling games of all time, but it wasn't necessarily the easiest. For infinite shields simply pause the game and type in BEST KEPT SECRET (including spaces).

Rock And Roll

This great marble game may be giving you so problems, so over to our man with the hints.

Level 1 – Easy Living. Warp to 33 by using the third repair kit you come to on the hole next to it.
Level 2 – Up and Down. Warp to 20 by going clockwise around the outside level of eggs about halfway through the level.
Level 3 – Silent Moving. Warp to 24 by filling in the middle row of a 3x3 hole near the start with the nearby repair kits.
Level 4 – Time is Money. Warp to 11 by using the single repair kit opposite the middle of three arrows, then keep rolling right across the hole then smash all the eggs.
Level 5 – Words R Easy. Crush all eggs for extra ball – use repair kits to get to those in the shape of GO IN and the second pipe takes you to the other two.
Level 6 – Geometric. Warp to 8 by using one repair kit on each space where the railing is missing in an area of many ventilators.
Level 7 – Secret Area. The secret area can only be discovered from level 27.
Level 8 – Varied Offer. First level with a continue shop.
Level 9 – Crossroads. Throw all four switches in top half to remove ventilators and magnets. Crushing all the eggs puts your energy back to maximum, but this is hardly worth bothering with as you get a full energy charge at the start of each level.
Level 10 – Try the Tree (time limit 9.00 mins). Tight time limit. A total of six red keys are needed and at least 2700 coins before going to the bottom of the tree (+ one blue key).
Level 11 – Beam Me Up. Crush all eggs for 15,000 points. Five smashable walls need breaking and one armoured ball can do this.
Level 12 – Bombastic. Crush all eggs for a 500 coin bonus.
Level 13 – Tricky Track (time limit 8.00 mins). Take icy U-turns by bouncing off walls.
Level 14 – Way Out. Warp to level 18. There are four potential routes to the transporter to the exit. The right hand one is the one to go for but take care not to waste your keys.
Level 15 – Fragile Action. Second level with a continue shop. To get through the green lock in the repair kit area, the fragile floor must be completely cleared to reveal a green key.
Level 16 – Air Fortress. Trickiest level yet in the shape of an aeroplane plus the word FLY.
Level 17 – Open and Close.
Level 18 – Running Man (time limit 3.30 mins). Going all the way round the outside is easiest but nets no points.
Level 19 – Helping Hand.
Level 20 – Your Choice. The quickest way to the exit is to continue right from the furthest repair kit and follow the obvious route – make sure you have plenty of repair kits as you can't return (+1 parachute).
Level 21 – Push and Fall.

Level 22 – Riddle Rooms. Crush all the eggs for an extra life. Make certain to get all available repair kits.
Level 23 – Disk Access.
Level 24 – Skating Rink (time limit 7.00 mins). Make certain you buy the spikes.
Level 25 – Arrow Action. At the arrow junctions, the directions required are: up, up, right, up, left, up, left, and finally up for the transporter. Crush all the eggs for full energy.
Level 26 – Don't Panic.
Level 27 – Radiation. Warp back to level 7 by moving all the balls on the platform out from the centre. You now have a bomb to visit the secret area when you warp to 7. On visiting the secret area the balls must be moved two spaces to left and right to warp to 30. Don't use green key to go through pipe.
Level 28 – Think Twice.
Level 29 – Free Fall.
Level 30 – Roller Coaster.
Level 31 – Crazy Dreams. Crush all eggs for full energy.
Level 32 – Castle of Doom.
Level 33 – Bonus Level. All exit holes go to level 2.

General Tips

Buy repair kits and parachutes whenever possible. Before buying armoured balls check for smashable walls in the vicinity. Speed-ups help in areas with ventilators and magnets, and for going against the flow of arrows. Collecting and using eyes will help you get round levels with time limits. Enter your name as COUNTRY on the high score table and you'll be able to pick the tunes.

There are bound to be quite a few whinging people out there who still aren't satisfied. "We want to go straight to any level," they say. Well now you can. Simply enter RAINBOW ARTS when you are asked to input your name and the screen will turn grey showing that the cheat has been activated. To play the required level, enter the level number followed by XX, then four digits that when added give the level number again followed by XX and finally the level number reversed. If your head is spinning, don't worry. Here's are some examples...

To play Level 12, enter: 12 XX 3333 XX 21

12 is the level, 3+3+3+3 = 12 and 21 is 12 reversed.

To play level 5, enter 05 XX 1112 XX 50

05 is the level number, 1+1+1+2 = 5 and 50 is 05 reversed.

If you just want to hear the tunes, type COUNTRY and a menu will appear. Use the left and right buttons to select the tune you want to bop along to.

A secret level: get into the game and find the 'special hole' on Easy Living (Level One). It's just after the spade, in front of the dead-end beneath four left-pointing arrows. Found it? Good. Now simply fall down the hole and... nothing happens. Not until you press the left mouse button anyway, at which point you will find yourself on Level 33. Yes, 33 – one after the last level!

Rotor

Flying a state-of-the-art gunship may be an attractive proposition, but it's not much fun if it keeps flying into walls all the time. If you want to access the higher levels but don't have the expertise to get to them legitimately, then try these level codes:

1 – GAG
2 – LIP
3 – SLY
4 – MEN
5 – AWE
6 – TNT

Another code, which allows access to the Battle Simulator, is PIT. So now you know.

R-Type

Heroically venturing into the unknown reaches of space to take on the might of the invading alien forces, you take off in your little R-Type fighter to be smashed to bits by the first nasty alien you meet. This isn't exactly the way to go about saving the universe, so try this tip. Instead of entering your name on the high score table, type in SUMITA. Now when you play you will be blessed with infinite lives.

Savage

To have all three lives at the start of Level Two type in this seven-letter password: SABATTA.

Silkworm

There are two versions of *Silkworm* on release. The only difference is that they have different cheat modes bevcause one magazine revealed the cheat mode before the game was even released! (The plonkers!)

Version One – hold down the help key and keep it pressed while pressing fire on the joystick to start the game. You will now have infinite lives and can move through the levels by pressing the numeric keys 1 to 0 and the minus key.

Version Two – if you have the latest version of the game then attempting the above will reveal the following message:- 'Congratulations, you have found the cheat mode....unfortunately it has been ZZAPPED! If this happens go to the control selection page and type 'scrap 28' and then start the game. The effect is as above.

Sim City

To bring even more realism into this city-running simulation, you can become a greedy and bitter corrupt official by embezzling money from the authorities. If the old kitty is looking a bit short of the necessary, hold down Shift and type FUND. The pot will go up by $10,000 each time. After a few goes, this causes an earthquake, so it may be an idea to stock up your dosh before building anything.

Space Ace – Complete Solution

Screen 1 – Outside Borf's ship
A classic case of RTFM here. If you want to know what that means ask a parent or guardianl.

Screen 2 – Stamping robot
Just as you enter the screen the robot's right leg smashes down, so pull right to avoid it. Push the joystick left when the leg lifts up and left again when Dexter touches the floor with his hands. Now wait until the left leg lifts up and push left again to go past.

Screen 3 – The rock tower
When the drones fire at you pull back on the stick and push up when you stand on the rock.

Screen 4 – Approaching the ship
Push up before the shuttle disappears behind the horizon.

Screen 5 – The Trash Monster
Press fire when the monster rears up above you.

Screen 6 – The Crusher Arm
When the arm comes up after crashing into the water, push right. Press up as soon as you land.

Scrren 7 – The Moving Platform
Push right when the platform comes up for the second time. Once you are on the platform quickly push right to jump off.

Screen 8 – Purple Monster 1
Pull back to come to a halt in front of the monster then push right to escape.

Screen 9 – Purple Monster 2
Again pull back to stop, then left to escape.

Screen 10 – Purple Monster 3
As soon as the monster's tentacle graps Dexter's feet, press fire.

Screen 11 – The Walkway
As soon as Dexter drops onto the walkway, push up on the joystick.

Screen 12 – The dog chase 1
Push up as soon as the dogs come on the screen.

Screen 13 – The dog chase 2
Push right as soon as you reach the crossroads.

Screen 14 – The dog chase 3
Push up when Dexter turns around and sees the dogs.

Screen 15 – The guard robots
As Dexter appears between the two robots push right.

Screen 16 – The blast tube 1
Push left as Dexter reaches the tube.

Screen 17 – The blast tube 2
Again push left as Dexter reaches the end of the screen.

Screen 18 – The blast tube 3
This time move right as Dexter reaches the end of the screen.

Screen 19 – The entry tube
Push up as Dexter reaches the ladder.

Screen 20 – The fight 1
As soon as Dexter and Borf appear press fire.

Screen 21 – The fight 2
Press fire as soon as you appear to block Borf's blow.

Screen 22 – The fight 3
Press fire when Dexter picks up his staff then push right to roll out of the way.

Screen 23 – The fight 4
Press fire as soon as you appear then pull down.

Screen 24 – The fight 5
Just as Borf is about to hit Dexter with his staff press fire.

Screen 25 – The fight 6
Push up as Borf swings his staff to jump over it, then pull down to duck the next blow.

Screen 26 – The fight 7 (long fight this)

Push right as soon as Dexter appears then up to run behind Borf's back.

Screen 27 – The fight 8 (it's almost as long as the one in They Live)
When the screen changes to Dexter reaching for the rope, push left.

Screen 28 – The lava platform (but not quite)
Leave the stick alone and let Dexter drop onto the platform.

Screen 29 – Kimberley's rescue
Just as the lava is nearly touching Dexter's feet push right.

Screen 30 – The approach 1
As soon as the screen appears push right.

Screen 31 – The approach 2
When Dexter nears the turning push left.

Screen 32 – The approach 3

As soon as Dexter appears push right.

Screen 33 – The last stand
When Borf fires the ray push left to shove the mirror forward. When you see the laser in the mirror push right.

