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CW PRICE NEW LOW PRICE! **£139.99**

Alfascan+ Features: Touch up an merge it • Migraph Jnr.OCR software • 400 dpi • 256-Greyscale • **100% compatible with all Amigas.**
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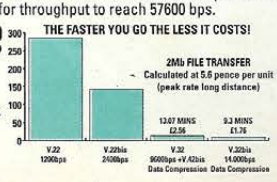

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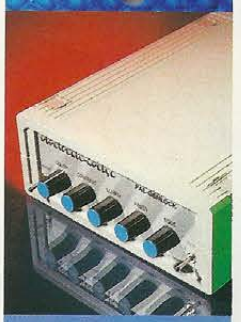

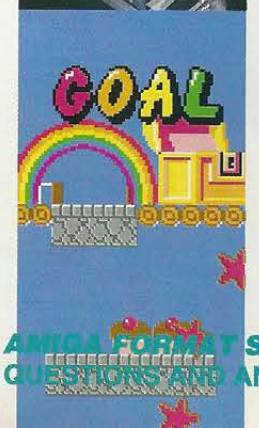

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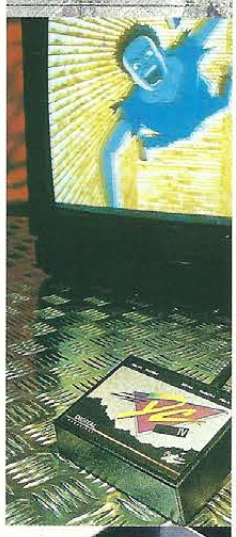

AMIGA FORMAT SPECIAL
QUESTIONS AND ANSWERS

A warm welcome to you from Tim Smith, editor of the Specials.

Welcome to the sixth Special edition of *Amiga Format*, which is still the world's best-selling magazine for what is still the best computer in the world. As is obvious from the gloriously silvered cover of this magazine, we will be looking at the very best in Amiga hardware accesories.

We have been looking back over the history of the Amiga in order to discover not only what the most valuable peripherals are for your A500, A500 Plus, A1500, A2000, A3000, A4000, A1200 and A600, we are also looking at ways in which you can get the best from them.

To this end, you will find rundowns of the best hardware (I have tried to avoid the dross, but in some cases we have had to mention a few dodgy products just so you know what to avoid) at the front of the magazine, with the 'How To' guides, tips, hints and the occasional look at different hardware combinations available towards the middle and back.

Although all of the magazine is up to the usual high standard you would expect from our parent magazine, *Amiga Format*, I would like to draw your attention to consultant editor, Andy Hutchinson's look at video techniques with your Amiga, the right hardware, a little know-how and a great deal of information. Then there's our in-depth look at the musical Amiga and the outside world, put together for us by the editor of the country's best-selling music technology mag. *AF*'s editor (and ex-art editor) and also one the foremost authorities on Amiga DTP and graphics, Marcus Dyson, has put together a nine-page piece on helping you get an all-round view of these topics. There's Stuart Campbells sometimes cruel look at gaming. There's also an eight-page hardware compendium detailing every piece of hardware reviewed since the birth of *AF*. This *Special* is special, no rip-off re-prints no rehashes, this is all new writing. Enjoy it...

As we go to press it was brought to our attention that DMI Marketing, formerly HB Marketing, has ceased to trade. Read *Amiga Format* for updates to this and other news.

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730

Over the years hardware add–ons for the Amiga have undergone a radical transformation. Here we look at how times have changed.

HARDWARE HISTORY

Here's a trivia question: what is a Winchester? Give up? Well, way back in the mists of time (all right, the early 1980s), a Winchester was what everyone called a hard drive. These hard drives were large boxes in putty grey that could store about 5Mb of data. You had to go through an amazing procedure every time you wanted to use your Winchester: this included running the thing up to speed, accessing the data and then parking the drive head when you'd finished.

These ancient drives were also massively susceptible to the slightest vibration. Knock the desk too hard and the heads would crash on to the drive surface, ruining your 5Mb of data. What's even more amazing is the cost of one of these data storage devices. Back then a 5Mb hard drive (power supply extra) cost about £650. Although Winchester still manufactures hard drives (jolly good ones at that) things have changed somewhat.

Since they first came on the scene in about 1984, the cost of hard drives has fallen in inverse proportion to their size. When the A1000 was released in the UK in 1986, nobody really considered attaching a hard drive to it for two reasons. Firstly they were incredibly slow (especially when compared to PC hard drives) and secondly they were too expensive. It was far easier to save everything to floppy disk.

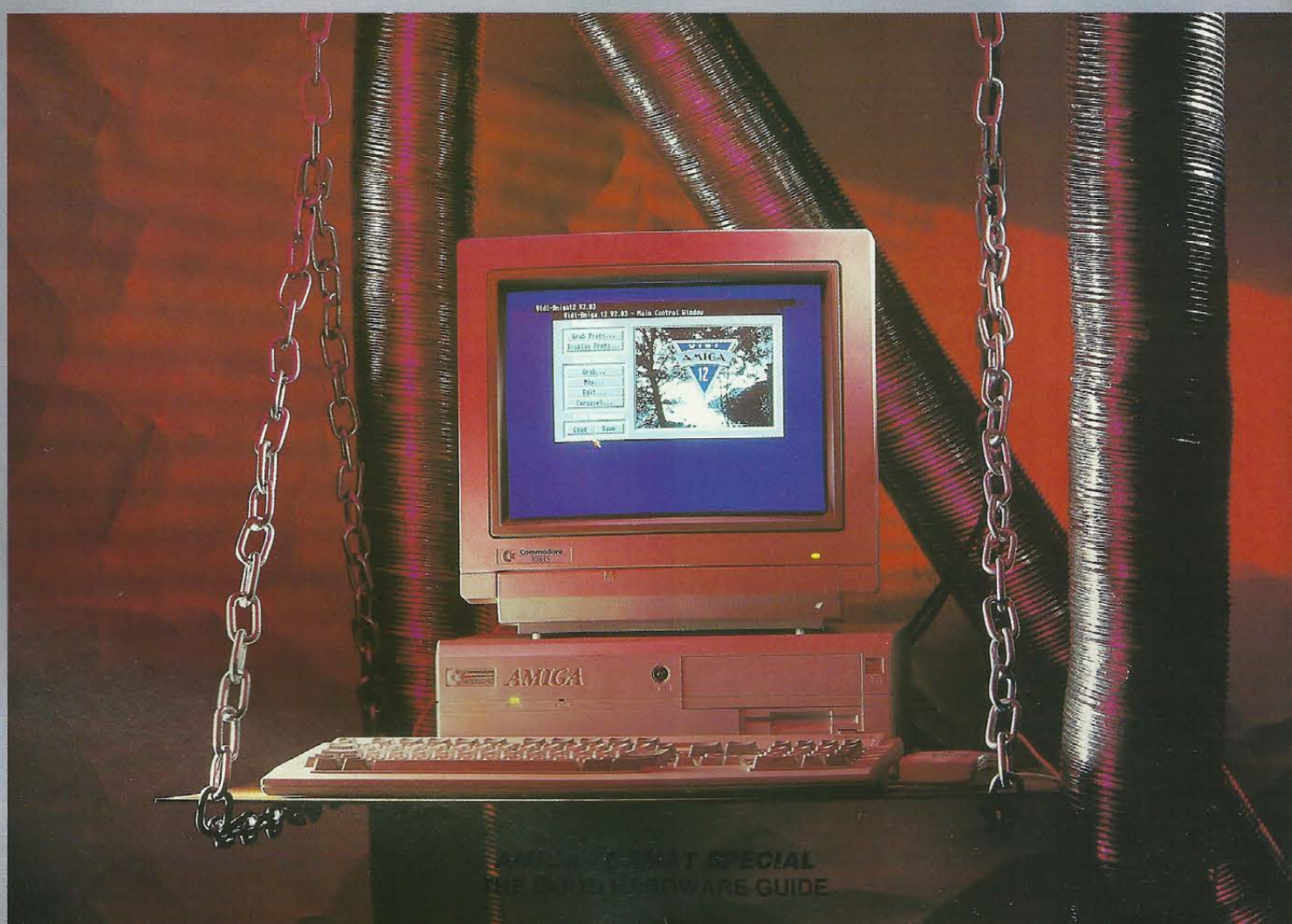
With the release of Workbench 1.3 and Kickstart on the A500, Commodore carried out a major overhaul of hard drive accessing routines. This included support the then new FastFile system and auto-boot support. It's interesting to note that although all hard drives are now auto–booting, this was an optional extra on hard drives ten years ago.

Once Commodore had sorted out its hard drive accessing, manufacturers started releasing models for the Amiga. One of the first available specifically for the Amiga was the Supra 30 drive. This 30Mb drive would set you back a wallet-denting £700. If you wanted a seriously large drive then you'd have to go for something like the Burocare 80Mb drive which weighed in at £950.

In the mid-80s a 5Mb hard drive cost about £650. Now you can get 80Mb for under £300.

By 1989 life was beginning to improve slightly. You could now buy a 20Mb drive for £369 or a 60M model for £649. By 1990 the RAM and hard drive combinations started appearing on the market and you could, for instance, pick up a GVP 40Mb mode with 4Mb of RAM for £890. Fast forward two years to early 1992, prices had dropped furher and you could buy a 52Mb GVP drive for £359.

However, it wasn't until 1992 with the release o the A600, A1200 and A4000 that hard drive prices started to plummet. With the back–up of IDE (Intelligent Drive Electronics) interfaces you could now get a 20Mb internal drive for just £149 or an 80Mb model for £299.



The RocKey chroma-key is one of the more recent additions to the ranks of Amiga hardware, and a good example of the remarkable pace of change.

The modem has been around for longer than the Amiga, but the falling price of the hardware has now made them more accessible to home users.

Daisywheel descendants

Fortunately, printers came of age a little while before the Amiga. By the time the A1000 arrived in 1986 there were a wide variety of dot matrix and daisy wheel printers already available, although laser printers were a little way off and inkjet printers hadn't even been conceived. You'd have to part with £400 for a decent 9-pin printer then.

By 1988 dot matrix printers had fallen to around the £250 mark and laser printers had started appearing on the market. If you had some serious money to spend you could invest in a laser printer for about £2,000. Happily, laser printers have slowly fallen in price, although with continual improvements in the quality of inkjet and bubblejet printers it all seems largely academic.

Moving up to date, you can now get a quality 9-pin printer for £140, £250 for a good 24-pin model, £200 for an inkjet or bubblejet printer, and £800 for a laser printer. If this trend continues then inkjets and bubblejets will slowly phase laser printers right out of the market. As it is they offer very similar resolutions at only a quarter of the price.

The continual march of technology is echoed in the wonderful add-ons that have become available for the Amiga over the years. Initially these kinds of products were much too expensive to enter the mainstream, but as the technology became more widespread, so costs and therefore prices fell. Of course, the development of add-ons also reflects the market place.

Go faster stripes

When it was released in the UK in 1987, very few people would have considered the A500 as slow and yet it was only a matter of a couple of years or so before accelerator boards started appearing for it.

By 1990 both 68020 and 68030 accelerator cards were available for the A2000, and one of the first A500 accelerator boards, ADSpeed, which featured a 14MHz replacement processor, appeared for the A500.

However the really popular models were the GVP Accelerator/Hard drive combinations. Released in 1991 the GVP A530 boasted an external 52Mb hard drive and a 40MHz 68030 processor all in the same case.

At £799 it certainly wasn't cheap but then you were getting serious processing power. The same A530 now costs £499, having recently been reduced in price from £638 – a good example of how the cost of some hardware has fallen dramatically over the years.

During the same period, Solid State Leisure released its A5000 upgrade board that included a 16MHz 68030 second processor and an extra one megabyte of RAM. The main thing to note here, is that it took a while for these accelerator boards to appear, because most people were quite happy with the processing power of their Amiga. However, as software gets more and more processor intensive, so speeds start dropping – it's the old economic maxim of supply and demand. Although there aren't any accelerator boards for the A1200 yet, one assumes that it will only be a year or so before the first 68040 accelerator appears with a suitably high price tag.

Out of memory

As the home computer market has evolved from its hobbyist beginnings into the mainstream pursuit of millions, so the public's demands have changed. The first home computers such as the VIC-20 had tiny amounts of memory (20K in the Vic's case), later on with the release of the Commodore 64, this memory space was trebled to the dizzy heights of 64K. When the Amiga was released it included the hitherto unheard of RAM capacity of 512K.

Everyone who'd been involved in the home computer scene during the early 1980s had trouble imagining just what kind of application would require that amount of memory, but it wasn't long before the first RAM upgrades started appearing. In 1986 you could pick up a 512K RAM expansion board for £120. By 1988 that price had dropped to £100, but included a clock/calendar chip.

As manufacturing techniques improved, the cost of RAM chips fell through the floor and led to a huge price drop in Amiga RAM upgrades. By 1989 you could pick up exactly the same RAM expansion board with clock for just £20. All of which meant that everybody could afford to upgrade their Amiga to the one megabyte mark.

By 1990 demand had changed again. Due to the increasing demands of video and DTP programs, one megabyte just wasn't enough any more and so two, four and eight megabyte expansions started appearing on the market. Then, an internal two megabyte upgrade would have set you back £289, while you could get an eight megabyte version for just another sixty quid at £349. This was because the expensive bit of a RAM card is the PCB (printed circuit board) itself and not the chips.

By 1991 you could kit out your A500 with 2Mb of FastRAM for just £90. Compare this with the previous year's price of £289 which would now buy you a 20Mb hard drive with 2Mb of RAM all in one box. By 1992 you could pick up an 8Mb external RAM board for £150 or a 1.5Mb board for an A500 for £70.

Come 1993 and a brand new kind of RAM expansion had appeared. The PCMCIA card, designed to simply slot into the side of the A600 and A1200 has revolutionised the way we think about memory expansions. Where previously this involved soldering chips on to the PCB itself, now all you do is push a credit card sized board into the side of the computer; if you want more memory simply insert a more powerful card.

Upgrade or be damned

Sooner or later everything becomes outdated. However, the rate of change that the Amiga has seen over the last ten years is nothing short of incredible. From simple beginnings, the Amiga world has been transformed by new and increasingly innovative pieces of hardware.

Ten years ago a hard drive was more science fiction than hardware fact and yet here, in 1993, we've almost made hard drives redundant by the increasing use of CDs, high density floppy disks and enormous RAM expansions. The advances we're going to see over the next ten years are impossible to guess at, but at the ***Amiga Format*** offices we're saving up for our 40 Gigabyte RAM expansion with parallel 68090 co-processors right now. Anyone want to buy a slightly used A1000?

CDTV was Commodore's first faltering step into the revolutionary world of CD technology.

If you're going to buy a printer, you need to read up on the subject. So, you can either scrabble around collecting your back issues and try to find all those elusive printer reviews, or you can just settle down and follow our expertly researched guide to Amiga printers

THE POWER OF PRINTERS

One of the most useful hardware add-ons for your Amiga is the printer, but choosing a printer can be a confusing experience. With so many different makes, models and types on offer, you'll need to know your printers to ensure you get the one that does the job you want it to do.

So it's important that you know the strengths of the different types of printer available. As the techies will tell you, printers essentially come in three different flavours – dot matrix, inkjet and lasers – all of which have their own individual pros and cons. Inkjets, for example, are expensive to run but their quality is very good. And, although they are cheap to run, dot matrix printers aren't that great in the quality department. Confused? Read the following guide to printers and you won't be....

Dot Matrix

Dot matrix printers are by far the most popular type of printer available today simply because they offer such a good combination of quality, value and cheap running costs. All dot matrix printers are impact printers, they work by forming characters on the page from a matrix of tiny pins that stamp down on to the paper through an inked ribbon. Because they are impact printers, dot matrix printers can be quite noisy although newer models are much quieter than the bone shakers that were on the market just a couple of years back.

Dot matrix printers come in two types – 9-pin and 24-pin. The number of pins directly relates to the quality of the printout, so a 24-pin printer is considerably better than a 9-pin dot matrix simply because each character is formed by more pins.

However, even 24-pin dot matrix printers are not as good as the cheapest inkjet. On the plus side dot matrix printers are the cheapest to run. If quality is therefore not that important, a dot matrix is a good investment.

Inkjet

Although inkjet and bubblejet printers are fairly recent developments in printer technology, they've grown very popular indeed among Amiga owners thanks to their low purchase prices and very high quality of output.

Like a dot matrix printer, inkjets and bubblejets form characters by combining patterns of dots. However, inkjets and bubblejets differ from dot matrix printers in that the printer head (the bit that forms the characters) doesn't actually touch the paper. Instead, tiny droplets of ink are sprayed on to the page. Because inkjets and bubblejets are non-impact printers they are very quiet.

The quality of output of inkjets and bubblejets is usually much higher than that of both none-pin and 24-pin dot matrix printers because the tiny nozzles that spray the ink on to the page are considerably smaller than the pins used in a dot matrix print head.

For functions such as printing graphics and text printing, inkjet and bubblejet printers are second only to laser printers in terms of quality.

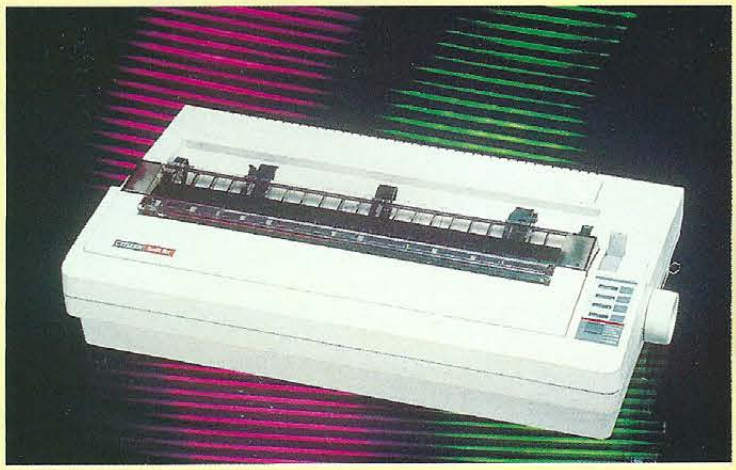
Laser

If you want the ultimate in printer technology, then you need a laser printer. Contrary to popular belief, laser printers don't work by burning little dots on to the page. Instead, the laser inside the printer is used to charge a photosensitive drum that is passed through a bath of positively charged ink particles. The paper (which itself is charged as it is fed into the printer) then passes over the drum and the ink particles on the drum are transferred to the paper. A rather complicated process maybe – all you really need to know is that laser printer output is second to none.

Lasers aren't perfect though. Far from it. Firstly, they can be expensive to run – the cartridges that hold the charged ink particles cost about £75 each and they don't last that long. Secondly, all lasers are page printers. That means they are only capable of printing a whole page at once, so even if you just want to print a single line of text, you'll still get a whole page fed through. For DTP and graphics printing though, a laser takes some beating.

PANASONIC KX-P2180
£199 (Indi Direct 0543 419999)

9-pin DMP



Panasonic's latest 'quiet' printer, the KX-P2180 certainly lives up to its name – Panasonic quotes noise levels of just 45 dBA (decibels). That's almost as quiet as an inkjet, making the KX-P2180 easily one of the quietest dot matrix printers on the market. It's also one of the most capable – boasting full colour printing as standard using a seven colour palette, the KX-P2180 produces good-quality printouts.

The KX-P2180 offers print speeds of 192 cps in draft mode and 38 cps in NLQ mode, so it's a pretty mean performer. It offers a choice of six resident fonts too, making the KX-P2180 the top nine-pin on the market. Highly recommended.

Citizen Swift 9/9x
£159 (Citizen 0753 584111)

9-pin DMP

This Citizen 9-pin is available in both standard 80-column and wide tractor format (pictured). The Swift 9 is a fairly capable workhorse of a printer that offers EpsonX and IBM ProPrinter emulation but can be driven directly using Citizen's own *PrintManager* driver software. The Swift is a surprisingly quiet printer, Citizen quotes a noise level of just 51 dBA (decibels) when the printer is run in its special quiet mode.

The range of fonts is nothing to write home about, just one draft and three NLQ fonts are on offer, but if your not too worried about that, the Swift 9 is quite a fast printer, turning in some very respectable performance figures – 160 cps in draft mode and 40 cps in NLQ. In all, the Swift 9 is a capable enough 9-pin that is certainly worth investigating.

Star LC-100
£219 (Star UK 0494 471111)

9-pin DMP

Not to be outdone by Epson and Citizen, Star's 9-pin offering is the LC-100, the latest in a long line of LC-series printers. Undoubtedly the LC-100's greatest feature is that it prints in full colour as standard, something that only Seikosha's and Panasonic's 9-pin offerings can match.

Like its big brother, the LC-24/100, the LC-100 has a pretty impressive specification to match its price. With a maximum print resolution of 240 by 216 dpi, the LC-100 offers print speeds of 150 cps in draft mode and a pretty respectable 37.5 cps in NLQ mode. Although speed may not be its greatest asset, the Star LC-100 has a good range of fonts for a 9-pin dot matrix – for your money you get four NLQ fonts and one draft font.

Epson LX100
£189 (Epson UK 0442 61144)

9-pin DMP

Epson's name is synonymous with good quality nine-pin dot matrix printers thanks to the widespread use of its printers in schools. Despite this, Epson has never really achieved acceptance with Amiga users. The company's contribution to the nine-pin market is the LX100, a strange looking printer that is surprisingly good. For starters, it's the only dot matrix printer that comes as standard with a built-in cut sheet feeder, an aspect of the printer that scores well in our book.

The LX100 is a good performer, offering a maximum print speed of 200 cps in draft mode and 40 cps in NLQ mode. But with a selection of just one draft and two NLQ fonts , the range is somewhat limited. For the price, the LX100 scores well.

Seikosha SP1900 PLUS
£129 (Silica 081-309 1111)

9-pin DMP

Seikosha may not command the same sort of respect as better known companies such as Star and Epson, but it knows a thing or two about making a decent printer that offers good value for money. Take the SP1900, for example. For just £129 you get a very capable 9-pin that can churn out pages at an impressive rate of 192 cps in draft mode and a very reasonable (at this price) 40 cps in NLQ mode. Although the SP1900 Plus's design is hardly likely to win any awards, it is still a functional enough printer.

As you'd expect from a printer at this sort of price, the range of fonts is rather limited – just two NLQ fonts are on offer (serif and sans serif), but the SP1900 Plus can apply a variety of styles to these fonts including bold, italic, condensed, double strike, double width and double height. As a no-nonsense budget printer, the SP1900 Plus is good value for money.

Star LC24-100
£239 (Star UK 0494 471111)

24-pin DMP

Following hot on the heels of the LC-100 comes its big brother, the LC24-100 which – as you've probably already guessed – is the 24-pin version of that brilliant little 9-pin. Boasting the same good looks as its little brother, the LC24-100 has a respectable print speed of 160 cps in draft mode (or 240 in condensed draft mode) and 53 cps in NLQ mode. It comes as standard with a substantial 16K print buffer.

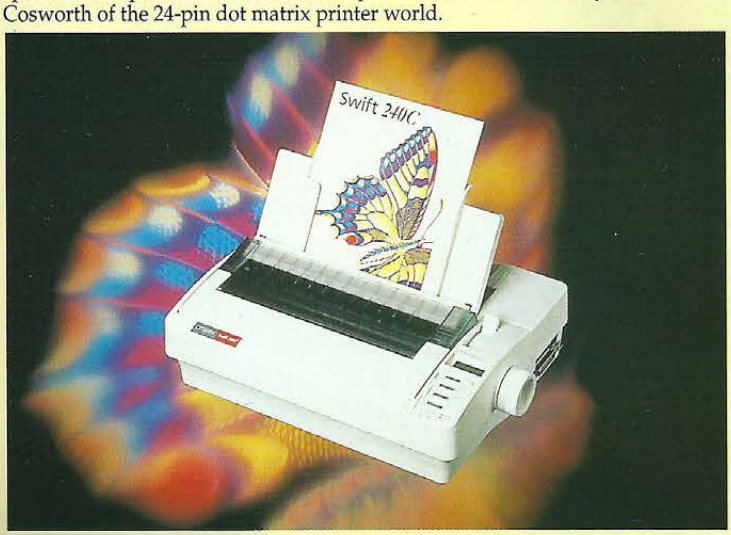
What really makes the LC24-100 such an attractive proposition is its wide range of fonts – one draft and five NLQ. Fonts on offer include Roman, Sans Serif, Courier, Prestige and Script. In fact, the LC24-100 is a great printer at a great price. If you're after a workhorse 24-pin, then look no further.

Citizen Swift 240C
£359 (Citizen 0753 584111)

24-pin DMP

For the ultimate in 24-pin printer technology, look no further than Citizen's recently-released Swift 240C, the flagship of its Swift 2 series of printers. Coming as standard with full colour printing capabilities and the sort of print quality that you'd expect from a colour inkjet, no other 24-pin printer even comes close to matching the Swift 240C. Although it's rather pricey, this printer absolutely oozes style in terms of both quality of manufacture and performance.

The 240C comes as standard with a highly impressive total of nine NLQ fonts (the widest selection of any of the 24-pin dot matrix printers included in this round-up) and two scalable fonts that can be enlarged up to 40 point without losing quality. The 240C doesn't hang about either – with a maximum print speed of 200 cps in draft mode and 66 cps in NLQ, this is definitely the Cosworth of the 24-pin dot matrix printer world.



Fujitsu DL1150
£395 (Fujitsu 081-573 4444)

24-pin DMP

Fujitsu may not be the best known printer manufacturer in the Amiga market place (Star and Citizen hold that honour), but the company does produce quality products. The DL1150 is such a product. Although it's rather expensive (Fujitsu really needs to address this), the DL1150 offers a very impressive list of features.

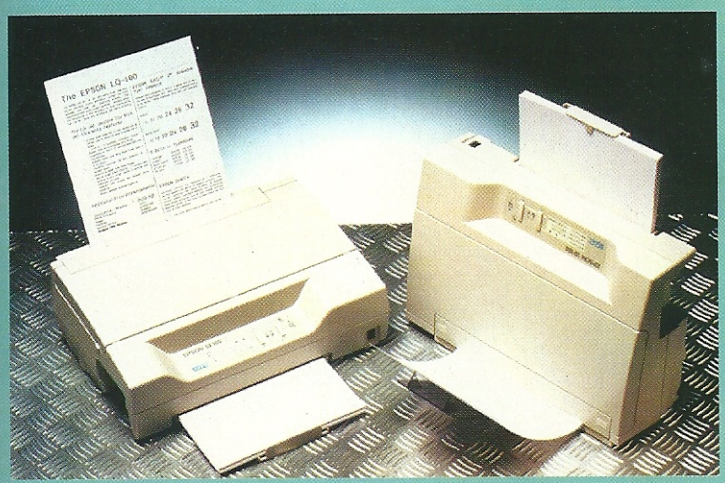
Its range of fonts is second only to the Citizen Swift 240C – three draft and seven NLQ. Print speed is very good too – 200 cps in high speed draft mode (that's 40 characters faster than the 240C) and 60 cps in NLQ. The DL1150 comes as standard with full colour printing capabilities, so it deserves to be rated up among market leaders such as the 240C. Highly recommended.

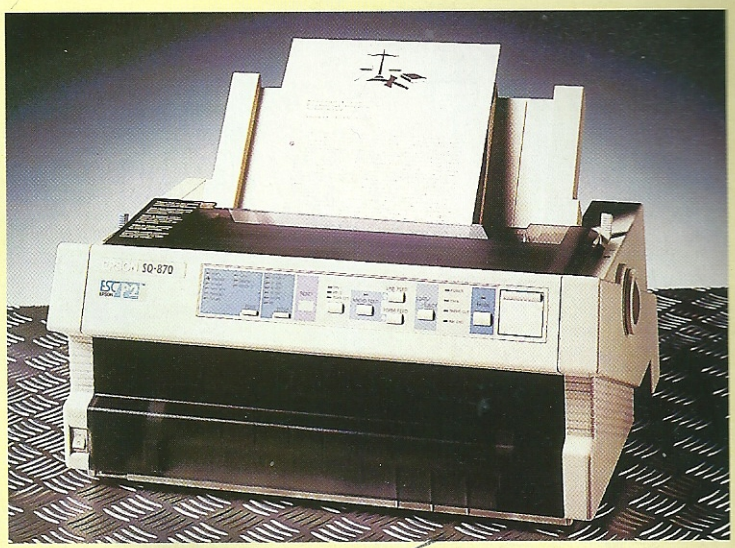
Epson LQ100
£245 (Epson UK 0442 61144)

24-pin DMP

Epson's 24-pin offering is the LQ100, a printer that shares the same weird-looking design as its 9-pin brother, the LX100. Like the LX100, the LQ100 comes complete with a built in cut sheet feeder that is capable of handling up to 50 sheets of standard A4 paper. Like Canon's inkjets, the LQ100 can be used both flat and standing up, therefore providing valuable extra desk space.