Borf will now get a blast of the infanto-ray up the nethers and Dexter will have won. Hurrah!

Starglider

For invincibility, launch your ship, press [F] [A] for a fixed crosshair, slow down to zero velocity and then press [Backspace] to pause the game. Now type in JS ARG S, pause the game again and type JS ARG S again. You will know the cheat is active because all the instruments will go to the centre position. You can now fly around and blow things up without fear of being destroyed.

Press [M] if you want to be reallly lazy. This halts all the aliens, allowing you to give them real hell. Press [M] again to restart the aliens' activity.

Missiles can be topped up by pressing [P] and an object editor is reached by pressing [Z], which allows you to spin around and zoom in on all the vector graphics.

Starglider 2

Load the game as normal and play a game. Press [F] for fixed sights, stop the ship and press the [Backspace] key. This will pause the game. Now type in WERE ON A MISSION FROM GOD making sure to include the spaces. Now hit [1] on the main keyboard – you will know the cheat is active because the shield and energy levels will drop to a fixed level. Now you can press [K] to get any weapon – even the Neutron Bomb – and pressing [K] at any later stage will top up your weapons.

Stormlord

To get further in this pretty arcade adventure, simply type DRAGONBRIDGE on the credit screen. A scrolly message should now say "You cheating swine". Start the game and press SPACE to pause. Now all you have to do is press L to skip a level.

Some Handy Hints

1. At the start of the game go left and over the statue. Avoid the bouncing ball by moving as close to the volcano as you can and be ready to pass over it as the ball goes up. Once through, collect the key and be ready to blast the enemy wizard who appears in front of you. Go back through the volcano and over the statue, then on to the skull and finally on to the tall stone.

Avoid the blue caterpillars by jumping on to the top ledge first and then down on to the middle ledge and finally to ground level blasting any you see as you go. Move towards the oak door which will disappear, and then hop up on to the teleport stone. The eagle will carry you left and to the first fairy. Waste no time and as soon as she is free get back on the teleport and the eagle will take you back (remember, you only have a limited amount of time to complete your task).

2. When the eagle returns you, go left and collect the pot of honey. Go back right again, avoiding the teleport stone at this stage, and jump on to the little ledges. Be careful however as these have a tendency to crumble from underneath you dropping you in to the venus fly traps. Once over, continue on above the bees and exchange the honey pot for the key. Don't hang about though as the bees waste no time getting there, so be ready to jump up immediately. You can now go and free the second fairy.

3. Continue right, over the bees and be ready to blast the green goblin coming toward you. Jump up and over the white daisies and prepare to do battle with the falling eggs. These hatch into flying demons and they are nasty pieces of work so try to blast the eggs as soon as possible, even while they're still falling. Remember to keep on the move at all times. Once through the egg bombardment another green goblin confronts you so be ready to blast him. Continue on, avoiding the bouncing ball as described earlier, and open the oak door freeing fairy number three.

4. Do not go on to the teleport in front yet, but go back in the direction you just came. You will re-engage the egg-demons so be prepared. Once through them, jump back over the white daisies but watch out for the green goblin. When he turns his back on you get ready to blast (note: he does not go beyond the daisies so you are safe behind them). Once he is out of the way, continue left back over the bees and over the little ledges (this is when they are especially likely to crumble!). Before you go on the teleport stone continue left, jump up and get the blue brolly which will protect you from the acid rain. Go back right and on to the teleport stone and the eagle will carry you right.

When he drops you, jump over the tall stone and the teleport stone and you will arrive at a set of volcanoes. Ignore the blue acid rain drops as you are protected by the brolly. Concentrate on the bouncing balls only and as soon as you're through you are attacked by a group of flying dragons, so be ready to blast as they come at you fast and furiously – jumping as well as blasting helps a great deal as they swoop down on you. Others come along at ground level which may be avoided by the jumping. Once through, an enemy wizard will confront you so be ready for him. Once he is out of the way continue right, jump up and pop – fairy four is freed.

5. As soon as the fourth fairy is set free the flying dragons attack again, so blast them as you make your way back. Continue on to the volcanoes, through them and to the teleport stone. The eagle swoops down and carries you back left. Once you are dropped, waste no time and go back right. Once again, go over the small ledges and past the bees. Destroy the green goblin coming towards you and continue on. Jump over the daisies and do battle with the egg demons.

Once through, blast the other green goblin you encounter, avoid the bouncing ball and go on to the

teleport stone in the little cove to your right. Here the eagle takes you on a one way trip. This is the last fairy to be rescued on this level and there is no teleport stone to take you back. Should you for some reason not have released any of the other four fairies then your quest on this level is over and you have failed.

When the eagle drops you, go forward – destroying the enemy wizard that confronts you. Continue on and jump on to the ledges. Get the pot of honey and go back left. Here you're confronted by another enemy wizard. Blast him then jump and swap the honey for the blue brolly above you. Immediately the bees surround the honey pot and you will find they are buzzing a little too low to get past. Go back right so they are off the screen and when you return they should have moved up making your passage past easier. Unfortunately, this causes another wizard to appear but he is easily dealt with.

Continue left, jump up and get the key leaving the brolly. By this time another enemy wizard will have appeared so be ready as he wastes no time firing at you. Once destroyed, go right and presto! Yes, yet another enemy wizard on the scene. Dispose of him too and continue on. Avoid the bouncing ball and don't swap the key for the blue brolly as you pass over it. Once on the top ledge, whatever you do, don't jump over and open the oak door ahead of you, because this is a trap and if you do you'll waste your last key. Drop down instead and a green goblin greets you, continue on and fairy number five awaits. Level one is now complete and all five fairies are released.

Strider

Avoid sections of the game that are proving too difficult by half with this tip. Pause the game by pressing [F9] and while the game is paused hold down the [Help] key, left [Shift] and [1]. Unpause the game and you can now jump to any level by pressing the number of the level you want (1-5). You can also jump to various positions within the level by pressing [F1] to [F5].

Strider – Complete Solution

You start off by flying in on your futuristic hang glider. When you land, jump up and destroy the flying object above you then walk along and destroy the guard. Walk along a bit more and destroy the flying object which should be above you: it should leave behind a pod which falls to the ground. Get near to it, strike it, collect it and a robot drone should start to orbit round you.

Walk along and destroy the other guard then walk along a bit further and crouch down to kill the small guard. Keep on walking a bit further, jump the gap in the floor, go up the side of the hill, destroy the two guards then get on the flat part and jump up. You should grab hold of the bottom of the platform above you.

Wait until the orbiting drone gets close to the guard and press fire. Move along until you are just out of range of the laser turrets, wait until the drone gets close to the turrets and press fire again. Keep doing this until all the turrets are destroyed.

Crawl to the top and destroy the guard then stop just out of range of the next set of laser turrets. Destroy the turrets, then jump onto the platform opposite you and walk off of the end. Keep walking and fall off the cliff, keep walking and wait under the platform: ignore the man on the platform until you get underneath it.

When the man attacks, crouch down. Keep pressing fire as he rolls toward you and keep this up until he's dead. Stay under the platform because the roof will collapse in flames. Once they have disappeared jump up on the platform, then onto the next platform above you and then the one above you again.

Take out the two guards and the turrets, go up and destroy the guard above you, then carry on and destroy the guard before jumping left onto the platform and collecting the long sword. Jump back right and continue over the hill and down the other side.

Drop off the end and quickly move close to the largest hole in the ground and crouch beside it. Once the baddie starts to come up through the hole, keep hitting the fire button until it's destroyed. Then drop down the smaller hole and as you're falling press left on the joystick and get ready to destroy the flying nasty.

Destroy the other guard once you land and then go and collect the energy pod. Continue right until you're under the green platform. Now make sure you use up all your long sword swings before continuing until the screen stops scrolling. When the sickle monster gets close to you jump over it and walk up the side of the wall and onto the platform on the left. Collect the long sword pod, jump back onto the wall and move back to underneath the platform. When the sickle monster comes round again, keep pressing the fire button and you should get enough hits on it to destroy it.

Level Two

Keep walking until you come to the platform with the pod (destroy the three dogs as they come towards you by crouching and timing the press of the fire button) and collect the long sword. Jump off the platform and keep going right. Just past the green scenery a mechanical gorilla will appear: move back just out of its range, crouch and press fire whenever it comes towards you and continue until it's destroyed.

Continue right until you arrive at the wall and then crawl up it and jump onto the left side. Destroy the crawler on the right side and then jump to the right. Now destroy the crawler on the left and jump back to the left. Keep moving up and ignore the crawler on the right. Kill the guard at the top and jump onto the rotating platform.

Go round with it and jump off onto the stationary platform at the top: walk right and crouch when the flying guard comes on and kill him. Walk down the side of the hill, taking care not to trip the mines that are there. Once you get to the bottom, get close to the gap and jump right. Walk right (destroying the dogs) as far as you can and then jump onto the platform that's diagonally up from you: do the same for the next platform. Destroy the droid, jump onto the platform above you, destroy the

droid and jump onto the platform facing you and then onto the next one facing you, walk onto the flat part and jump onto the platform above you and dodge the bombs which fall on you.

Jump onto the next platform above you and go to the far right. Jump up again and you should be behind a guard: destroy him and walk to the left, destroying the ballet dancers. Keep going left and take out the turrets, then walk right along the platform to the end and you'll have completed Level Two.

Level Three

Walk down the side of the hill and when you get near the bottom jump to the right to avoid the killer fish. Go up and over the hill and then go down a bit and jump onto the platform opposite. Walk along and dodge the boomerangs which the Amazon woman is throwing at you, and destroy her.

Climb up the side of the cliff and destroy the woman above you. Walk left and jump onto the platform above you and walk along a bit more and destroy the women and then jump onto the platform above you and kill the other woman. Jump onto the platform above, kill the woman and do the same again then walk along and kill the woman facing you and then jump across the gap and destroy the next four women as you walk along.