The LQ100 is certainly better in terms of specification than the LX100. It offers print speeds of 167 cps in draft mode and 60 cps in NLQ mode with a very respectable choice of five NLQ fonts, two of which are scalable up to 32 point. The LQ100 also comes with a 11k print buffer which helps to speed up printing sessions considerably. A good effort from Epson.





Epson SQ-870
£659 (Epson UK 0442 61144)

Inkjet

Epson's dot matrix offerings may leave a little to be desired, but no one could deny that the company knows how to produce an inkjet as this printer vividly demonstrates. The SQ-870 is a feature-packed printer that is definitely at the leading edge of inkjet technology – offering print speeds of up to 550 cps in draft and 200 cps in NLQ mode, the SQ-870 leaves the competition for dead in the speed stakes.

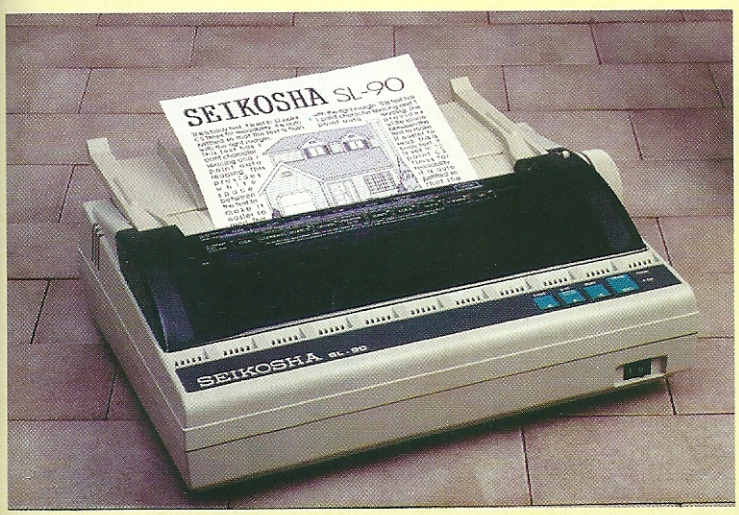
Speed isn't its only asset though – with eight NLQ fonts on offer (all of which are very useable), the SQ-870 sends the competition running for cover. In all, quality is brilliant, speed is brilliant, the design is brilliant. Consider us impressed. If only it wasn't so damned expensive!

Seikosha SL90
£182 (Silica 081-309 1111)

24-pin DMP

Seikosha's latest 24-pin printer has been designed with performance in mind. Based around its successful SL92, the SL90 offers increased printing speeds of 160 cps in draft mode (or 240 cps in high speed mode) and a very impressive 70 cps in NLQ mode. Like all of Silica's dot matrix printers, the SL90 comes complete with a printer starter pack that includes a centronics printer cable and packs of both fanfold and cutsheet paper – in fact, everything you need to get up and running.

Although its speed is highly impressive, it is a little disappointing that the SL90 only offers two NLQ fonts – Courier and Prestige Elite – although additional ones can be added using font cards. Despite this shortcoming, the SL90 is a cheap and cheerful 24-pin dot matrix with surprisingly good specifications and is definitely worth a look.



Canon BJ10sx
£227.99 (Canon UK 081-773 3173)

Bubble-jet

The latest version of Canon's BJ-10 bubblejet printer is the BJ-10sx. It shares the same good looks and clever design as its predecessors but is capable of printing text and graphics at a much higher speed. Like the Star SJ-48, the BJ-10sx is essentially a portable printer and is therefore very small indeed (it can easily fit into a briefcase). You can buy a rechargeable battery for it, enabling the BJ-10sx to be used anywhere.

The major improvement offered by the BJ10sx over previous models is the increase in printing speed. Whereas the old BJ10ex only offers a printing speed of 83 cps in NLQ mode, the BJ10sx has been souped up to offer print speeds of 110 cps. With four NLQ fonts on offer and very good print quality, the BJ10sx continues to keep Canon at the top of the bubblejet market.

Citizen ProJet
£496 (Citizen 0753 584111)

Inkjet

Citizen's contribution to the inkjet market is the ProJet, a professional-standard inkjet with a suitably high price tag to match its impressive specifications. The ProJet continues Citizen's long tradition of well-made printers and offers possibly the best paper handling facilities of any of the inkjets featured here. It comes as standard with a cut sheet feeder and will tidily stack the sheets once they've been fed through the printer.

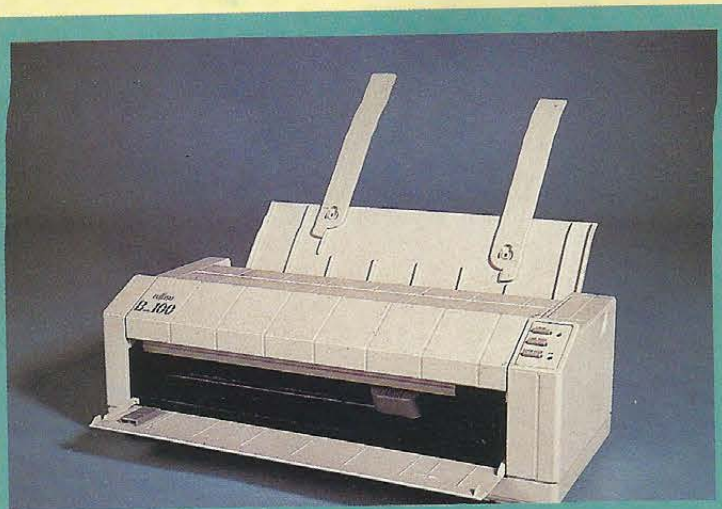
Undoubtedly the ProJet's greatest asset is its speed – running at an impressive 360 cps in draft mode and 120 cps in NLQ, the ProJet leaves the budget inkjets for dead even if it still lags a long way behind the Epson SQ-870. The range of fonts is pretty disappointing though – the Projet has just three NLQ fonts – but extra ones can be added.

Star SJ-48
£583 (Star UK 0494 471111)

Inkjet

It's not unusual for hardware manufacturers to license printer technology from other companies – Commodore, for example, has never made its own printers or monitors, although it has put the Commodore badge on various products. Although Star would probably never admit it, its SJ-48 bears more than a striking resemblance to Canon's BJ10ex (they both use exactly the same ink cartridges, for example). You can also clip the Canon BJ feeder on to the SJ-48.

There's not a lot you can say about the SJ-48 that doesn't also apply to the BJ-10ex (the forerunner of the BJ-10sx reviewed here) – both come with two NLQ fonts, they both offer EpsonQ emulation and they both print at a rate of 83 cps in NLQ mode. However, the latest version of the Canon BJ-10 is still a better bet, especially when you compare prices.



Fujitsu Breeze 100
£349 (Fujitsu 081-573 4444)

Inkjet

Fujitsu doesn't just make great dot matrix printers – it also does a particularly nice line in inkjet printers and here's one in the shape of the new Breeze 100, or just plain B100 to its many friends. The B100 is a dinky little printer that, although lacking the solid feel of the Epson SQ-870, produces some very impressive printouts. Boasting a 300 dpi resolution and support for Hewlett Packard's DeskJet standard, which is supported by Workbench, the B100 is easy to set up and use.

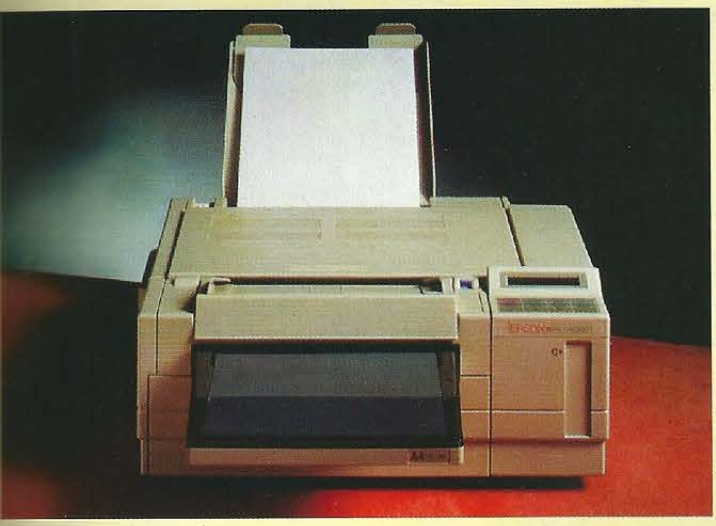
The B100 offers three NLQ fonts – Courier, Times Nordic and Letter Gothic – in a number of different sizes and styles. Coupled with its 8K print buffer, the B100 turns in consistent times of 160 cps in draft mode and an impressive 80 cps in NLQ mode. If it was a little cheaper, Fujitsu would be on to a winner.

Ricoh LP1200
£820 (Silica 081-309 1111)

Laser

Ricoh's LP1200 laser printer caused quite a stir in the Amiga market when it was launched late last year. This is hardly surprising when you consider that it offers the sort of specifications that would only have previously been found in a laser printer costing something in the region of £1,500.

Unlike most lasers, the LP1200 comes as standard with 2Mb of page memory which is more than enough to hold a 300 dpi A4 printout from *ProPage*. Print resolution is a very impressive 400 dpi (100 more than most lasers) that can be accessed using JAM's *StudioPrint* software. The LP1200 also offers six very useable fonts. These features, combined with the excellent price, make the LP1200 one of the best laser printers available for the Amiga.



Epson EPL-4000
£799 (Epson UK Ltd 0442 61144)

Laser

Epson's laser printer offering is the EPL-4000, a very impressive printer at a reasonable price. Although the basic EPL-4000 only comes with 512K of memory (enough for text printouts but little else), it can be upgraded to five megabytes using inexpensive RAM cards. Bringing the EPL-4000 up to the same spec as the Ricoh will cost you an extra £170 though, so bear this in mind before you buy.

There is also a postscript emulation option available for the EPL-4000 for an extra £500. This gives you an additional 35 fonts (the EPL-4000 comes with four) as well as full compatibility with the industry standard DTP page description language. If postscript isn't needed, then the EPL-4000 can still be driven using HP LaserJet and HPGL/2 drivers.

Oki OL-400e
£499 (Oki 0800 525 585)

LED

If you want laser quality without paying laser prices then Oki's OL-400e is for you. Instead of an expensive laser mechanism, the OL-400e uses cheaper LED (Light Emitting Diode) technology. Although it's not as precise as a laser, the difference in print quality is negligible. What's more, LED printers are much cheaper to run than lasers.

Based on the original OL-400 that achieved a Gold award in *Amiga Format* 43, the OL-400e uses a compact case design that takes up considerably less desk space than any of the other lasers. The range of fonts is a little limited – the OL-400e comes with just four fonts – although extra ones can be added with font cards.

Star LaserPrinter 5
£849 (Star UK 0494 471111)

Laser

Following on from the success of its LaserPrinter 4 series, Star has launched a new range of lasers called – not surprisingly – the LaserPrinter 5 series. Although the name may not inspire, both the design, which is very hi-tech, and the specifications are impressive.

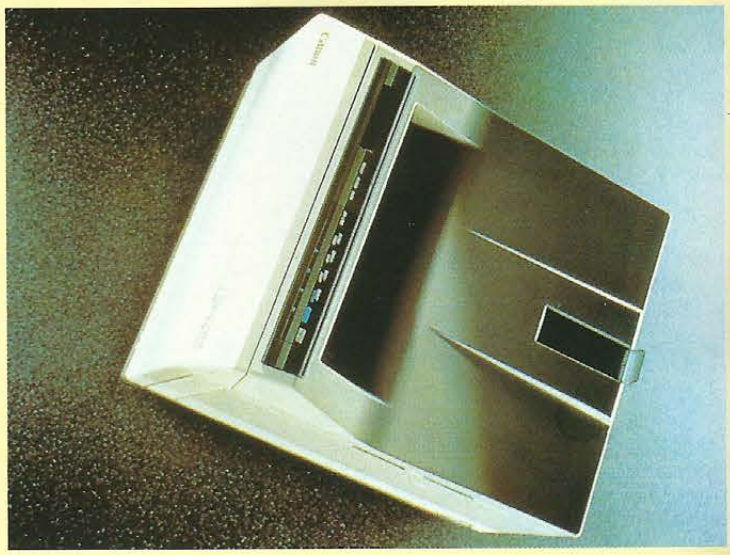
How's this for a specification – 512k of RAM as standard expandable to 4.5 Mb (you really do need at least 2 Mb), five pages per minute, 14 resident fonts and dual paper feed as standard. Surprisingly though, the laser is still based around the rather aging HP LaserJet 2 language which (in these days of LaserJet 4 printers) is rather a let down. Despite the flash new design, the LS5 is still something of a missed opportunity.

Canon LBP-4 Plus
£1,175 (Canon UK 081-773 3173)

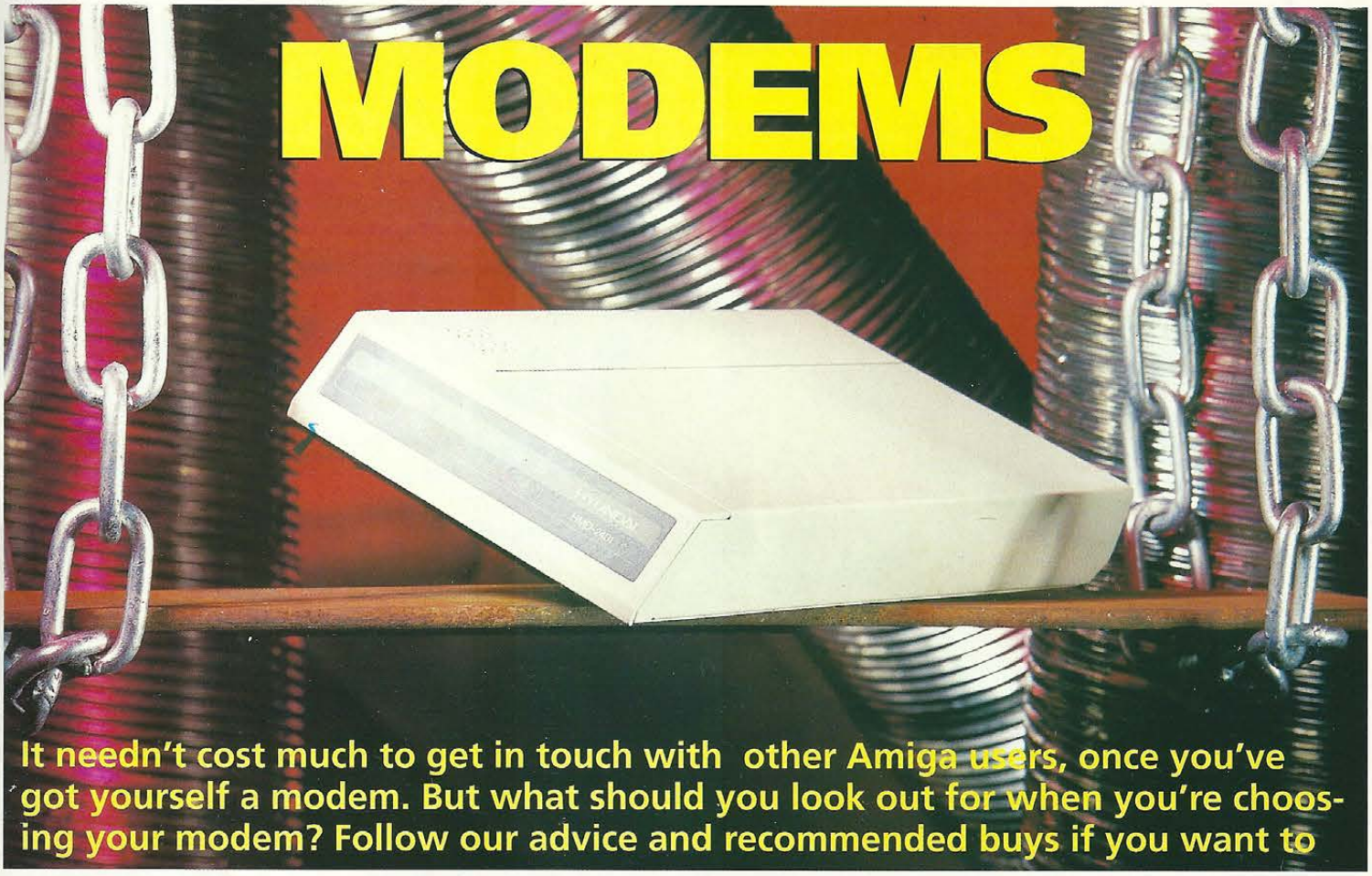
Laser

This is the latest addition to Canon's range of laser printers and boasts perhaps the best design and build quality of all the lasers included here. In fact the LBP is a great little printer.

It offers a range of emulation modes including EpsonQ, IBM ProPrinter, Diablo and Canon's own CaPSL language which is similar to the HP LaserJet language. Although Hewlett Packard support is a surprising omission, Canon does supply an Amiga printer driver for the LBP, so getting up and running is absolute child's play. Print quality is astounding, thanks to Canon's print enhancement technology. The LBP consistently produces some of the best printouts obtainable from any laser printer.



MODEMS



It needn't cost much to get in touch with other Amiga users, once you've got yourself a modem. But what should you look out for when you're choosing your modem? Follow our advice and recommended buys if you want to

Computing has always been perceived as a rather solitary activity, but it needn't be if you buy yourself a modem. These unobtrusive boxes enable you to use your Amiga to communicate with other computers (not just other Amigas) using the telephone network. And, when used in conjunction with communications software, you can also transmit and receive software down the phone lines without having to wait for the postie to drop that Jiffy bag through your letterbox.

Modems are devices that translate the digital information that your Amiga understands into audible pulses that can be transmitted down a phone line. Or, as the techies would say, a modem modulates a digital signal into an audio signal – hence the term modem (short for MOdulator DEModulator). While all modems perform basically the same function, some do offer a variety of extra options that can enhance your comms (communications) sessions – error correction and compression being just two.

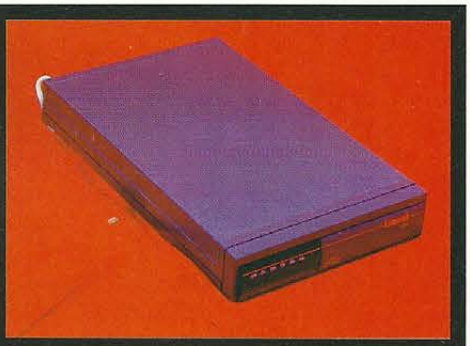
Most modems offer a range of baud rates. These baud rates essentially indicate the speed of data transfer; the faster the baud rate, the faster the modem is able to transmit and receive information. This is worth noting because the higher the baud rate, the larger the saving on your phone bill (yes, BT will still charge you for telephone calls even if it is your Amiga that is making those calls). Modem manufacturers designate the speed of a modem using a variety of different codes that are as follows:

V21	**300 baud**
V22	**1200 baud**
V23	**1200/75 split baud**
V22BIS	**2400 baud**
V32	**9600 baud**
V32BIS	**14400 baud**
HST	**14400 baud (not V32BIS compatible)**

Most people buy modems for the sole purpose of contacting a Bulletin Board Service (better known as a BBS). This is a computer that is permanently connected to a phone line (or several phone lines) via a modem. The owner of that computer, the Sysop (pronounced 'sissop'), has set up their computer to act as a sort of meeting place for computer owners with modems.

You should be aware, though, that not all Bulletin Boards support the speeds detailed above. Obviously for your modem to receive or transmit information at its top speed, it must be talking to a modem that is also capable of those speeds. If you contact a BBS that only supports a maximum baud rate of 2400, then your 14400 modem won't be able to run at its full speed. Quite a few V32BIS boards are springing up, but it's wise to get a modem that offers error correction because crackly phone lines can cause havoc at higher speeds.

Buying a modem is only half the story, though. Before you can get online, you will also need communications software to drive your modem and interpret what you type in. Many modem manufacturers include comms software with their modems but if they don't, it's a good idea to look at the Public Domain because PD libraries have cheap programs that are often better than their commercial counterparts. It's far more important to get flexible, functional software than a modem with all the bells and whistles. Check out the PD programs *JRComm*



Pace Linnet 24
£175
(Silica 081 309 1111)

Pace's cheapest offering to Amiga owners is the Linnet 24, a V22BIS modem that looks identical to the more expensive Linnet Quad modem. The only real difference between the Linnet 24 and the Quad is the Linnet's lack of error correction, making it identical in specification to the much cheaper Amstrad SM2400. The Linnet 24 has a maximum transfer speed of 2400 baud with no error correction or compression hardware to push those bytes through a bit faster.

There's nothing wrong with the Linnet 24 other than its price. If Pace were to drop this to a level closer to the Amstrad, it would be an attractive modem for first-time buyers.

Supra Fax Modem V32BIS
£269
(Power 0234 843388)

If you want the ultimate in modem technology, then look no further than Supra's brilliant little Fax Modem V32BIS. As its name suggests, this is capable of not only connecting with Bulletin Boards, but it also doubles up as a fax machine when used with the appropriate fax software.

The Supra Fax is capable of sending and receiving information at the very impressive rate of 14400 baud. By using the V42BIS protocol this can be increased by a theoretical 400 per cent. If your budget can stretch this far, then you'll find the Supra Fax modem V32BIS to be an absolute dream.

Amstrad SM2400
£125
(CentreSoft 021-625 3388)

Although its specifications don't seem anything out of the ordinary, the SM2400's greatest asset is its very low price, making it an ideal choice for the comms beginner. With a transfer speeds up to 2400 baud, the SM2400 is by no means fast, but it's one of the easiest to set up and use of all the modems included here.

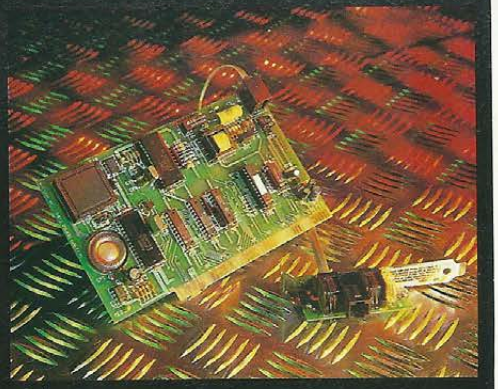
The SM2400 really is starting to show its age these days due to the lack of both error correction and compression. But, if you'd like to try out this comms lark without investing a small fortune then it's a good bet. A reliable modem at a good price.

Supra 9600
£245
(Power 0234 843388)

Following hot on the heels of its big brother, the Fax Modem V32Bis, comes the Supra 9600, a smashing little modem that, although not quite as fast or powerful as its big brother, can still hold its head up high with the best of 'em.

It offers a full range of speeds up to 9600 baud but, when used it conjunction with its built-in compression hardware, the Supra 9600 is theoretically capable of pushing and pulling data down a phone line at a rate of 38400 bps. A very capable modem at a good price.

Supra 2400zi
£125
(Power 0234 843388)



If desk space is starting to get a bit tight and you're lucky enough to own an Amiga capable of handling Zorro cards (an A2000 or A4000, for example), then you may well want to check out the Supra 2400zi. This is more suitable for A1500 owners because it fits internally. It has a maximum transfer speed of 2400 baud but doesn't offer error correction or compression.

The great thing about the 2400zi is that, because it doesn't tie up the serial port, you can plug in several 2400zi's to the same Amiga and run them off separate phone lines. If you want to run your own BBS but can't face having to fork out for a multi-serial card (a board that enables you to connect more than one modem) then the 2400zi is worth considering.

Supra Fax Modem Plus
£139
(Power 0234 843388)

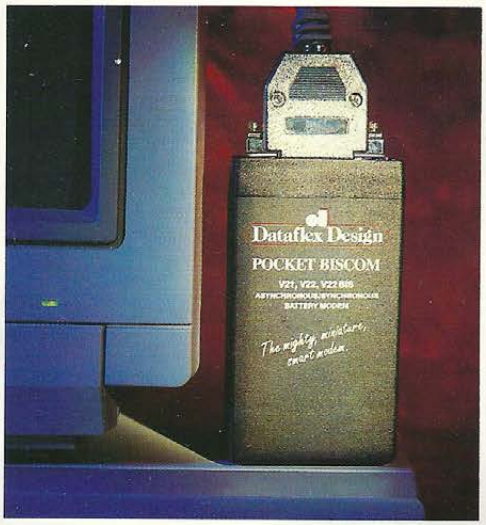
The Supra Fax Modem Plus is a 2400 baud modem that is also capable of sending and receiving fax transmissions when used with the correct software. Although the modem is restricted to a maximum speed of 2400 baud, it does have the added benefit of both V42BIS and MNP level 5 error correction, making your comms sessions that bit more trouble free.

Add to this a very good standard of both design and build quality and it's easy to see why Supra modems are so popular. There are plenty of other budget modems available, but the Supra Fax Modem Plus leaves them all for dead.

Hyundai HMD2401
£99
(Personics 0252 311332)

Unlike the Supra range of modems, the Hyundai HMD2401 was never designed or even marketed as an Amiga modem, but thanks to the wonders of RS232 (the Amiga's serial connector), the modem will work with the Amiga. It doesn't have a British-style three-pin power plug, so an adaptor is supplied to mate the Euro-style connector to the British mains.

The HMD2401 certainly isn't a hi-tech, hi-spec Hyundai. It has a maximum transfer rate of 2400 baud with no extras such as error correction or compression. For beginners, it's a good choice.



Pocket Biscom
£290
(Daytona Ltd 0494 474799)

The prize for smallest modem has to go to the Pocket Biscom, a modem that is only a little bigger than a packet of kingsize cigarettes. The Pocket Biscom comes with a European two-pin power connector, so an adaptor will be required.

The Pocket Biscom's performance is nothing to write home about with a maximum speed of 2400 baud, it's not going to win any awards in the modem speed stakes. Really, the question you should be asking yourself before you buy is, why do I want a 2400 baud modem when you can get hold of a 14400 V32BIS Supra for £30 less?

Pace UltraLink Quad
£469
(Pace 0274 532000)

Despite being rather tacky in both design and build quality, the Pace UltraLink Quad has an impressive maximum throughput of 9600 baud with error correction and both MNP-5 and CCITT V42 LAPM compression with a compression rate of 400 per cent. To make use of these features the UltraLink Quad has to be connected to another modem or BBS capable of handling the same sort of compression, but it's a nice addition nonetheless.

The only real spanner in the UltraLink Quad's works is its high price. When you stop to consider that you can buy a faster Supra Fax Modem V32BIS for about £140 less, the UltraLink Quad becomes a far less attractive proposition.

BILL OF RIGHTS

Any equipment that can be connected to the public telephone network must be approved by the British Approval Board for Telecommunications (BABT), on behalf of the president of the board of trade to meet requirements set down by the British Standards Institute (BSI).

We asked Barry Cartman, the assistant director of the BABT, exactly what the position is with modems regarding BABT approval.

He told us that if a modem is BABT approved it should carry a sticker with a green circle on it. If it is not approved it should still carry a sticker, but one with a red triangle on it. It is an offence under the 1984 Telecommunication Act to use non- approved equipment on the public telephone network.

It is also illegal to sell a modem that does not carry one or other of the stickers. However, it is not an offence to buy a modem that is not BABT approved, as this could be used on a private network.

BABT approval is based on the criteria that the modem is compatible with the network in the UK, that it isn't going to cause any harm or injury to the user, other users of the network or any network employees. BABT testers also satisfy themselves that the modem will not dial wrong numbers and that you will be charged the correct cost for the length of your call.