Walk down the side of the cliff and jump onto the platform facing you. Destroy the woman at the top, walk along and destroy the next two women and then go to the right and destroy the killer fish. When you've done that destroy the dinosaurs, walk along and destroy the woman and then walk a bit more and there should be two platforms above you: jump onto the first platform and wait near the diagonal part in the platform. A huge dinosaur will jump out at you. Move back when it fires lasers at you and then move forward when it moves back. When it jumps at you press the fire button rapidly to destroy it and then get ready for Level Four.

Level Four

Destroy the flying object, then the next three laser turrets and then another flying object. Collect the drone and walk along. Destroy the flying object and the laser turret with your sword. Destroy another two turrets and walk along. Destroy the small flying object with your sword and use the sliding technique to destroy the rest of them.

Kill the flying thing but don't bother to collect the drone, just drop through the hole in the ground. When you land, destroy the guard and collect the long sword and walk left: jump onto one of the platforms as it passes and almost immediately jump right. Jump the gap in the floor and kill the guard and then walk along until you see another gap in the floor: get very close to the edge and then jump right and you will land on the edge of the gap.

Collect the energy pod and climb up the side of the wall. Destroy the guard with your sword and destroy the next two guards as well. Climb to the top and destroy the two robot droids and walk right: climb the wall and destroy the robot droid at the top with your sword.

Walk along and drop down the side of the wall and walk along a bit more: destroy the small flying things using the sliding technique again then destroy the guard and the small flying robot. Destroy another guard, walk along and collect the energy pod. Drop through the gap in the floor and when you land you will start to orbit the huge round object: when you get close to it, strike it with your sword to destroy it.

Drop down the hole, walk along and there will be a man with a hook in his hand: don't get close or he'll hit you, but stay out of range and keep hitting him with your sword until he's destroyed. You've completed Level Four.

Level Five

Walk right and collect the long sword and then destroy the guard behind you. Jump onto the platform on your right, go to the bottom of it and then jump across onto the wall. Destroy the guard at the top with your sword, destroy the flying object above you and then destroy the guard at the other side of the gap in the floor. Jump across. Walk along and destroy the flying object, then the two guards and then the flying thing.

Walk up the side of the hill and destroy the guard at the top. Climb the wall and don't bother killing the guard: just climb up when he turns left. Do the same thing for the next guard too. Destroy the guard at the top and walk on. Collect the long sword when it appears and use it to destroy the small flying object on the other side of the gap. Then jump it and climb up the wall. Destroy the small flying objects as you move up.

Drop off the edge and use the sword to open the capsule on the other side of the gap: jump over and collect it then drop down the gap. Use the same method to destroy the huge round object that you used on Level Four. If you drop on the left hand side of the gap, jump to the right and drop off the side and you should land on a platform.

Collect the long sword and walk along, then drop off the side of the wall and crouch near the hole. When the object rises out of the ground, use your sword to destroy it. Jump over the gap, kill the guard and collect the energy pod, destroy the next guard and collect the next energy pod, walk along and jump the two gaps in the floor. Walk along and just as you pass a thin blue line in the background a huge gorilla will jump out at you. Stay behind the blue line and keep swiping at the gorilla: keep it up until you've destroyed the gorilla and finished!

Stunt Car Racer

Here are some tips on coping with various tracks for all you demon drivers out there!

Little Ramp

Take the first corner at full belt and tackle the ramp at 150 mph.

Humpback

Accelerate around to the hump, so that you reach 200 mph by the time you are half-way up. At this speed you

should have a fair jump and landing. On the other ramps, keep either below 130 mph or over 180 mph. Anything between these speeds will result in hefty damage. The rest of the track should be taken at about 170 mph.

Big Ramp
Take the first two small ramps at 170 mph, then get up to 210 mph for the main ramp. The rest of the course should be a doddle.

Stepping Stones
Head down the starting straight at 110 mph and take the second gap at 100 mph. When you get to the steps, push up to 140 mph and nudge the speed up if it falls below 110 mph.

High Jump
Get up to 210 mph from the start to clear the jump and keep under 200 mph for the small jump. You can tackle the slanted road in two ways – either keep at the top and keep the speed up, or give the car a nudge to the right every now and then. If you slip off, push fire and push forward and right instantly.

Roller Coaster
Keep under 110 mph on the first hill, and you should take the bumps fairly easily. Remember – don't push too hard!

Ski Jump
Keep below 100 mph up the first hill and on the second keep to around 140 mph, slowing down after the jump. For the big jump, get to 220 mph, but if you can't manage it just crawl around and you'll live.

Drawbridge
At the drawbridge, put the pedal to the floor when the bridge has gone down about halfway. Tackle all the hills to the next ramp at 140 mph, then on the bumpy section head down the middle of the track at 170 mph. Lastly, get up to top speed for the down hill jump.

General Hints
If you get stuck in a hole, drive slowly to the wall and accelerate with boost. You should hit the track or drive off the edge, minimising damage.

At the beginning of a race, accelerate and pull left to block off the other driver – you may even manage to run him off the track.

Super Cars

How many budding drivers out there would like to wipe the smug smile off that car dealer's face? Well if you enter your name as RICH at the start of the game, then you will have 500,000 lovely spondoolicks to wave at him. That should help

Then again, if you still can't get to the second level, then enter your name as ODIE at the start. Or perhaps even better, you can also enter BIGC to gain access to the third stage.

Switchblade

It's not fair. How can such a little hero get through all that game by himself – oriental sword-hero or not? Let's right this wrong straight away! Enter POOKY on the high score table and hold down a number from one to five while clicking on END to exit. Start the game and the number you pressed should take you to a different starting point within the game.

Sword of Sodan

Type in NANCY jon the high score table to get infinite lives and the ability to skip levels by pressing RETURN. Or alternatively, you could...

Start the game as normal, choose a character and start off. Get killed on the first level. The high score table offers you the chance to start a new game – do so. Choose the same character as last time and keep pressing [Return] until Level One has loaded. Press [Return] once more and an exclamation mark appears over the place where your lives should be. You now have infinite lives. If you press [Return] again you will go to the next level and you can keep doing this to finish.

Test Drive

If you have trouble steering round sharp corners, try pressing and holding the Fire button: the car will automatically be taken safely round the bend!

The Three Stooges

When you are on the 'Doctors Wanted' stage of the game, drive your buggies at the same speed as the male nurse pushing a patient. Keep a fraction behind them: this enables you to run up a high score without any danger of collision.

During the 'Slapping' game, tweaking Curly's ear gives the best result, as he rarely ducks out of the way.

Thunderbirds – MISSION 2

Gordon needs an aqualung and an American Express (TM) card. Alan needs an aqualung and a bottle of radiation pills.

Take Alan left and up from TB4. When you see the captain take the radiation pills walk to him and he will give you a blue card. Switch to Gordon and go left, down and right: keep going right until you come to the radiation pills, then take them.

Carry on going right until you can go down. Go down and carry on until you see a room with two computers in it whic are exactly the same, one on the left and one on the right. Go to the one on the left. Now bring Alan to that place and use the American Express (TM) card and the blue card to shut down the reactor.

Take Gordon left until he can go up. Go up, continue going left until you can go down. Go down: you should now be underwater. Go left as far as possible, then go right as far as possible leaving the doors open as you go. Walk left, holding down return as you go, and when the water has gone go down. Then go left (don't worry

when you fall down the hole) and keep going left and you will go back up through the hole.

Keep going left until you can go no further and then go right as far as you can, leaving the doors open as you go. Now go left holding return (the sub should surface). Now go up, left and carry on going left until you can go up. Go up, then right until you reach TB4. Job done!

Thunderblade

Courtesy of Woody of US Gold, a way to skip levels in this Sega chopper conversion. When the game has completely finished loading and the picture from the film 'Blue Thunder' appears, type in CRASH. When you press the [H] key the screen should flash to show the cheat is active. To access the next level, now press [HELP].

Treasure Island Dizzy

Here are some objects and where to use them.
Chest – below cliff
Snorkel – in water
Gravedigger spade – grave on island 2
Magic stone – Totem pole on island 2
Detonator and dynamite – mine on island 1
Axe and bible – bridge on island 1
Pogo stick – the pogo place on ship
Sack of gold coins – shop
Fire proof suit – in smuggler's cave on island 2
Brandy – shop
Gold egg – shop
Brass key – smuggler's cave
Crow bar – rock in water.

Untouchables

We'd all like to be heroes like Elegant Mess in the film, but even in Ocean's licenced game things can often go wrong. Some tips, my good man!

First of all let's get the obvious cheats out of the way. If you type SOUTHAMPTONGAZETTE, you can press [F10] to skip levels. Pressing [Help] on Levels 2, 3 and 6 puts you halfway through the level.

Even with a cheat it can be quite hairy with all those guns going off, so here are rough guides to the levels.

Level 1

Duck down when things get heated, as only the book-keepers' bullets come in low enough to hit you. Only pick up violin cases when it's really necessary, as they can help you out of a tight spot, but they're in short supply.

Level 2

Go for the liquor bottles first and shoot the First Aid boxes if your energy gets a bit low. Particular villains to watch for are the bottle-throwers.

Level 3

Always come out from behind the wall and fire quickly, going for the grenades thrown from the cars first. Be especially careful of the men with machine guns.

Level 4

Try to keep to one side of the baby's pram, and don't walk into anybody. Oh, and watch for members of the public – we don't want innocent bystanders hurt, do we?

Level 5

Shoot the plant pots for more life and be quick taking out the men that run across the screen. Spend as little time loading your gun as possible, as the criminals can do a lot of damage in that time.

Vigilante

Get onto the high-score table and enter your name as GREEN CRYSTAL to enable the cheat mode: then you can increase your lives by pressing [F1] and skip levels by pressing [F8].

Wizball

Pause the game using [Space] and type RAINBOW. Resume the game and pause again. Now hit [C] to fill the cauldron with the current colour, [S] to complete the level and [T] to complete the whole game.

Xenomorph

Don't bother hoarding weapons – there are far too many to hold anyway. Just find the best and stick with them. However it is useful to have a back-up device for when you are stuck in a tight spot. The Super Magnum is the best of the handguns, but ammo is in rather short supply.

Standing your ground and blasting the tougher monsters (such as Blobs and Xenomorphs) is a waste of energy. Try to dodge them or better still find another way to your destination. Many of them seem to have pre-defined paths to follow anyway, and only break off when they see you. Don't open fire as soon as you see them, try to sneak past them whenever possible – it saves energy! You only have to actually kill one alien, and that's the Master Alien on Level 15, so running around like Rambo does no good at all.

And now for a major upset – you can complete the game without replacing the CNS chips! As long as you find and use the navigation disks and anti-matter pellets and don't touch the maintenance circuit boards at all, the computer seems to forget that the chips have blown and takes off from Atargatis successfully. What luck!

Xybots

To obtain infinite energy from one Master Xybot to the next, simply get to Level Eight then stand one player as close to the exit hole as possible, Get the second player behind the first so that he can shoot Player One.

Player Two shoots Player One until his energy is less than 6%. On a count of 1-2-3 move Player One into the exit hole and at the same time press Fire for Player Two. The bullet should hit Player One just as disappears into the hole. On the next level the player who went into the hole first should have an energy reading of zero. He can now get shot as often as he likes. The only minor (!) drawback is that the the players can't zap.

Workbench Extra

This section is reserved especially for Amiga users who are slightly more acquainted with the complexities of their machine, particularly those who have an interest in programming in Basic. It includes a number of AmigaBASIC routines for advancing your Basic programs that bit further as well as a few interesting little snippets on the more technical aspects of Amiga use. Not for beginners!

Multicoloured Workbench

How many colours does your Workbench screen have? You're probably limited to the standard four. The following AmigaBASIC program is designed to allow you to add and remove as many bitplanes as hardware constraints will allow (a minimum of one and a maximum of four).

The two plane-manipulating routines are written as subprograms that can be called straight into your programs and are accessed in the same manner as any standard AmigaBASIC subprogram.

Using the programs couldn't be simpler. Firstly, make sure that you have the two .bmap files, 'intuition.bmap' and 'exec.bmap', in the same directory as your program. To add an extra plane, just call up the 'CreatePlane' subprogram and extra colours will instantly be made available. Extra bitplanes mean less free memory and slower program execution and therefore, to remove a plane, just call 'NukePlane'.

```
REM** The following three lines must be
REM** at the very start of your prog.

LIBRARY "intuition.library"
LIBRARY "exec.library"
DECLARE FUNCTION AllocMem& LIBRARY

SUB CreatPlane STATIC
  bitmap&=PEEKL(WINDOW(7)+46)+184
  bitplane&=PEEKW(bitmap&)*PEEKW(bitmap&+2)
  wdepth%=PEEK(bitmap&+5)
  IF wdepth%>5 THEN EXIT SUB
  POKEL bitmap&+5,wdepth%+1
  IF wdepth%>5 THEN CALL RemakeDisplay
END SUB

SUB NukePlane STATIC
  rastport&=WINDOW(8)
  bitmaps&=PEEKL(rastport&+4)
  current.planes%=PEEK(bitmaps&+5)
  window.base&=WINDOW(7)
  screen.base&=PEEKL(window.base&+46)
  screen.width%=PEEKW(screen.base&+12)
  screen.height%+PEEKW(screen.base&+14)
  planes%=current.planes%-1
  IF current.planes%=1 THEN EXIT SUB
  POKE bitmaps&+5,planes%
  plane.ad&=PEEKL(bitmaps&+4+4*current.planes%)
  CALLFreeRaster(plane.ad&,screen.width%,screen.
  height%)
  CALL RemakeDisplay
ENDSUB
```

Turbocharging AmigaBasic

Anyone who has used AmigaBASIC for more than a couple of minutes will soon grow tired of it's oh-so-slow redraw rate. If you've never noticed, try moving a window in front of the BASIC 'List' window and then remove it and you'll see AmigaBASIC redrawing the program text at a phenomenally slow rate.

The reason for this is that AmigaBASIC uses the Intuition 'SIMPLE_REFRESH' technique to redraw the screen. This basically means that the AmigaBASIC program has to manually redraw every time you bring the 'List' window to the front of a group of windows.

The short BASIC 'patch' below cures this by changing the 'List' window's definition from 'SIMPLE_REFRESH', to the faster 'SMART_REFRESH'. Smart Refresh is faster because the window contents are remembered by Intuition every time a window obscures it. When the window is then removed, Intuition simply uses the blitter to paste the window contents back onto the screen.

```
    DEFLING a-Z
    CHDIR "Extras:BasicDemos/"
    LIBRARY "dos.library"
    DECLARE FUNCTION xOpen() LIBRARY
f=xOpen (SADD("Extras:AmigaBASIC"+CHR$(0)),1005)
    CALL Seek(f,22289,0)
    CALL xWrite(f,SADD(CHR$(0)),1)
    CALL xClose(f)
```

Re-routing DOS

When you open a custom screen using AmigaBASIC, or in fact any language, AmigaDOS still sends all requesters to the default Workbench screen. Programs that have not taken this into account are easily spotted because the Workbench screen pops to the front every time a requester is displayed: which is not only shoddy programming, it also tends to be very annoying for the user of your software.

As always, there is a way of redirecting AmigaDOS so that instead of writing all requesters to the Workbench screen, they are instead sent to your custom screen. The code below is a short AmigaBASIC stub that should be included directly into your main program after your custom screen is opened to achieve the desired effect.

```
    LIBRARY "exec.library"
    DECLARE FUNCTION FindTask&(task&) LIBRARY

    MyProc& = FindTask&(0)
    Temp& = PEEKL(MyProc&+184)
    POKEL MyProc&+186, WINDOW(7)
```

To restore DOS routing to the Workbench screen, just enter the following line at the end of your program.

```
    POKEL MyProc&+184, Temp&
```

And there it is. Simple but effective, professional-looking re-routing.

Faster Floppy Drives

Users who purchased Workbench 1.3 may have been disappointed to find that the new fast file system is only available to hard disk users. However, with a little bit of tinkering with the MounbtList file in the DEVS: directory of your boot disk, FFS can just about be talked into working

with floppy disks. The MountList entry below must be appended to the end of the existing mountlist and provides system information for a new floppy drive device called FFO:.

```
/* Mount Entry to allow use of FFS on
floppies*/

FFO:     Device = trackdisk.device
    FileSystem = 1:FastFileSystem
    Unit = 0
    Flags = 1
    Surfaces = 2
    BlocksPerTrack = 11
    Reserved = 2
    Interleave = 0
    LowCyl = 0; HighCyl = 79
    Buffers = 20
    BufmemType = 3
    Mount = 1
    DosType = 0x444f5301
    stacksize = 4000
    Globvec = -1

#
```

Note that the '#' is very important.

Unfortunately, not everything is rosy in the fast file system garden, and there are a couple of 'ifs and buts'. Firstly, the fast file system and the old (slow) system are incompatible, so you cannot boot from an FFS disk. Secondly, when FFO is mounted, there must be an FFS format disk in the drive or else the machine will complain bitterly. To get around this, the first time you mount FFO:, you must instantly format a disk with the FFS using the 'FFS' option on the Workbench 1.3 'Format' command.

However, the machine does not notice when you remove the fast filing system formatted disk from the drive. The problem is this: since the current version of the fast file system only supports non-removable devices such as hard drives, it hasn't been written to sense when a disk has been removed. Fortunately, this problem can be fixed quite easily.

The solution is to use the AmigaDOS 'DISKCHANGE' command, which informs the disk operating system that you've changed the disk in the specified device and therefore the system must re-read status information concerning that particular disk. To use it, first insert your Fast Filing System formatted disk and then type DISKCHANGE FFO:.

Re-directing Print-out

When using the CLI, you don't want to have your CLI window tied up while a long text file prints out. Thankfully, with a multi-tasking operating system such as Amiga DOS, it is fairly simple to implement a printer spooler that will print out concurrently. The batch file below will (surprise surprise!) do the job very nicely thank you. As well as allowing you to print in the background, the batch file also allows you to send a file to the printer as a hex dump using an extra 'HEX' parameter.

To use it, all you have to do is to enter 'Execute Spool <filename>' and press return. To access the extra hex option, you would have to enter 'Execute Spool <filename> HEX'. Note that Workbench 1.3 users can make the batch file executable by using the Shell environment and the 'Protect Spool +S' command.

```
    .key filename/a, typ/s

    if not exists <filename>
         echo "File Not Found"
         quit
    else
         copy <filename> to ram:<filename>
         if <typ> eq "HEX"
         run > NIL: type ram:<filename> to PRT:
opt h
         else
         run > NIL: type ram:<filename> to PRT:
         .endif
         delete ram:<filename>
    endif

    echo "Printing file in Background"
    quit
]
```

How can I use fonts other than the standard Topaz within AmigaBASIC programs?