Apart from testing modems BABT inspectors also visit the place of manufacture to make sure that the modem they have tested is a true representation and has not been doctored to meet the test requirements.

Although it is perfectly possible to buy a non-approved modem, it is illegal to use it on the public network, and if an operator discovers that you are using a non-approved modem they have an obligation to either disconnect you or persuade you to stop using the modem.

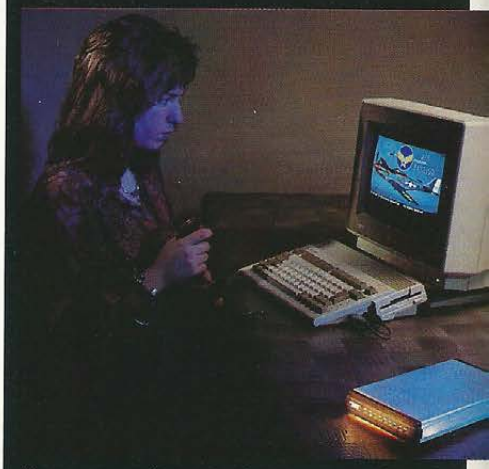
THE GOOD BBS GUIDE

There are literally hundreds of Bulletin Board Services scattered throughout the UK that offer help and information on just about any subject you dare to mention ranging from computers and music to medical matters and bodybuilding. Although most BBSs aren't Amiga specific, there are many that do have something to offer Amiga owners. There are even BBSs that cater solely for Amiga owners. They offer an unrivalled range of freebee software just waiting to be downloaded to your Amiga. Here's a list of what we consider to be the best boards for Amiga owners.

01 For Amiga	**071 377 1358**
The End Zone	**0524 752245**
061 For Amiga	**061 799 4922**
Amiga Pond	**051 547 3245**
Kickstart Amiga	**0954 789993**
Forever Amiga	**0763 244591**
Cheam Amiga	**081 644 8714**
CIX (Subscription only)	**081 390 1244**

Pace Linnet Quad
£222
(Silica 081-309 1111)

The Linnet Quad offers pretty much the same facilities as the Hyundai HMD2401 and the Amstrad 2400 modems but for a lot more money. The Linnet Quad is only capable of a maximum baud rate of 2400 although it does also offer V42 and MNP levels 4 and 5 error correction. The design is worse than the Ultra Link too, making it an even less attractive buy. On the plus side all of the Pace modems are well-tested and therefore reliable. You tend to get what you pay for.



If you use non-approved modems on the public network, you're breaking the law. Punk.

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NEW MEGA A1200!

Due to the shortage of A4000 / 030 INDI are nowoffering a mega A1200 configuration. Just look at this spec A1200 * 4 MEG RAM * 80 Meg HD * M1230 XA 50 Meg HZ .Runs @ 1.5 times faster than a standard A4000 / 030. Now look at the price **£939.99** (save £100 with A500 trade in) Credit terms available.

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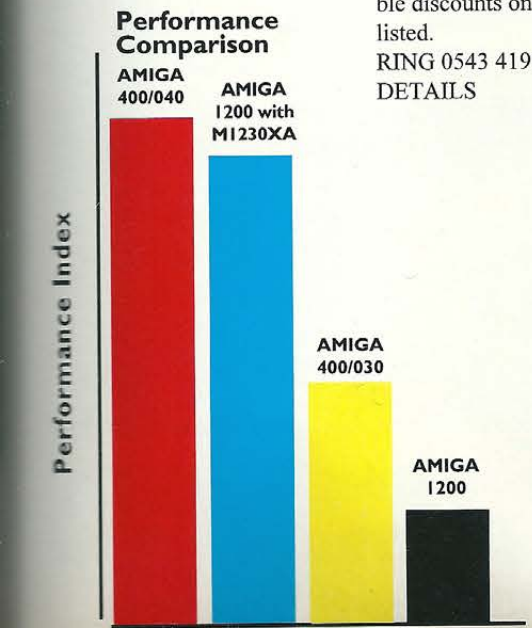


INDI LAUNCH NEW MULTI MEDIA CLUB

Indi have just launched **"The Indi Multi media Club"**. Members will be offered a complete range of Amiga Software covering Professional, Games, Utilities, CDTV, and CD Audio and video and selected PD.

Membership costs £10 per annum with a free offer on joining. Members will then receive a monthly catalogue giving incredible discounts on all products listed.

RING 0543 419999 FOR MORE DETAILS

DMA ENSURES HIGHEST PRACTICE

As with most industries, the UK's personal computer industry has its share of cowboys operating in the mail order sector and at the receiving end a line up of despairing consumers who have suffered at their hands.

A personal computer is a sophisticated and expensive item and provided the purchaser is dealing with a reputable and accredited supplier, buying a computer by mail order can be a perfectly safe and cost effective exercise. The Direct Marketing Association (DMA) was set up in April 92 to set and maintain high standards for the sake of the industry and society at large, and to ensure that we can continue to regulate our own activities on the basis of proper professional responsibility.

Membership of the DMA is not conferred lightly - it is a privilege which entails responsibilities, to the consumer as well as to the industry. The foundation for this must be good practice. DMA members are required to abide by the highest standards as laid down in the DMA's code, enforced on members by The Authority of the DMA a separate body with an independent Chairman, and which is an assurance of vigorous self - regulation and professional responsibility.

DMA members also agree, as a condition of membership, to abide by The British Code of Advertising Practice and The British Code of Sales Promotion Practice: to apply the Mailing Preference Service file when appropriate: and to subscribe to the Advertising Standards Board of Finance (ASBOF) and to the Mailing Standards Levy as applicable.

The DMA symbol can only be used by members. Printed on stationary, advertising and other promotional material it demonstrates that these companies conform to the Association's high standards and are subject to the DMA's Code of Practice, thus enhancing the companies credibility with customers, suppliers and of greatest importance, the consumer.

Since the symbol was introduced last June, it has become synonymous with quality , professionalism and and responsibility. While it cannot be shown in any way which will become a sign of best industry practice and of strict adherence to DMA codes of conduct. The symbol represents authority for members and reassurance for consumers. It has been a high valued mark of confidence signifying to the consumer the truly professional edge of the industry.

Alison Slan

Alison Slan
(Director of Public Relations,DMA)

Hi,

Commodores decision to reduce the price of the Amiga 600 took everyone by surprise and really positions the A600 as the perfect entry level computer .

Of course the problem with new technology is that something has to be left behind and in Commodore case it's the poor old 500.

Now Indi tell me that Commodore are taking back all old A500's when you buy a new state of the art Amiga 1200. So dust off that old A500 make sure that it is in full working order and you still have the mouse, modulator, manuals and power pack. Give Indi a call on **0543 419999** and ask for **"Amiga 500 Trade in Desk"**, Indi will send Securicor to your home and pick up your A500 at their cost and then deliver a superb new Amiga 1200 with **£100 off** the advertised price. Remember this is a limited offer What's a PCMCIA slot I ask? Indi explained to me that its Commodores way of ensuring that both the Amiga 600 and 1200 can remain future proof. Credit card style memory cards are already available from Indi but thats just the beginning, faxes, modems and network cards are on their way and who knows what else. If you need to know more about PCMCIA why not drop me a line.

On the subject of letters I have been swamped. It's absolutely great and I promise each one will be responded to and get a signed photograph so keep them coming! Last months winning letter came from **Adrian Simpson of County Down** Northern Ireland who gave a very well informed comparison between Amiga and less useful consoles.

I was absolutely knocked out with all the details he sent me concerning the music capabilities of the Amiga. Adrians letter was far too detailed to reprint but a big thankyou to him for writing it. Adrian the prize is on its way.

WHAT DOES THIS SYMBOL MEAN

Finally I received a few important letters asking what is the **DMA** and why is it important to consumers that Indi is part of it. On thais page you will find a letter from the Chairman of the DMA, it's well worth a read.

Jakki Brambles

DEFERRED CREDIT ON ALL ORDERS OVER £200.
*PAY 10% NOW AND NOTHING MORE FOR 3 MONTH

indi DIRECT MAIL

DIRECT MARKETING ASSOCIATION

CUSTOMER CHARTER

INDI Direct Mail is original and very exciting. Before you buy mail order you must first be confident that you will receive the product you've ordered and that the supplier will be still be there in the future, should you need them.

A mail order purchase from INDI is a safe and secure decision, and here's why.
INDI is a wholly owned subsidiary of a public company now in it's tenth year of trading and specialising in the supply of computer products.

With a turnover approaching £30 million per annum, we have the resources and the purchasing power to offer you the best deals, deliver them next day nationwide and always be around when you need us.

SALES AND SUPPORT

The INDI sales team have been trained to take your order with the utmost care and efficiency. All stock offered for sake is held in stock, centrally at our group ware house complex and is available for next day delivery, direct to your home or business. If at any time we are out of stock your money will not be banked until the product is available (a point worth checking should you be tempted to purchase elsewhere)

General information regarding product is available from our sales team, however technical support is always on hand should you need assistance.

All prices quoted are inclusive of VAT.

INDI TELESALES
TEL 0543 419999 FAX 0543 418079

CREDIT FACILITIES

INDI are now able to offer competitive credit facilities on all orders over £200. All credit facilities are subject to status and applicants must be over the age of 18.
If you would like a quote simply call our our sales line where acceptance can normally be notified within the hour. We are also able to offer Credit Insurance to cover repayments in the event of sickness or unemployment.

AMOUNT* OF CREDIT	12 MONTHS		24 MONTHS		36 MONTHS	
	MONTHLY PYMNT'S	TOTAL PAYABLE	MONTHLY PYMNTS	TOTAL PAYABLE	MONTHLY PAYABLE	TOTAL PYMNTS
200	£22.00	£264.00	£12.00	£298.32	£9.31	£335.63
500	£54.99	£659.88	£31.06	£745.44	£23.27	£837.72
1000	£109.98	£1319.76	£62.13	£1491.12	£46.54	£1675.44

APR 29.9% WRITTEN QUOTATIONS AVAILABLE ON REQUEST
*After deposit paid

AFTER SALES AND SPECIALIST SERVICE

All products are guaranteed for 12 months. Some products carry a 12 months at home service and repair guarantee (where indicated). In the unlikely event that any product purchased from INDI arrives at your home faulty, we will collect from your home and replace the product completely free of charge.

As part of our policy of continual product development and refinement, we reserve the right to change specifications of products advertised. Please confirm current specifications at the time of ordering.

Prices are valid for month of publication only.

AMIGA A1200

ALL NEW 32 - BIT AMIGA

INDI ADDED VALUE FREE

COMIC RELIEF PACK
The event may be over but the fund raising still goes on. If you're looking for the l Amiga technology then this is the starter pack for you. Based around the outs A1200, this pack also gives you sleepwalker, a most addictive platform game from software. You'll be pleased to know that every one of these packs purchase another £10 for Comic Relief.

A1200 STANDARD FEATURES.
* 68020 Processor .* PCMCIA Slot. * 2MB Chip RAM. * 3.5" I Drive * AA Chipset. * Built in TV modulator. * Alpha numeric keypad. *12 Months at home maintenance.

INDI PRICE
£379.99 or from **£14.47*** per month
*(Credit price based on 36 monthly payments APR 29.8%. Total repayment £520.92 and 90 day deferred payments.

A1200 60 MEG HD INDI PRICE £569.99
A1200 80 MEG HD INDI PRICE £599.99
A1200 120 MEG HD INDI PRICE £679.99

INDI A1200 ACCESSORY PACKS
Pack Contains:
* International Games Challenge. * The Cool Croc.
* Paradroid 90. * Zapsac and Zappo T - shirt.

INDI PRICE £19.99

OFFICIAL A1200 HD SYSTEMS
The Amiga 1200 supplied by Indi Direct Mail now includes the official (legal) Commodore installation disk and hard drive utility manual. Indi are proud to be an official supplier of Amiga 1200 Hard Drive systems, that include the official software, documentation and on - site warranty.

A500 TRADE IN!!
£100 for your old Amiga 500 against any A1200 from Indi Direct. Must be in full working order, complete with mouse, manuals and P.S.U

60 / 80 Hard Disk upgrades available on any A1200. Upgrade includes full Wang warranty on A1200 and Hard Disks. Phone for a quote.

AMIGA A4000

It's here - The new Amiga 4000/030
The NEW Amiga 4000/030 features a EC68030 processor running at an incredible 25Mhz, and upgradable at a later date to a faster processor. The 4000/030 has a powerful 4 Mb of 32 - bit RAM (2Mb chip & 2 Mb fast) expandable to 18 Mb using industry standard 32 - bit Simms module. In line with the Amiga Flagship 4000/040 the 4000/030 features the new AGA graphics chipset, giving you a massive pallet of 16.8 million colours. A range of hard drive options are available from 80 - 240 Mb and includes a SCSI option.

4000/030 80 Mb HD INDI PRICE £939.99
Other Drive Options
4000/030 120 Mb HD INDI PRICE £1039.99
4000/030 240 Mb HD (exclusive to INDI)
Phone for price.
4000/030 120 Mb SCSI HD (exclusive to INDI)
Phone for price
A full range of approved upgrades are available for the 4000/030, including additional memory modules, hard drives, PC bridge boards, FPU's (68881 &68882)and the 24 - bit Opal Vision graphics and video system

NEW MONITOR RANGE

THE NEW DUAL SYNC1942 Monitors have been specially designed for the New Amiga 1200 and 4000 computers. Both monitors feature built - in stereo speakers.

INDI PRICE
1940 Monitor £279.99
14 inch screen size - 0.39 mm dot matrix

INDI PRICE
1942 Monitor £379.99
14 inch screen size - 0.28 mm dot matrix

Parnet Adaptor for CDTV
Connect a CDTV player to any Amiga, and access th of CD - ROM software.The Parnet interface and s will allow the Amiga CDTV to be used as a CD drive withe any Amiga and will give any Amiga owne to the vast range of CDTV software currently availab The CDTV player offers excellent value for mone compared with a standard CD - ROM drive and i Most CD - ROM drives will set you back over £40 CDTV will cost you less than £300 and will play aud in addition to CD - ROM / CDTV disks your Amig face cable and PD disk with driver software for your player.