To use different fonts within your BASIC programs, you'll have to call the operating system routines. The Amiga font handling routines are held within the disk-based library 'diskfont.library' which resides within the LIBS: directory of every self-respecting Workbench disk. As well as this library, AmigaBASIC also needs access to diskfont's '.bmap' file which will have to be created using the 'ConvertFD' program in the Basic demos drawer on your Extras disk. To use these routines, use the source code stub below:

```
    DEFLNG a-Z

    LIBRARY "graphics.library"
    LIBRARY "diskfont.library"
    DECLARE FUNCTION
    Open DiskFont LIBRARY
    DECLARE FUNCTION OpenFont
    LIBRARY

    FontName$ =
    "diamond.font"+CHR$(0)
    PointSize = 20

    FontAttr(0) =
    SADD(FontName$)
```

```
FontAttr(1) = PointSize *
65536&

FontPointer =
OpenDiskFont (VARPTR(FontAttr(0)))
IF    FontPointer = 0 THEN
      PRINT "Unable to Open Font."
      GOTO Abort
END IF

CALL SetFont(WINDOW(8), FontPointer)
PRINT "Now in Diamond Font"
CloseFont(FontPointer)

FontAttr(0) =
SADD(("topaz.font"+CHR$(0)))
FontAttr(1) = 8 * 65536&
FontPointer =
OpenFont (VARPTR(FontAttr(0)))
CALL SetFont(WINDOW(8), FontPointer)
PRINT "Back to Topaz 8"

Abort:
LIBRARY CLOSE
```

Guru Meditation Numbers

The Amiga is undoubtedly a wonderful machine. Not only can it produce better sound and graphics than the vast majority of comparable machines, it can also crash far more impressively than most. You don't just get a 'Bus Error - core dumped' message or even a couple of meaningless bombs appearing on the screen: the Amiga crashes in style.

But just what do those seemingly meaningless Guru Meditation numbers really mean? Are they just the product of a tortured mind or can they really be of help to the average user?

Guru meditation numbers have a general format which once you've learned how to decode them, a wealth of information will be revealed to you. The format for the code is xxyyzzzz.pppppppp, where 'xx' is the particular part of machine that has caused the crash, 'yy' tells you the error class, 'zzzz' tells you exactly what happened (eg. RAM out of memory etc) and 'pppppppp' tells you the starting address of the task that caused the crash (there's no escape from the Guru!). Below is a list of the more common error codes.

XX NUMBERS (System ID codes)

00	68000 CPU Trap
05	Math Library
07	DOS Library
09	Icon Library
10	Audio Device
13	Keyboard Device
14	Trackdisk Device
15	Timer Device
30	Bootstrap
31	Workbench
81	Exec Library
82	Graphics Library
83	Layers Library
84	Intuition Library

YY NUMBERS (Error Classes)

01	Not Enough Memory
02	MakeLibrary Error
03	OpenLibrary Error
04	OpenDevice Error
05	OpenResource Error
06	I/O Error

ZZZZ NUMBERS (Error Codes)

Exec

0001	CPU Trap Checksum
0002	ExecBase Checksum
0003	Library Checksum
0004	No Library Memory
0005	Corrupted Free Mem List
0006	No interrupt memory

Graphics

00001-5	Copper Error
0006-A	No Memory

Intuition

0001	Unknown Gadget
0002-5	No Memory
0006	Item Box Error
0007	No Memory for new screen
0008	No memory for allocRast()
0009	Unknown system screen
000A	No memory for add gadgets
000B	No memory for open window

Dos

0001	No memory for startup
0002	Taskend failed
0003	Packet failure
0004	Unexpected packet failure
0005	FreeVec() failed
0006	Disk block sync error
0007	Corrupted bitmap
0008	Key already set
0009	Bad checksum
000A	Disk Error
000B	Key out of disk range
000C	Foul Overlay

Trackdisk

0001	Seek Error
0002	Error Wait

Boot

0001	Bootsector Error

Saving Corrupt Disks

It really is very annoying to insert a disk into a drive only to get a 'Validation Error' prompt pop up every time. Usually, you can save the disk by either using the Diskdoctor utility or by reformatting from scratch. Sometimes, however, a disk can be so corrupt that it won't even reformat and so it usually ends up in the bin.

But, as it happens, there is a way of partially getting around this by messing around with the Workbench Mountlist to create a custom device that only uses those tracks that come before the corrupt tracks. First of all, format the courrupt disk using the 'Format' command and note down the track number that causes the format to fail. Now type ED DEVS: MOUNTLIST to load the Mountlist file into the CLI text editor, Ed. Once Ed appears, search through the file for a Mountlist entry for a device called 'DF2:' which will look something like the entry below:

```
/* Mount a 5.25" disk drive to be mounted as
DF2: */

DF2: Device = trackdisk.device
Unit = 2
Flags = 1
Surfaces = 2
BlocksPerTrack = 11
Reserved = 2
Interleave = 0
LowCyl = 0; HighCyl = 39
Buffers = 20
BufMemType = 3
#
```

Firstly, change the 'Unit = 2' line to read either 'Unit = 1' (if you have two drives) or 'Unit = 0' (if you have only one drive). Next, change the line 'HighCyl = 39' to read 'HighCyl = nn', where 'nn' is the number of the last track that the Format command was able to successfully format before encountering the corrupt tracks (take one away from the track number that you wrote down). Finally, type MOUNT DF2: and then format the corrupt disk using FORMAT DRIVE DF2: NAME "Empty". Now, whenever you wish to access the disk, you must refer to it as DF2: regardless of which drive it is in.

Using ROM Kernel library routines

In an ideal world, Commodore would have completely documented every single routine within the Amiga ROM Kernel, but because of the sheer number and complexity of them, it would have been almost impossible to completely document them without having to resort to issuing the AmigaBASIC manual in volumes.

The official documentation for the Kernel routines is contained within Addison-Wesley's 'ROM KERNEL MANUAL: Libraries and Devices' which was produced in association with Amiga and documents all the ROM routines. This book costs about £35 but must be seen as invaluable if you're serious about your programming.

Buffering BASIC

Keyboard buffers are wonderful things. When you're using a program that has a slow screen update rate, it is useful to be able to type ahead of the program and then let it worry about catching up with you, therefore allowing you to carry on working at full rate. Unfortunately (yes, there's always an 'unfortunately' in there somewhere!), this can mess things up if you don't want this to happen, Luckily there is a way around this.

The following snippet of code is arranged as an AmigaBASIC subprogram that can be called from anywhere within your program. What it basically does is to empty the keyboard buffer, before transferring control back to your program.

```
SUB CLEARKEYS STATIC
FOR X = 1 TO 10
     R$ = INKEY$
     NEXT X
END SUB
```

Now all you have to do is to call the routine 'CLEARKEYS' before attempting to use the INKEYS function.

Renaming in AmigaBasic

In AmigaBASIC, you can give a window a name when it is first opened, but it cannot be changed unless it is closed and then re-opened. The case is even worse when you try to name a screen: with the current release of AmigaBASIC, you cannot even give it a name when it is first opened!

Fortunately, intuition includes a routine which will handle this very nicely, thank you. This code will allow you to rename both the screen and current window title:

```
LIBRARY "intuition.library"

    WinName$ = "Blahblah"+CHR$(0)
    ScrName$ = "BlooBloo"+Chr$(0)
    CALL   SetWindowTitles(WINDOW(7),
SADD(WinName$),    SADD(ScrName$))
```

Checking keypresses in AmigaBasic

Have you ever wanted to detect for special keys within your AmigaBASIC programs, only to find that BASIC's INKEY$ function won't do the job. The way around the problem (as always) is to bypass BASIC and hit the hardware directly by reading one of the hardware registers to find out which key has been depressed.

Here's how it's done. What you must do is to read the CIAA serial data register that looks after the keyboard (this register is located at Hex $BFEC01 or DEC 12577793). The BASIC statement A = PEEKW(&H00BFEC01) will do the job very nicely, thankyou. To find out the exact value returned, all you do is to read the value stored in variable 'A'.

For example, if you were writing a game that used the cursor keys to control the main character, you could use the following code stub:

```
WHILE K <> 117
      K = PEEKW(&H00BFEC01)
      IF K = 103 THEN GOSUB UP_ROUTINE
      IF K = 101 THEN GOSUB DOWN_ROUTINE
      IF K = 97 THEN GOSUB LEFT_ROUTINE
      IF K = 99 THEN GOSUB RIGHT_ROUTINE
WEND
```

Below is a list of a couple of possible return values and their meanings:

Value	Keyboard Equivalent
63	Left Shift
61	Right Shift
117	Escape
57	Control
59	Caps On
58	Caps Off
65	Help
97	Cursor Pad Left
99	Cursor Pad Right
103	Cursor Pad Up
101	Cursor Pad Down

Moving Data with the Blitter

The Blitter is a complicated (but very powerful) beastie at the best of times, so here's a short assembler routine to allow you to carry out the simplest of all possible Blitter operations – copying data, unchanged, from one area of memory to another.

The source code is really quite simple and self explanatory: all you do is to firstly tell the Blitter what operation you want (known as the minterm), give it the source address, the destination address, the modulo source and destination jump offsets and then finally the width and height of the operation. Writing to BLTSIZE will then start the Blitter.

```
BLTCON EQU $DFF040     ;AMIGA HARDWARE ADDRESSES
BLTDPTH EQU $DFF054    ;REFER TO THE 'HARDWARE
BLTAPTH  EQU $DFF050   ;REFERENCE MANUAL'
BLTDMOD EQU $DFF066    ;FOR THEIR MEANINGS.
BLTAMOD EQU $DFF064
BLTSIZE EQU $DFF058

BLOCK_MOVE:
    MOVE.W          #$09F0,BLTCON
    ;MINTERM D=A
    MOVE.L          #Destination_Address,BLTDPTH
;DESTINATION
    MOVE.L          #Source_Address,BLTAPTH
;SOURCE
    MOVE.W          #00,BLTDMOD
    ;DEST.MODULO
    MOVE.W          #00,BLTAMOD
    ;SOURCE MODULO
    MOVE.W          #%0000000000000000,BLTSIZE
;SIZE & START
```

The register BLTSIZE must contain the width and height of the Blitter operation. Writing to this register will automatically start the Blitter, and should always be the last operation after all other Blitter registers have been set up. Although BLTSIZE is only a single, 16-bit register, it is split into two separate sections that contain the height and width of the operation.

The register is split as follows: hhhhhhhhhhwwwwww (h = height and w = width). The height value refers to single display lines, but the width value refers to words (16-bit values), therefore the maximum blit is 1024 lines by 1024 pixels (still pretty impressive though!) If this little tippette has whetted your appetite for all things hardware-hitting wise, then check out the bible of amiga programmers, 'The Hardware Reference Manual' from Addison-Wesley. Alternatively, Abacus 'Amiga System Programmer's Guide' is a worthy substitute.

Using Extra Memory

Writing assembler programs that make extensive use of the Amiga custom chips which will run correctly on an unexpanded Amiga is a doddle – you never have to worry about your program crashing out because of the wrong type of memory being used.

However, problems start to occur when you try to run a program on an expanded Amiga that addresses the custom chips. Unless you've told your assembler or linker that you wish custom chip data to be loaded into chip memory, most assemblers will produce code that automatically writes its data into fast memory.

There are a number of ways of ensuring that your custom chip data will always be loaded into chip memory. The first, and probably the simplest way is to try and get your hands on the PD program *FixHunk* on Fish Disk No 197 (Developers can of of course use the Atom utility). Once you've linked your program, all you have to do is to enter either Atom MyProg-CC or FixHunk MyProg and all data hunks will be pushed into chip ram. The second method is to tell the linker to push data into chip ram by using the BLink 'CHIP' option.

For Devpac 2 and ArgAsm users, these assemblers include a very powerful 'SECTION' directive that allows you to split you source code into multiple sections and specify both the hunk type and the type of memory that is used for each. For example, if you had a slice of code containing some sprite definitions and screen data, you would insert a line such as SECTIONMySprite&ScreeData,DATA_C immediately before the data. For further details of the SECTION directive, consult your Devpac or ArgAsm manuals.

Intuition Windows in Basic

One of the most common complaints of users of AmigaBASIC is the lack of control over Intuition windows. However, if you're lucky enough to own HiSoft's BASIC then you'll be happy to learn that clever Mr Pennel at HiSoft has extended the language to allow more precise control than was ever thought possible from BASIC. The syntax of the WINDOW command is WINDOW OPEN id,

title, (x1,y1)-(x2,y2), type, Screen id. The parameter 'type' defines the attributes of the window to be opened, and it is this parameter that has been extended within HiSoft BASIC. The type parameter is a number that is made up by adding the different components together (see table below). Within the current release of AmigaBASIC, the window attributes consist of five window options that can be put together in any combination you need.

For example, if you wanted to open a backdrop window that had smart refresh (the window is automatically redrawn if a window that covers it is removed) and includes both a sizing gadget and a drag bar, then the type parameter would have to be 83 (1+2+16+64).

Unlike AmigaBASIC, HiSoft's 'WINDOW' command has been extended to allow more flexible handling of windows. HiSoft BASIC includes four extra attributes that can be assigned to a window such as non-GIMMEZEROZERO, backdrop, borderless and absolute window sizing. Here's a complete listing of all the window options and their values (options 32 through to 256 are HiSoft BASIC specific and cannot therefore be used from AmigaBASIC).

Value	Meaning
1	Sizing gadget
2	Drag Bar
4	Depth gadget
8	Close Gadget
16	Smart Refresh
32	Turn off 'GIMMEZEROZERO'
64	Backdrop Window
128	Borderless Window
256	Absolute Window co-ords

Foolproof AmigaBasic

Writing applications software in AmigaBASIC is a fairly straightforward affair until it comes to the task of making programs foolproof. While your program may be the most powerful thing this side of a Cray, it is often the silly little error-trapping problems that give a program a bad name. For example, how many times have you used a program written in AmigaBASIC that asks for a filename, tries to load it from disk and then crashes out because it cannot find the file? Sounds familiar, doesn't it?

The solution is to use the DOS library routines Lock() and UnLock() which test whether a specified file or directory exists. If the file does exist, AmigaDOS will successfully lock onto the file and return a filing system handle. If the file or directory doesn't exist, the Lock returns a value of zero. Once the file has been locked successfully, you can then unlock it and open it as you would normally. Here's a small demonstration program which should help you get the general idea:

```
LIBRARY "dos.library"
DECLARE FUNCTION Lock& LIBRARY
INPUT "Enter Filename : ",Filename$
Found& = Lock&(SADD(Finlename$+CHR$(0)), -2)
UnLock(Found&)

IF Found& = 0 THEN
     PRINT "File does not exist"
ELSE
     PRINT "Yes, the file exists"
END IF

LIBRARY CLOSE
```

For the program to work, you'll have to use the ConvertFD utility on your Extras disk to create a .bmap file for the dos.library (consult your AmigaBASIC manual for details on how to do this properly) and save it to your LIBS: directory.

Samples in AmigaBasic

One annoying omission in AmigaBASIC is the lack of any in-depth support for producing sounds. Particularly sampled sounds. You can produce the odd beep and whistle, but it would be nice to be able to play real sampled sounds in Basic programs. The program below will allow you to do just that.

The program works by bypassing the usual, rather limited, BASIC sound routines and hitting the Amiga hardware directly. While this is a naughty thing to do with a multi-tasking machine such as the Amiga, the program seems to work fine without crashing the machine.

If you're using AmigaBASIC, the maximum size of a sample you can have is 10,500 bytes long. However, HiSoft BASIC owners can have samples of any length in memory with no problems at all. As a final note, samples must be saved in RAW format, that is, with no IFF information at all. If you try to play an IFF sample, the IFF headers will also be played! Here's the code:

```
OPEN "( A RAW Sound File)" FOR INPUT AS 1
Loader:
DIM Wave% (LOF(1))
FOR t=1 to LOF (1)
de% = ASC(INPUT$(1,1))
Wave% (t) = de%
NEXT t
CLOSE 1
DMA:
lw = 14676118% 'Hardware Register
thi = 14676128% 'Address 4 Array
tlo = thi + 2
tlen = thi + 4 'Address 4 Array Length
per = thi + 6 'Address 4 Array Freq
vol = thi + 8 'Address 4 Array Volume
Freq = 300
POKEL thi, VARPTR (Wave%(1))
POKEW tlen, LOF (1)
POKEW PER, FREQ 'Set frequency.
'Experiment for best results
POKEW vol, 70 'Set Volume
```

```
POKEW lw, &H8201 'Now the Magic starts....
Finish:
INPUT "Press RETURN key to STOP", a$
POKEW lw,1 'Stop sound playing
END
```

Mouse Click Detection

Many would-be Amiga C programmers have probably given up hope after just five minutes of ploughing through the Commodore-Amiga official documentation, as it assumes a good deal of background knowledge.

For example, if you used the official method of detecting a mouse button click, you would have to go through a rather tedious and long winded process of having to open the input device, get input from it, reply to the message etc, etc....

But if all you want to do is carry out simple 'Click mouse button to continue' operation, the official method is too much hassle. Below is a quick and easy (and illegal) way to detect if the right mouse button is being depressed. It is written in C, but can just s easily be used in assembler.

```
/*Mouse Button Tester
Demo*/
#include <exec/types.h>
main()
{
while (1) /* Infinite Loop
*/
{
if ( *((UBYTE
*)0xbfe001)&64)
printf ("Button off!\n");
else
printf ("Button on!\n");
{
{
/*End*/
```

Centring Text in Amiga Fonts

If you've ever tried producing a tidy screen display from AmigaBASIC when using any font other than the standard system font, Topaz, then you'll be aware of the problems that can occur. They lie in the fact that the standard system font is not proportional, which means that each character takes up a standard number of pixels on screen (eight in Topaz's case), which is very convenient when calculating the location of text. The other Amiga fonts such as Garnet, Diamond etc are proportional which means that each character only takes up the bare minimum of pixels – an i is narrower than an m and so on. Centring text in Topaz font is very easy to do, but what do you do when you are using a proportional font such as Ruby? Easy, just use the program below!

```
DECLARE FUNCTION TextLength% LIBRARY
LIBRARY "graphics.library"
DisplayWidth = 617
Centre "This is a string of text...."
Centre "....and this is another"

LIBRARY CLOSE
END

SUB Centre (text$) STATIC
SHARED DisplayWidth%

Length = TextLenght%(WIDOW(8), SADD(text$),
LEN(text$))

Start% = (DisplayWidth% - Length%) / 2

PRINT PTAB(Start%); text$
END SUB
```

Avoiding Reserved Words in AmigaBasic

One of the most common errors that crop up in AmigaBASIC programs is the use of reserved words as variable names. One way of trapping this kind of error is to write all your programs in lower case. When you get to the end of a line and press return, AmigaBASIC automatically converts all reserved words to capitals. If any of your variables changes to upper case then you know that you have used a reserved word.

This is also handy for trapping typing errors. If the command you enter doesn't get converted to upper case then you know that it either isn't an AmigaBASIC command or you have made a typing error.

Using AmigaDOS commands in BASIC

It can be useful to be able to execute DOS commands from within your BASIC programs? For example, if you're writing a game in BASIC you could add music to your creation by calling a DOS command to play a *SoundTracker* module in the background.

The following snippet of BASIC code (or 'stub' as programmmers prefer) calls the ROM Kernel routine Execute(), which is used to launch an external program as a separate task. To be able touse it, you'll need to copy the file dos.bmap from the Basic Demos drawer on your Extras disk to your boot disk's LIBS directory. If the program fails to work, check to make sure that C directory of your boot disk contains the AmigaDOS RUN command.

```
LIBRARY "dos.library"
DECLARE FUNCTION Execute%() LIBRARY

Command$ = "INFO"+CHR$(0)

CALL Execute(SADD(Command$),0,0)
```

HAM in AmigaBASIC

Ever wished you could access HAM (Hold and Modify) mode from AmigaBasic? Just think, 4096 colours on

screen at the same time! With the current releases of both HiSoft Basic and AmigaBasic, 32 colours is about as colourful as things get, but with the source code below you can 'HAM up' your Basic programs with ease.