INDI PRICE £39.
A4000/030 PLUS CDTV + 1960 MONIT
INDI PRICE £1599.99
CDTV + PARNET.
INDI PRICE £329.99

AMIGA A600 PRICE CRASH

THE WILD THE WEIRD AND THE WICKED A600 is an ideal starter pack containing a considered mix of software, making the most of the Amigas capabilities.

PACK CONTAINS:
* **A600 Single Drive**
* **Built in TV Modulator**
* **1 Mb Memory**
* **Pushover: Grandprix**
* **Silly Putty: Deluxe Paint III**
* **Mouse and Manuals**

NEW LOW LOW PRICES
~~£289.99~~
£215.99

A600 - SD A single drive Amiga for those of you requiring a basic A600 at a very co petitive price.
PACK INCLUDES: A600 single drive, built in TV modulator, 1 Mb memory. 12 Mont home service
INDI VALUE ADDED FREE * Kick Off 2 * Pipemania * Space Ace * Populous * Microswitched Joystick

INDI PRICE ~~£239.99~~ **£189.99**

A600 EPIC PACK (40 Mb HD) PACK INCLUDES:
A600 Hard Disks (40Mb) * **1 Mb Memory** * **Epic** * **Rome** * Myth * Trivia Pursuit * Amiga Text * Deluxe Paint III * 12 Months at home service.
PLUS INDI ACCESSORIES PACK AS LISTED COMES WITH AN EXTRA 512K RAM EXPANSION FREE.

INDI PRICE ~~£395.99~~ **£379.99**

INDI A600 ACCESSORY PACK
* Microswitched Joystick * Lockable Disk Box * Disk Wallet * 10 Blank Disks * Kick Off 2 * Pipemania * Space Ace * Populous * Zapsac Carry Case * Zapp T - Shirt.

INDI PRICE £26.99

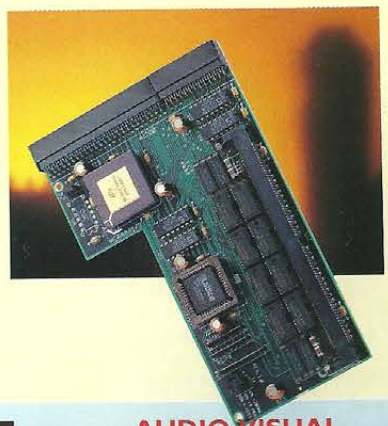
WANT THE BEST IN PROFESSIONAL AMIGA. WHY NOT TAKE ADVANTAGE OF THE CREDIT DEALS AVAILABLE (SUBJECT TO STATUS). CREDIT AVAILABLE ON 6,12, 18, 24, 36 MONTHS. WHY NOT RING NOW FOR A QUOTE. SAME DAY RESPONSE.

AMIGA RECOMMENDED PERIPHERALS & ACCESSORIES

NEW FROM MICROBOTICS!!!. M1230XA ACCELERATOR LAUNCH!!

Microbotics beats the competition in price/ performance/ features and configurations. INDI is very pleased to announce the availability of the new 68030 accelerator product for the A1200: the microbotics M1230 XA (call it the "XA" for short). 50 Mhz as standard! Huge 128 MB memory design is standard (the biggest memory space in any A1200 peripheral) just look at these specifications and prices!

M1230 XA W/40 MHZ EC 030 OMB **INDI PRICE £299.99**
M1230 XA W/40 MHZ EC 030 4MB **INDI PRICE £399.99**
M1230 XA W/40 MHZ EC 030 8MB **INDI PRICE £499.99**
M1230 XA W/50 MHZ MMU 030 0MB **INDI PRICE £399.99**
M1230 XA W/50 MHZ MMU 030 4MB **INDI PRICE £499.99**
M1230 XA W/50 MHZ MMU 030 8MB **INDI PRICE £599.99**



MBX1200.

The original and best floating point unit and mem upgrade for the Amiga A1200. Available with 0,4 or 8 M 32 bit Fast RAM and a choice of floating point units. complete with real time clock (RTC)

1MBX1200Z 6881 14 MHZ 0MB **INDI PRICE £149.00**
MBX1200Z 6881 14 MHZ 4MB **INDI PRICE £299.00**
MBX1200Z 6881 14 MHZ 8MB **INDI PRICE £399.00**
MBX1200Z 6882 25 MHZ 0MB **INDI PRICE £199.00**
MBX1200Z 6882 25 MHZ 4MB **INDI PRICE £349.00**
MBX1200Z 6882 25 MHZ 8MB **INDI PRICE £429.00**
MBX1200Z 6882 50 MHZ 0 MB **INDI PRICE £399.00**
MBX1200Z 6882 50 MHZ 4MB **INDI PRICE £499.00**
MBX1200Z 6882 50 MHZ 8MB **INDI PRICE £599.00**

MEMORY UPGRADES AND ACCESSORIES

M501 The original 0.5MB battery backed upgrade for the A500.

INDI PRICE **£29.99**

M502 The original H1 MB battery backed upgrade for the A500.

INDI PRICE **£49.99**

8 Up memory board. Designed for the A1500/ A2000. Memory upgradeable to 2/ 4 or 8MB

INDI PRICE **£69.99**

Hard frame suitable for A1500/ A2000. Allows for the interface of a SCSI hard drive.

INDI PRICE **£110.99**

AUDIO VISUAL

MEGAMIX. Low cost, hi spec digital effects cartridge plugs into the printer port of the Amiga. Allows stereo sampling from almost any musical source.
INDI PRICE £29.99

VIDI AMIGA 12. The ultimate low cost colour digitiser for the Amiga. "The best value full colour digitiser on the market" AMIGA FORMAT.
INDI PRICE £75.99

TAKE 2. Animation package is a must foe computer artists and enthusiasts of all ages. As used in Rolf Harris Cartoon Club.
INDI PRICE £37.99

ROCTEC ROCGEN
Entry level Genlock for all Ami Record stunning Amiga Graphi standard video or overlay text graphics onto a video signal.
INDI PRICE £69.99

ROCTEC ROCGEN PLUS.
As above but with extra features such as tinting and signal inversion. Allows for real time editing of graphics. Compa with all Amigas.
INDI PRICE £133.99

ROCTEC ROCKEY.
The ultimate accessory for Amiga / Video fans. Separate controls to chroma key on any colour.
INDI PRICE£249.99

PYRAMID SCANNER.
A total hand held scanning package for all Amigas comple with interface and software.(mono)
INDI PRICE £99.99

AMIGA PERIPHERALS

2MB SMARTCARD. The original and still the only fully PCMCIA compatible memory card for A600/ A1200.Comes with lifetime guarantee. Beware of cheap imitations.
INDI PRICE £129.99

4MB SMARTCARD. Same as above but maximum 4MB.
INDI PRICE £199.99

ZAPPO 601.
Trapdoor upgrade for the A600. 1MB with RTC.
INDI PRICE £49.99

ZAPPO 601 INC. As above only 512K no clock· **INDI PRICE £29.99**

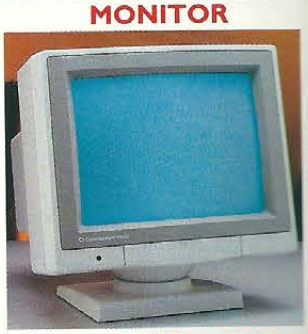
DISK DRIVES

ZAPPO EXTERNAL FLOPPY
You've seen all the reviews on this popular and affordable second Amiga drive. Compatible with all Amigas.

INDI PRICE **£59.99**

" Quality: 9 out of10. " Exceptional value for money. AMIGA COMPUTING JAN 93

MONITOR



1084ST MONITOR.
Commodores original and best selling colour stereo mo Now includes swivel and tilt stand for total ease of u

INDI PRICE **£189.99**

(£179.99 if purchased with A600 / A1200 / A15

Third Party OpalVision Software

(Available now or coming soon)

Aladdin 4D, Amilink Video Editing Products, Art Department Professional, Caligari 24, Cine Morph,Fractal Pro, Image FX, Imagemaster, Imagine, Michtron Entertainment Products Morph Plus, Real 3D, Scala Multi media 200, Texture City Image Libraries, 3D Professional, Transporter, Tv Paint, Vista Pro, Video

The NEW OPAL VISION system (Rev.2)

The amazing Opalvision 24 - bit graphics board and software suite has been updated and is now even better value for money.

The software suite now includes:

Opal Paint V2.0 - Now includes full magic wand implementation and Alpha Channel that allows photo compositing with selectable levels on a pixel by pixel basis.The new Chrominance effect allows absolute, real time control of image contrast, brilliance and re - mapping of colours.

Opal AnimMATE V2.0 - ofering real time play back of animations created by ray tracers, landscape generators, morphers and all other 24 - Bit software.

Opal Hotkey V2.0 - Display OpalVision graphics anytime with key combinations.

Opal Presents - Comprehensive, icon - driven presentation package.

Special Limited off er

IMAGINE V2.0 for only **£59.99** when purchased with OPALVISION

Imagine 3D is the most popular 3D rendering software, that now supports OpalVision.This is a full version that would cost £300 if purchaed separately.

"Quite simply, it's a spectacular product - *Amiga Computing*

"Undoubtedly the finest, most professional paint program to arrive on the Amiga" - *Amiga Format*

"Professonal quality at this Price can't be turned away" - Amiga User International

"The verdict was unanimous - brilliant" - *Amiga Shopper*

INDI PRICE **£599.99**

OpalVision NEWS FLASH

At Last - OpalVision Upgrade Modules!

OpalVision Video Processor - Plugs into the OpalVision main adds a waelth of additional features * 24 Bit real - time fram from composite or S - Video. * Professional quality genlock *VLSI microcode processor "Roaster Cip" for Digital Video *Luninance & Chroma Keying * 256 - level "Alpha Channel" cy) key.Management Software

Full specification available on request

OpalVision Video Suite - An advanced external rack video and audio switching device with it's own internal comp 9 video and 10 audio inputs, 24 - Bit frame store and a host effects triggered manually or automatically.Full specification request

OpalVision Scan - Rate Convertor - For 31 Khz output of Amiga graphics, OpalVision images and any Pal or Time Base Correction adds to the list of professional features that simply plugs into the OpalVisionmain board.Full specifi on request

Amiga 4000 OpalVision Systems

Complete Amiga 4000 / OpalVision systems are available for applications

*Graphics/ Fine Artists * Multimedia * Videographers * A Desktop Publishing * Designers

We found the perfect printer in the KX - P2180 and KX - P2123 quiet printers.
We then considered that if you were going to buy a Panasonic printer you would probably need a quality word processing package to use with it. We found that too, with 'Wordworth' yet at a retail price of £129.99 we thought that might be a little too expensive on top of your printer purchase! So together with Panasonic we decided to give a copy of 'Wordworth' free with every Panasonic printer. How's that for added value?

Panasonic KX - P2180

***WORDWORTH COMPLETELY FREE! WITH PANASONIC QUIET PRINTERS.** The writers choice. The ultimate word processor for AMIGA computers. Wordworth is undoubtedly the ultimate word / document processor for the full range of AMIGA computers. The graphical nature of WORDWORTH makes producing documents faster and easier, with the enhanced printing fonts (including full Panasonic KX - P2180 and KX - P2123 colour printing support), Collins spell checker and thesaurus, no other word processor comes close. "Without doubt this is one of the best document processors for the AMIGA, Today" (Amiga Format)

NORMAL RRP £129.99 inc. VAT

The new Panasonic KX - P2180 9 -pin quiet printer. Produces crisp clear text in mono or in 7 glorious colours with new quiet technology. THe new KX - P2180 is typically 15dBa quieter in operation, than the competition.

INDI PRICE
£189.99

- **Fast Printing** Speeds 192 CPS NLQ
- **Colour Printing** 7 colour palette (blue, red, green, yellow, violet, magenta,black)
- **Quiet printing** Super quiet 45 - 48 dBa sound level (most matrix printers are typi cally in excess of 60 dBa)
- **6 Resident Fonts** Over 6,100 type styles using Courier Prestige, Bold PS, Roman, Script and Sans Serif Fonts.
- **3 Paper Paths** Paper handling from bottom, top and rear for total flexibility
- **1 Year Warranty** for total peace of mind

Panasonic KX - P2123

The new high performance Panasonic KX - P2123 24 pin. Quiet colour printer offers leading edge quiet printing technology at an affordable price

INDI PRICE
£239.99

- **Fast Printing Speeds** 192 CPS draft, 64 CPS LQ and 32 SLQ.
- **Colour Printing** 7 colour palette (blue, red, green, yellow, violet, magenta, black)
- **Quiet Printing** Super quiet 43.5 - 46 dBa sound level (most matrix printers are typically in excess of 60 dBa)
- **7 Resident Fonts** Over152,000 type styles using Super LQ, Courier Prestige, Bold PS, Roman, Script, and Sans Serif Fonts.
- **24PIN Diamond** Printhead High performance and high quality output
- **1 Year Warranty** for total peace of mind.

Panasonic LASER PRINTER

KX - P4410 LASER PRINTER

WORDWORTH COMPLETELY FREE!WITH PANASONIC LASER PRINTERS.
The writers choice. The ultimate word processor for AMIGA computers
NORMAL RRP £129.99 inc VAT

KX - P4430 LASER PRINTER

Once again INDI have joined together with Panasonic to offer all Amiga owners the most outstanding Laser Printer offer ever. We are now able to offer high quality, professional laser printing at affordable prices. We are also giving away a copy of Wordworth with every Panasonic Laser Printer purchased (RRP £129.99). Whether you are looking for a laser printer to handle word processing, DTP, presentation or complex graphic applications - the Panasonic range offers you the power to meet your requirements.

KXP - 4410

- 5 pages per minute
- 28 resident fonts
- Optional 2nd input bin(total printer capacity 2 x 200 sheets)
- Low running costs
- Parallel interface
- Optional memory expansion to 4.5 Mb (0.5 as standard)
- HP laserjet II Emulation

INDI PRICE
£499.99 inc. VAT
Imminent price increase.
This price while stocks last.