To be able to use this listing, you'll need both exec.bmap and intuition.bmap to be present within either your current directory or within the LIBS: directory of your boot disk. Exec.bmap can be found within the BasicDemos drawer of your Extras disk, but Intuition.bmap will have to be constructed using the ConvertFD program on the Extras disk.

```
' ** HAM MODE FROM AMIGABASIC **

LIBRARY "exec.library"
LIBRARY "intuition.library"
DECLARE FUNCTION AllocMem& LIBRARY

SCREEN 1,320,200,1,1
WINDOW 1,"HAM MODE DEMO",(0,0)-(300,180),0,1
PALETTE 0,0,0,0
PALETTE 1,1,1,1
FOR i% = 2 TO 6
   CreateNewPlane
NEXT i%
Ham

' ** DEMO **
' ** The following Lines are to demonstrate the
' ** HAM-From-BASIC code. These can be removed.

DemoLoop:
   x=MOUSE(1):y=MOUSE(2):f=MOUSE(0)
   b=INT(RND*16)+16
   r=INT(RND*16)+32
   g=INT(RND*16)+48
   LINE (oldx-1,oldy)-(x-1,y),r
   LINE (oldx,oldy)-(x,y),g
   LINE (oldx+1,oldy)-(x+1,y),b
   oldx=x:oldy=y
   IF f<>0 THEN CloseNicely
   GOTO DemoLoop

' ** End Of Demo Source **

CloseNicely:
   WINDOW CLOSE 1
   SCREEN CLOSE 1
   LIBRARY CLOSE
   END

SUB CreateNewPlane STATIC
   bitmap& = PEEKL(WINDOW(7)+46)+184
   bitplane&=PEEKW(bitmap&)*PEEKW(bitmap&+2)
   wdepth%=PEEK(bitmap&+5)
   IF wdepth%>5 THEN EXIT SUB
   newplane&=AllocMem&(bitplane&,65538&)
   IF newplane&=0 THEN ERROR 7
   POKEL bitmap&+8+wdepth%*4,newplane&
   POKE bitmap&+5,wdepth%+1
   IF wdepth%<5 THEN CALL RemakeDisplay
END SUB

SUB Ham STATIC
   viewmode&=PEEKL(WINDOW(7)+46)+76
   POKEW viewmode&,2^11
   CALL RemakeDisplay
END SUB
```

```
POKEW lw, &H8201 'Now the Magic starts....
Finish:
INPUT "Press RETURN key to STOP", a$
POKEW lw,1 'Stop sound playing
END
```

Mouse Click Detection

Many would-be Amiga C programmers have probably given up hope after just five minutes of ploughing through the Commodore-Amiga official documentation, as it assumes a good deal of background knowledge.

For example, if you used the official method of detecting a mouse button click, you would have to go through a rather tedious and long winded process of having to open the input device, get input from it, reply to the message etc, etc....

But if all you want to do is carry out simple 'Click mouse button to continue' operation, the official method is too much hassle. Below is a quick and easy (and illegal) way to detect if the right mouse button is being depressed. It is written in C, but can just s easily be used in assembler.

```
/*Mouse Button Tester
Demo*/
#include <exec/types.h>
main()
{
while (1) /* Infinite Loop
*/
{
if ( *((UBYTE
*)0xbfe001)&64)
printf ("Button off!\n");
else
printf ("Button on!\n");
{
{
/*End*/
```

Centring Text in Amiga Fonts

If you've ever tried producing a tidy screen display from AmigaBASIC when using any font other than the standard system font, Topaz, then you'll be aware of the problems that can occur. They lie in the fact that the standard system font is not proportional, which means that each character takes up a standard number of pixels on screen (eight in Topaz's case), which is very convenient when calculating the location of text. The other Amiga fonts such as Garnet, Diamond etc are proportional which means that each character only takes up the bare minimum of pixels – an i is narrower than an m and so on. Centring text in Topaz font is very easy to do, but what do you do when you are using a proportional font such as Ruby? Easy, just use the program below!

```
DECLARE FUNCTION TextLength% LIBRARY
LIBRARY "graphics.library"
DisplayWidth = 617

Centre "This is a string of text...."
Centre "....and this is another"

LIBRARY CLOSE
END

SUB Centre (text$) STATIC
SHARED DisplayWidth%

Length = TextLenght%(WIDOW(8), SADD(text$),
LEN(text$))

Start% = (DisplayWidth% - Length%) / 2

PRINT PTAB(Start%); text$
END SUB
```

Avoiding Reserved Words in AmigaBasic

One of the most common errors that crop up in AmigaBASIC programs is the use of reserved words as variable names. One way of trapping this kind of error is to write all your programs in lower case. When you get to the end of a line and press return, AmigaBASIC automatically converts all reserved words to capitals. If any of your variables changes to upper case then you know that you have used a reserved word.

This is also handy for trapping typing errors. If the command you enter doesn't get converted to upper case then you know that it either isn't an AmigaBASIC command or you have made a typing error.

Using AmigaDOS commands in BASIC

It can be useful to be able to execute DOS commands from within your BASIC programs? For example, if you're writing a game in BASIC you could add music to your creation by calling a DOS command to play a *SoundTracker* module in the background.

The following snippet of BASIC code (or 'stub' as programmmers prefer) calls the ROM Kernel routine Execute(), which is used to launch an external program as a separate task. To be able touse it, you'll need to copy the file dos.bmap from the Basic Demos drawer on your Extras disk to your boot disk's LIBS directory. If the program fails to work, check to make sure that C directory of your boot disk contains the AmigaDOS RUN command.

```
LIBRARY "dos.library"
DECLARE FUNCTION Execute%() LIBRARY

Command$ = "INFO"+CHR$(0)

CALL Execute(SADD(Command$),0,0)
```

HAM in AmigaBASIC

Ever wished you could access HAM (Hold and Modify) mode from AmigaBasic? Just think, 4096 colours on

On the Disks

Using the Disks

First make a back-up copy of both disks by loading the Workbench and dragging the disk icon over that of your back-up disk. These disks are not self-booting – all the programs are designed to be run from the Workbench.

The first thing you want to do is read the instructions on using the programs by double-clicking on the 'read me' documentation file included with each one. You can then run the program by double-clicking on its icon.

The text display program that shows the documentation files is simple to use. You can scroll up and down bit by bit by using the up and down cursor keys. You can make it scroll quickly and continuously by holding down the [Shift] key and pressing the cursor key. Best way to read, however, is the slow continuous scroll – press the [Space] bar or left mouse button for forwards, the [Backspace] key or right mouse button for backwards. Pressing any of these again will pause the text. To quit, press [Escape] or, if you're at the end of the file, [Space] twice.

DISK ONE

JRComm

Enter the fascinating world of communications with this fully-fledged comms package. All you need is a modem and this program and you're away. *JRComm* is an easy-to-use package that includes many powerful features to make your sessions online as smooth as possible.

Scenery

Try your hand at playing God with this Fractal landscape creator. With just a single click of the mouse you can mould mountains, valleys and seas.

Cruncher

Squeeze more storage space out of your disks with this handy compression utility. Even better, when you compress a program with *Cruncher*, you don't even need to decompress it – *Cruncher* adds a little decruncher to the start of every crunched file, thereby automatically decrunching the program every time it is loaded.

ScreenX

Ever wished you could save screens out to disk as IFF files? Now you can, with Steve Tibbet's acclaimed screen management program *ScreenX*. Not only can you save screens as IFF files, but you can also change different aspects of any screen with ease.

IconMaker

Creating Workbench icons has never been so simple with this easy-to-use icon creation utility. Just design your icons in *DPaint*, save them out as brushes and *IconMaker* does the rest. Within seconds your *DPaint* brush is transformed into a Workbench icon.

CLI Tools

CLIers will love this collection of additional CLI commands. All deserve a place on any self-respecting Workbench disk! Here's what they have to offer.

SysInfo 2 – Without doubt the number one system information utility. With just a single command, you can find out how much memory is installed within your machine, what processor (and co-processors) is installed, the version of Kickstart, the video mode, and the list continues...

WhereIs – Losing a file on a floppy disk is bad enough, but what happens if you lose a file on a multi-megabyte hard disk? Help is at hand, however, in the shape of WhereIs – a powerful 'find file' utility.

Border – Bored with the borders around your CLI windows? With Border you can switch them off, giving your Amiga CLI that true 'PC feel'.

ClickDOS

With this incredibly useful program, you'll have the power of AmigaDOS at your fingertips without ever having to learn a single CLI command!

SafeBoot

Protect your software investment by storing all your game bootblocks safely away from those dreaded viri!

ViewILBM

Vilbm will happily display pictures in just about any resolution, be it HAM, HalfBrite or Overscan. There are no instructions here because it is so simple to use – simply hold down the [Shift] key to click on as many picture icons as you want, then double-click on the program icon, or use the command Vilbm in the CLI just as you would use Type for text files. Click the left mouse button to move on to the next picture.

QuickLens

Those of you with TV modulators may find this utility handy. *QuickLens* magnifies any part of the Workbench screen, making that small print almost readable.

WB Hacks
Where would we be without those great little Workbench hacks? Within this directory you'll find two classic hacks that as well as being fun, may even prove to be useful. There is no documentation – just experiment!

MegaWB
Create a massive 1024 by 512 Workbench screen without having to fork out 'trez mucho masoolas' for an expensive high resolution monitor. *MegaWB* will allow you to scroll around a huge Workbench that is fully accessible to other Workbench-resident programs.

DISK TWO

FuncKey
Customization is the key to *FuncKey*. You can set up the Amiga function keys to do exactly what you want them to. Run in parallel with other programs, *FuncKey* could save you a lot of time by setting up the function keys to hold commonly-used commands.

Screen Shift
Workbench screen not correctly positioned on your monitor? If so, forget Preferences and load *ScreenShift* instead. It will let you reposition your Workbench screen at any time – even while Preferences is running!