WORDWORTH COMPLETELY FREE WITH LASER PRINTERS

Panasonic 2 YEAR ON-SITE WARRANTY

KXP - 4430

- Satinprint (optimum resolution technology)*
- 5 Pages per minute
- HP Laserjet III Emulation, PCL 5
- 8 Scalable fonts & 28 bitmap functions
- Optional 2nd input bin (total print er capacity 2 x 200 sheets
- Optional memory expansion to 5.0 Mb (1 Mb as standard)

INDI PRICE
£699.99 inc. VAT
Imminent price increase.
This price while stocks last.

*(Satinprinters use optimum resolution technology to produce truly outstanding print quality. This software technique smooths away traditional jagged edges on curved characters and lines by varying the printed dot size

WORDWORTH COMPLETELY FREE WITH LASER PRINTERS

Panasonic PRINTER ACCESSORIES

1) PANASONIC AUTOMATIC SHEET FEEDER
Automatic sheet feeder for KXP 2180/ KXP 2123 holds 80 A4 sheets. **INDI PRICE £89.99**

2) PRINT DUST COVER
Specially tailored quality dust cover for Panasonic KXP 2180/ KXP 2123 printer. **INDI PRICE £8.99**

3) PRINTER STAND
2 piece printer stand. **INDI PRICE £9.99**

4) PAPER PACK
500 sheets quality A4 paper. **INDI PRICE £9.99**

5) CONTINUOUS PAPER
2000 sheets 1 part listing paper. **INDI PRICE £19.99**

6) PARALLEL PRINTER CABLE
To be used when connecting Amiga to Panasonic printers.
INDI PRICE £8.99 (£5.99 if purchased with a printer)

7) PANASONIC COLOUR RIBBON
Colour ribbon for KXP 2180/ KXP 2123.
INDI PRICE£18.99

8) PANASONIC BLACK RIBBON
Black ribbon for KXP 2180/ KXP 2123 **INDI PRICE £9.99**

SAVE £££'S ON THE FOLLOWING ACCESSORY PACKS

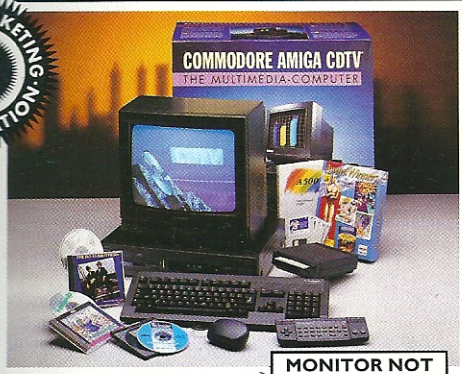
PACK 1
PANASONIC COLOUR RIBBON PACK
Contains 6 colour ribbons for the KXP 2123 RRP £119.99.
INDI PRICE £34.99 SAVE £30!!!

PACK 2
PANASONIC RIBBON PACK
Contains 2 black and 4 colour ribbons for KXP 2180/ KXP 2123.RRP £99.99.
INDI PRICE££69.99 SAVE £30!!!

PACK 3
PANASONIC DELUXE ACCESSORY PACK
Contains automatic sheet feeder, 2 black ribbons, 2 colour ribbons, 1 dust cover, 2 piece printer stand. RRP £169.99 **INDI PRICE £139.99** SAVE £30

12 MONTHS INTEREST FREE CREDIT AVAILABLE ON CDTV EXTERNAL HARD DISK SUBJECT TO STATUS. LOW INTEREST CREDIT AVAILABLE ON ALL ORDERS OVER £200

MIGA CDTV THE MULTIMEDIA COMPUTER TOTAL HOME



MONITOR NOT INCLUDED

ENTERTAINMENT SYSTEM

The problem with any new product is that it always takes time for everyone to realise its full potential.
CDTV is no exception and in our opinion everything we have read does a pretty poor job of explaining just what CDTV can do and why it is so exciting.

THE INDI GUIDE TO CDTV

IT'S A CDTV PLAYER - Yes, it will play all your Primal Scream, Paverotti, Pink Floyd and any other CD you care to mention in superb high quality stereo, with infra red remote control.

IT' AN AMIGA - Plug in the keyboard, switch on the external disk drive and the colossal range of inexpensive Amiga Software can be used on CDTV.

T'S A MULTIMEDIA SYSTEM - Just imagine, stereo sound, images and text all on screen. It asks a question, you respond, it responds - truly interactive! Each CD disk holds hundreds of megabytes of data with instant optical access. The whole of Hutchinsons encyclopeadia fits on to one disk. This interactive system is a unique aid for Education, Business or Leisure. The future is here!

CK CONTENTS AS STANDARD * Amiga CDTV Player * CDTV Keyboard * CDTV 1411 3.5" Disk Drive * CDTV Infra Red Remote Controller * CDTV Wired Mouse * CDTV Welcome Disk * Manuals * Fred Fish CDTV Disk

DI VALUE ADDED FREE * Lemmings CDTV (£34.99)
Blues Brothers (£12.99)
Pipemania, Populous, Kickoff 2, Space Ace.

INDI PRICE

PACK AS SHOWN £329.99

PRICE CRASH ~~£399.99~~

MULTI MEDIA PACK WITHOUT INDI VALUE ADDED £329.99

CDTV CONNECTS DIRECTLY TO YOUR TV SET

AMIGA CDTV ACCESSORIES

THE BRICK - ETTE

Just plug in the brick - ette and use any wired Amiga compatible joystick, mouse of trackball device on the Commodore CDTCV. The built - in 8 - bit Micro Processor gives the Brick - ette big smarts in a tiny package and makes it easy to use just plug into the remote port and it is ready to go with real time mouse or joystick movement on your CDTV. No loading of driver programs or software. No switches for mouse or joystick. Special settings (with Brick allow you to blast away with with three rapid fire modes & dual fire buttons. Comes complete with Commodore Micro switched joystick.

INDI EXCLUSIVE £49.99
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EXPAND YOUR HORIZONS

It's only a matter of time before you'll wish you had more memory on board your Amiga. But if you're not sure what you get for your money just follow our advice

One thing that is guaranteed in life is that no matter how much RAM your Amiga has, you'll end up wanting more. For those of you new to this computing lark, RAM (short for Random Access Memory) is your Amiga's memory and it is used to temporarily hold all the programs and data that you load into your machine. In this respect, RAM is your Amiga's workspace and the more workspace you have the more work it can do.

Back in the days of the first A500s, 512K of RAM was thought to be more than adequate for most users, but the increasing complexity of Amiga software has forced Commodore to up the stakes in the amount of memory that comes as standard with an Amiga. The latest home Amiga, the A1200, now comes with 2Mb of memory as standard – that's four times as much as the original A500. The new A4000-030 comes as standard with 4Mb of memory, but even that isn't enough for some applications.

The amount of memory you need depends entirely on what you use your Amiga for. If you use it for nothing more than games, then one, or possibly two megabytes of memory is more than adequate. But if you tinker around with paint programs, run word processors or enjoy a bit of animating, then 4Mb would be more comfortable. For really powerful applications such as ray-tracing and DTP, 6Mb is a minimum requirement. Some programs won't run without this sort of memory. A good example of this is Virtual Reality's *Vista Pro 3.0*. Unless you've got 6Mb of RAM, *Vista* will curl up its toes and die every time you try to load it.

Don't be fooled by the minimum memory requirements listed on the back of many software packages. This doesn't mean that the program you've bought will run at its full potential with this amount of memory. It simply means that you'll be able to load the program and use it in a very limited form. Take Gold Disk's *Professional Page*, for example. Although Gold Disk claims that the program will run on a 2Mb Amiga, it's virtually crippled on anything other than a 6Mb machine.

Memory has become even more important now the AGA chip set has established itself. With all those memory-gobbling screen modes on offer (a 1280 by 512 HAM8 image takes over 650K), anything short of 4Mb of memory is almost useless.

The release of AGA-equipped Amigas also marked the arrival of widespread use of 32-bit RAM chips. Up until now, Amigas got on very nicely with 16-bit RAM chips (they're still used in the A600) and although you can use 16-bit RAM on an A1200 or A4000, but the effect is the same as driving a car with the handbrake on.

GVP HC8II

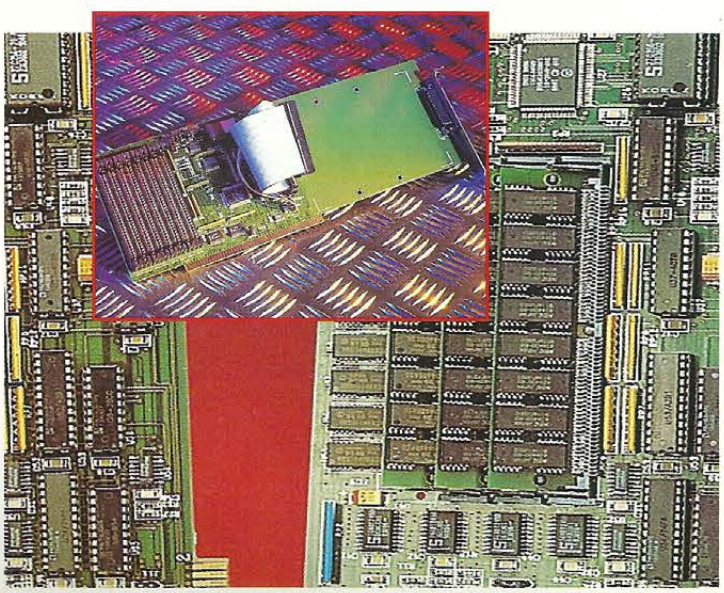
£149

(Silica Systems 081-309 1111)

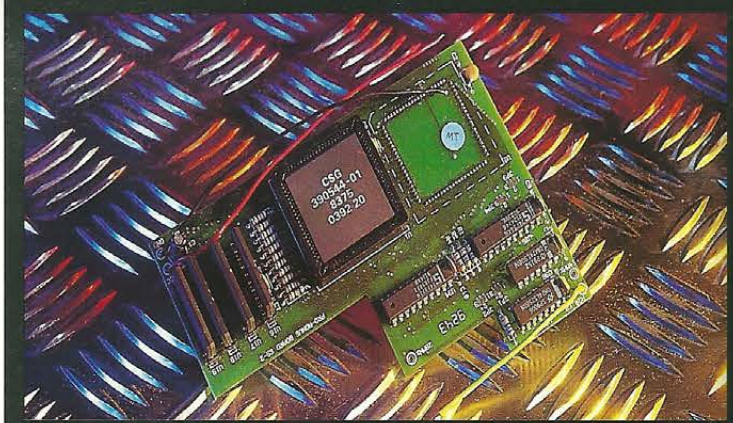
Although this board (inset) comes unpopulated as standard, it can be expanded to a maximum of 8Mb using low cost SIMM (Single Inline Memory Module) modules. What makes it so special, however, is the inclusion of a built-in SCSI interface that can be used to drive any SCSI-compatible hard drive.

For users who need a RAM expansion and don't already own a hard drive, the HC8II provides the perfect choice. Although it is expensive purely as a RAM expansion, you'll save yourself the cost of having to invest in a hard drive controller should you ever decide to take the plunge into hard disk territory.

A2000 upgrade.



AGNUS ADVICE



Having lots of RAM expansion won't solve all your memory problems if you use your machine for applications that use lots of Chip RAM, the memory that is set aside specifically for holding graphics and sound. Although this problem was addressed with the A500 Plus onwards, earlier Amigas still use the old 1Mb Fat Agnus or, even worse, the old 512K Agnus chip.

If you own an A500 an A1500 or A2000, then you may be interested in a board from WTS Electronics (above) that adds a 2Mb Agnus chip plus an extra megabyte of display RAM.

What's more it costs just £139 and at that price is the one upgrade that every A500, A2000 and A1500 owner should own. Fitting the ProAgnus board isn't a job for the faint-hearted though. You have to open up your Amiga, remove the existing Agnus chip from its holder and solder a couple of cables to the motherboard. WTS will do the job for you for just £20 which includes the cost of having your machine returned to you by courier. For more details contact WTS on 0582 491949.

PC501Plus

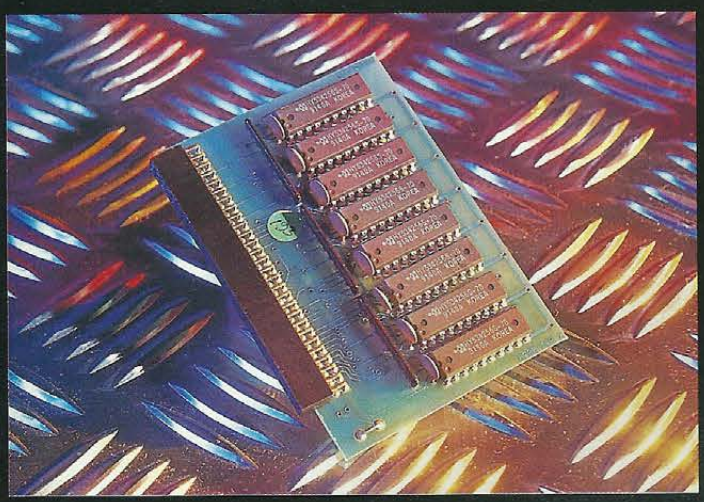
£35.95

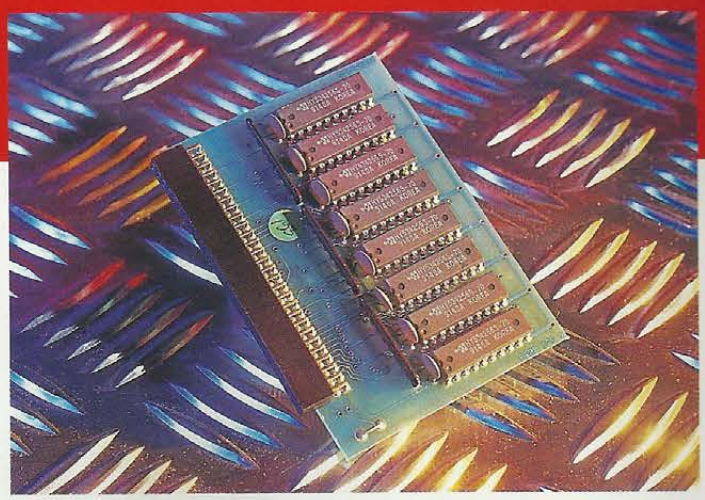
(Power Computing 0234 843388)

The PC501 Plus is a 1Mb trapdoor expansion that doubles the memory of an A500 Plus to 2Mb, all of which is Chip RAM. The board uses the now obligatory 256x4 DRAM chips that enable a large amount of RAM to be squeezed into a very small space. In fact the PC501Plus uses just eight RAM chips to provide a full megabyte of RAM.