Perfect Sound
A powerful audio digitising package that will let you edit digitised sound samples. You can carry out many complex operations on standard IFF sound files and even grab samples if you have a sampler plugged into the paralle port of your Amiga. Note that this is a commercial demo and pay attention to the instructions.

Zero Virus
Vanquish those viruses forever with this virus-busting utility program. *Zero Virus* can handle both bootblock and parasite viri with ease with a powerful brainfile system that allows it to 'learn' about new viri that it encounters.

Zap
Zap includes a wealth of brilliantly simple but powerful tools to let you edit binary files to your heart's content.

BootIntro
You've seen the little intro that greets you every time the *Amiga Format* Coverdisk is inserted into your machine, now add them to your own disks with *BootIntro*.

RSL Clock
Not just a clock – it's a complete toolkit containing many useful ways of gathering information about your system. Go on, bung it on your Workbench disk!

Drop Cloth
Let's face it, the Workbench screen is rather boring! With *DropCloth*, you can spruce it up a bit by dropping any four-colour medium resolution IFF picture behind it. To get you started, we've even included two of our own. Just double-click on either of the demos to run them.

Task Control
Keep multitasking firmly under control with this handy Workbench utility. Even if you don't use it for zapping tasks, *TaskControl* will provide you with a fascinating insight into the workings of your Amiga.

Super Echo
Sound samplers will love this real-time sound processing program that will turn your Amiga into a sophisticated effects unit. Create effects including echos, stutters, delays etc. As always, experimentation is the key.

FPic
Doctor those IFF pictures without having to pay expensive vet's bills! *FPic* is a powerful image processing program that will let you tidy up your IFF art using proven algorithms developed by companies such as NASA.

Drop Shadow
DropShadow creates realistic er, drop shadows behind any windows open on the Workbench screen. Smart!

DecHexBin
Programmers will love this handy little number base converter. Never again will you have to convert between decimal, hex and binary using the traditional method – using your noddle. *DecHexBin* will happily run in the background, therefore allowing you to use it in conjunction with your favourite programming language.

Mandel Mountains
Creates beautiful Mandelbrot images in full 3D using some very complex mathematics indeed. Don't worry too much about the maths, though – *MandelMountains* handles all the boring calculations for you! Remember, the key is to be patient while it is working.

Spread
The fun's got stop sometimes, so *Spread* can earn its living by helping you to keep track of all things financial. Whether you're balancing your cheque book, or handling the accounts of a small business, *Spread* could be the answer to your problems. Isn't it time you put your aged pocket calculator into retirement?

These disks were compiled by Jason Holborn.

If either of your disks is faulty, return it to this address for a replacement within a month of purchase:

Get the Most out of your Amiga
Disk Returns
Future Publishing
The Old Barn
Somerton
Somerset TA11 7BR

SUBSCRIPTION & DISK OFFERS

Subscribe to *Amiga Format* for 12 months at the reduced price of £35.40 and receive the two disks to complement this book absolutely FREE!

Usually the subscription alone costs £39.95, the disks alone cost £3.95

• Great Subscription Offer

If you want to get the very best out of your Amiga, then you'll want to get ***Amiga Format.*** Every month, ***Format*** offers an incredible package:

• Big magazines

Issues as large as 284 pages crammed with definitive coverage of the full range of Amiga activities – from games to music, from DTP to programming, from serious software to graphics.

• Superb reviews

Authoritative and easy-to-understand reviews of all the best new products, with painstaking comparisons and clearly-stated conclusions.

• Latest news

Amiga innovations from around the world, including reports on new Commodore products.

• Reliable buyers' guides

We'll help you make all the right choices of essential products.

• Stunning design

Amiga owners are sophisticated people and so ***Amiga Format*** is a magazine you'll be proud of!

• Coverdisk

Yes, every issue of ***Amiga Format*** carries a free disk packed with software; playable special versions of major new games from leading software houses such as Mirrorsoft, Ocean, Activision and Psygnosis. Vital utilities backed by expert tutorials in the magazine. Handy programs to help you get more out of your Amiga. Astounding graphics and artwork taking the Amiga to the very edge of what's possible.

At just £2.95 ***Amiga Format*** is simply unbelievable value and an irresistible way of making the most your Amiga.

Amiga Format is published on the second Thursday of every month. As well as being available on subscription, it is sold in **WH Smiths**, **John Menzies** and all good newsagents throughout the land.

• Guarantee

If you are not delighted with your subscription you may cancel at any stage and claim a full refund for all unmailed issues.

Yes,

☐ I would like to take advantage of this special subscription offer and receive the next **12 issues** of ***Amiga Format*** for an all-inclusive payment of **£35.40**, including the two disks to complement my book.

OR

☐ I would like to buy the disks only at **£3.95**.

Name.....

Address .....

.....

Post Code .....

Please tick your payment method.

I enclose a ☐ **cheque** ☐ **postal order for £35.40/£3.95**

Please debit my Access/Visa card

Card number ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

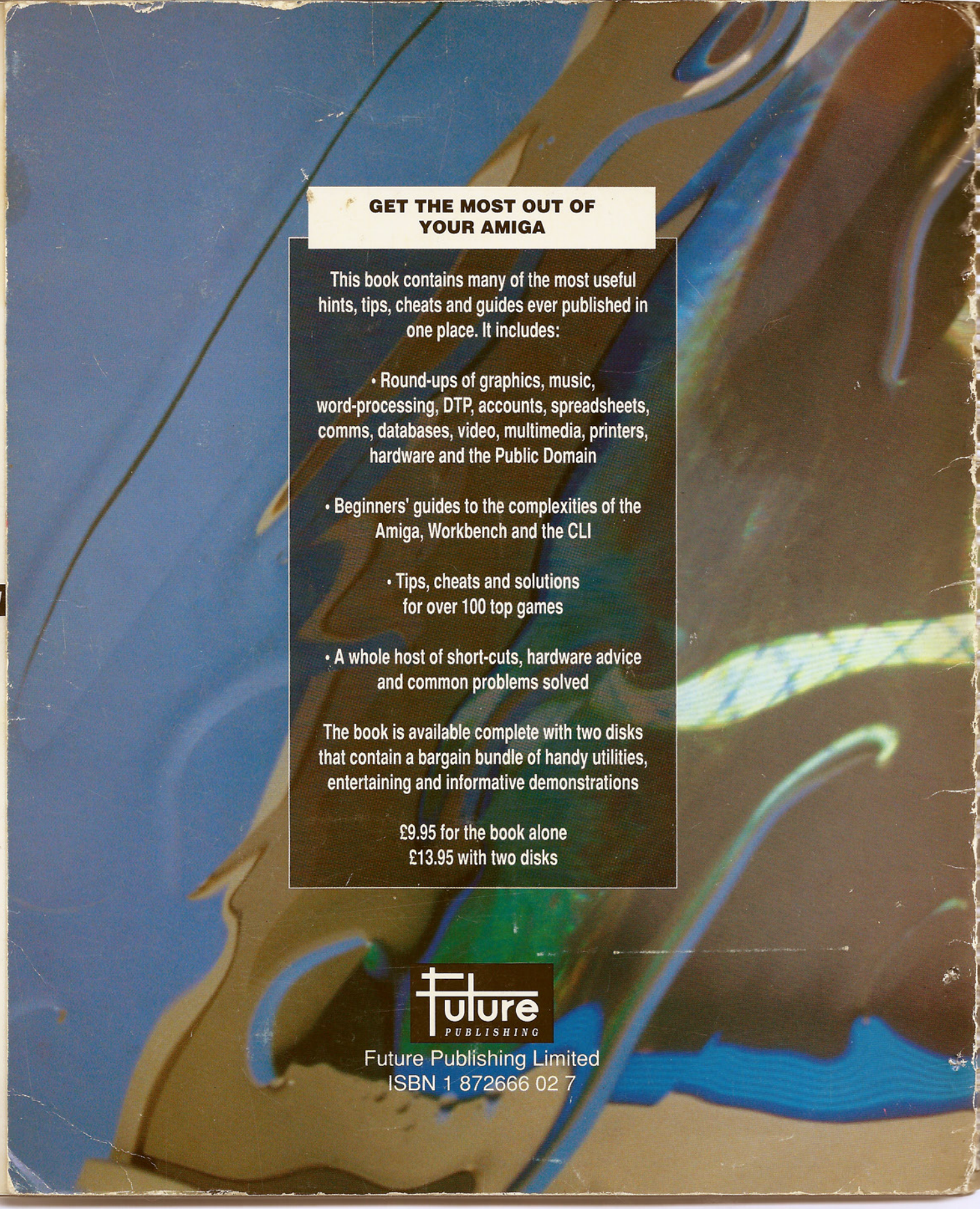
Card expiry date ☐☐ ☐☐ ☐☐☐☐

Offer closes June 21st 1991

SEND TO AMIGA FORMAT, FREEPOST, SOMERTON, SOMERSET, TA11 7BR

Index

Unfortunately, there is not sufficient space here to list all 100-plus games in the Gamebusters section of the book. They are, however, arranged in alphabetical order on Pages 125-52, so you shouldn't have too much trouble finding the one you want.



GET THE MOST OUT OF YOUR AMIGA

This book contains many of the most useful hints, tips, cheats and guides ever published in one place. It includes:

- Round-ups of graphics, music, word-processing, DTP, accounts, spreadsheets, comms, databases, video, multimedia, printers, hardware and the Public Domain

- Beginners' guides to the complexities of the Amiga, Workbench and the CLI

- Tips, cheats and solutions for over 100 top games

- A whole host of short-cuts, hardware advice and common problems solved

The book is available complete with two disks that contain a bargain bundle of handy utilities, entertaining and informative demonstrations

£9.95 for the book alone
£13.95 with two disks

Future PUBLISHING
Future Publishing Limited
ISBN 1 872666 02 7