The low chip count and good board design make the PC501 Plus one of the smallest A500 Plus RAM expansions on the market. There is usually little to separate smaller RAM expansions, but the quality of the PC501 Plus is a cut above the rest.

A500 Plus upgrade.





PC501

£29.95

(Power Computing 0234 843388)

Power Computing's answer to the ADD501 is the PC501. Designed specifically for the A500 (not the Plus), the PC501 adds a further half megabyte of RAM therefore doubling the A500's memory to one megabyte. It uses 256x4 DRAMs although the board design is rather clunky (it's double the size of the ADD501). Like the ADD501, the PC501 includes a battery-backed clock. It is so similar to the ADD501 that the only real difference between the two is price. So ask yourself why you should pay an extra £9 for a PC501 board that does exactly the same job as the ADD501 but doesn't have a RAM disable switch.

A500 upgrade.

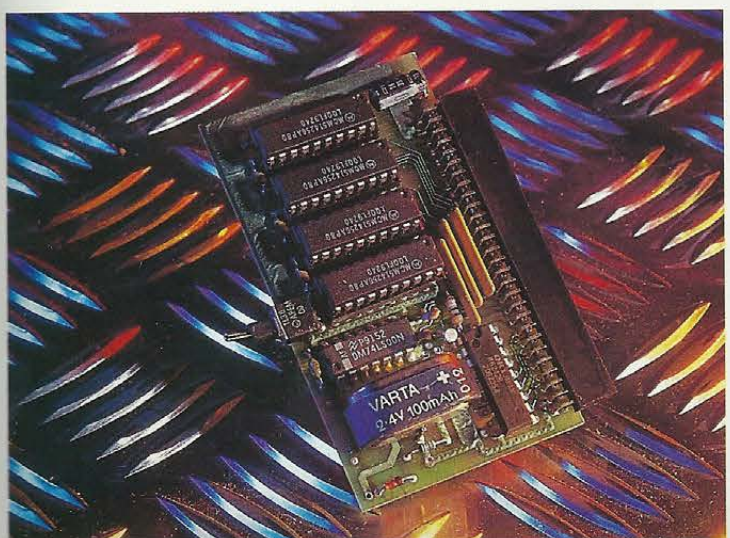
ADD501

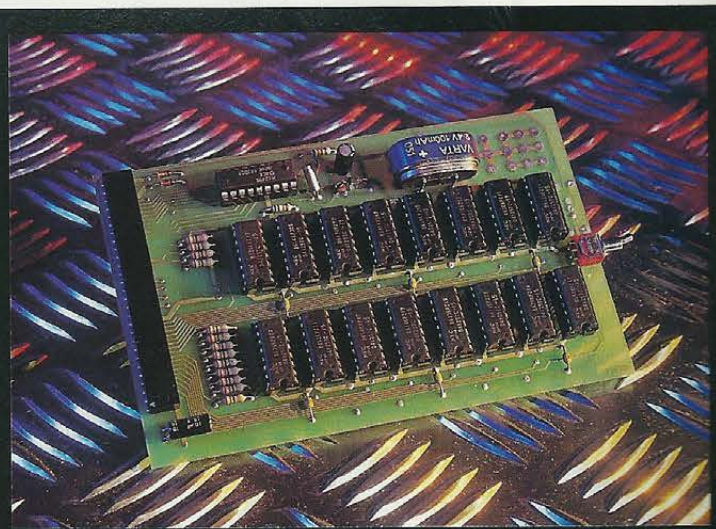
£21

(Ashcom 0530 411485)

If you own one of the original A500s, then the trapdoor expansion for you has to be the ADD501 from Ashcom. Although very similar to Power's PC501, the ADD501 wins in terms of price and has a much tidier board design. It also has battery-backed clock and a hardware disable switch for turning off the RAM expansion should you encounter problems running software. Like the PC501 and 501Plus, the ADD501 uses 256x4 DRAMs that draw very little power from the Amiga, therefore saving the A500's power supply from too much strain. The ADD501 adds a half megabyte that doubles the A500's memory to a full megabyte. In our opinion it's the best half meg RAM expansion for the A500.

A500 upgrade.





ProRAM A501

£19

(WTS Electronics 0582 491949)

The no-nonsense ProRAM A501 is a card that does nothing for design, but a great deal for value. Unlike most A500 half megabyte trapdoor expansions, the ProRAM A501 uses the now almost defunct 256x1 DRAM chips that are of much lower capacity than the 256x4 DRAMs used in other boards. Therefore it needs more space for the 16 RAM chips (giving a total of 512K of RAM) and is much larger than its competitors. The ProRAM card has a RAM disable switch, so you can switch off your RAM expansion at any time. Cheap and cheerful, it gets the job done.

A500 upgrade.

RAM UPGRADES

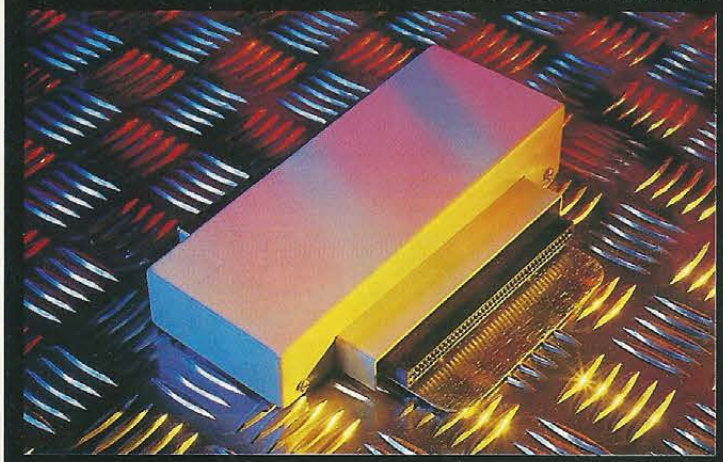
Power 8Mb Board

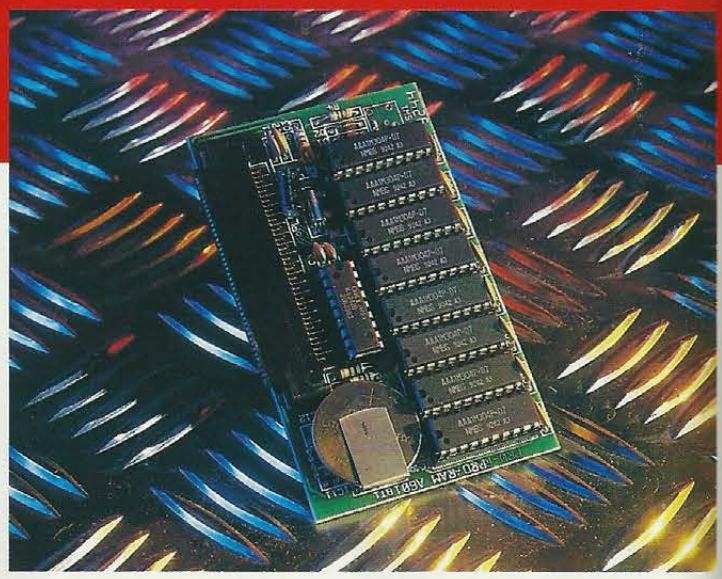
£109

(Power Computing 0234 843388)

If you want to expand the memory of your Amiga A500 or A500 Plus beyond the 512K possible with a trapdoor expansion, then look no further than Power Computing's 8Mb board. Now in a smart new casing, the new board is less obtrusive than the previous offering. It has a full bus connector passthru (so you can still use your hard drive) and is made of solid metal so it's a sturdy piece of kit. The board comes with 2Mb as standard, and can be expanded to a maximum of 8Mb using low-cost, low-power 1Mbx4 ZIP chips. As with the trapdoor RAM expansions, there's very little to separate the Power board from the ADDAX board, but the Power board gets our vote for its strength and style. Highly recommended.

A500 and A500 Plus upgrade.





ProRAM A601

£38

(WTS Electronics 0582 491949)

The ProRAM A601 card. features the same 256x4 DRAMs as every other A600 trapdoor RAM expansion. and doubles the A600's Chip RAM to 2Mb. Considering that WTS chose to use the rather ageing 256x1 DRAMs on its A500 expansion, it's nice to see that at least its A600 product is bang up to date and uses the 256x4 DRAMs. The design and quality are first class. A600 RAM expansions are pretty much the same, so they are best judged on their price, which puts the ProRAM top of the pile.

A600 upgrade

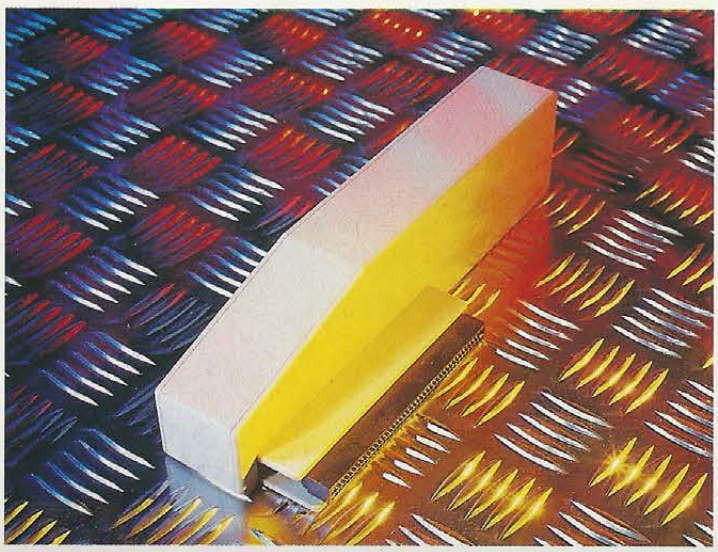
ADDAX

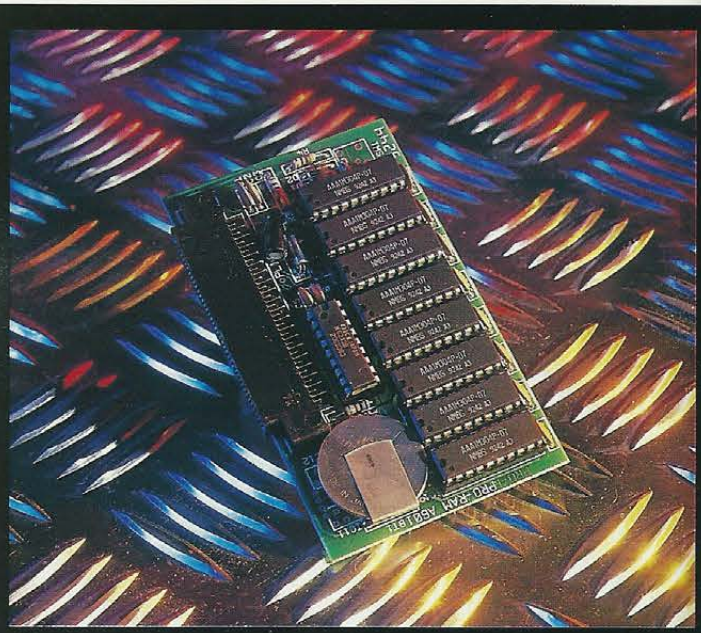
£125

(Ashcom 0530 411485)

The ADDAX board for the A500 and A500 Plus has a basic configuration of 2Mb of Fast RAM (all bus connector expansions are Fast RAM and not Chip RAM) and can be expanded to a maximum of 8Mb using 1Mbx4 ZIPs. The cost of expanding ADDAX and the Power Board to 8Mb works out about the same. ADDAX has a bus passthru connector, so it can be used in conjunction with other devices that use the A500's 86-pin bus connector. If it weren't for the rather tacky plastic casing and slightly higher price tag, the ADDAX would be a joint contender with the Power 8Mb Board.

A500 and A500 Plus upgrade.





PC601

£39.95

(Power Computing 0234 843388)

This 1Mb RAM expansion card fits to the A600 via its trapdoor slot and doubles the amount of RAM to 2Mb of Chip RAM - more than enough for even the most memory-hungry of games. The board also has a battery-backed clock, something that is sadly missing from the A600. Well-designed at a reasonable price

A600 upgrade.

AX601

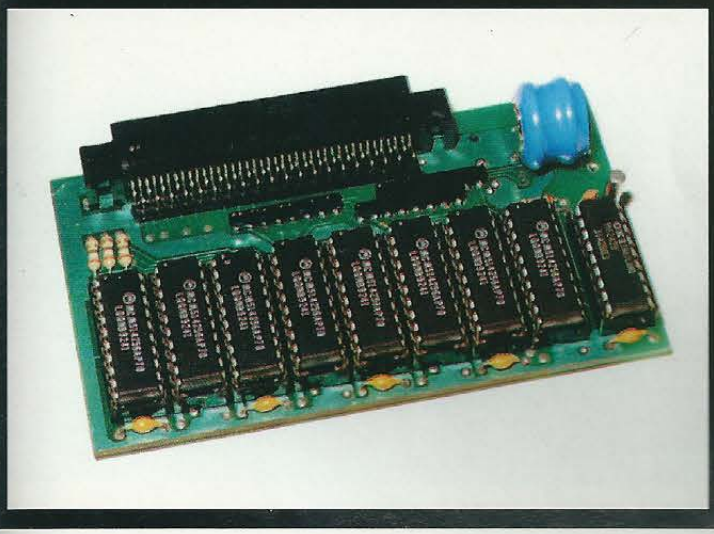
£45

(Ashcom 0530 411485)

Ashcom's 1Mb RAM expansion for the A600 is virtually identical to all the other A600 boards featured here, apart from the fact that it is the only one to feature a RAM disable switch. If you're the sort of person who likes to dabble with Public Domain software, then this may well be the card to buy just in case you happen to stumble across a piece of PD software that doesn't like large amounts of Chip RAM.

The only thing that lets down the Ashcom card is its price. Of course if you think it's worth paying an extra seven quid or so for this board rather than the A601 or PC601, because of the RAM disable switch, the choice is yours.

A600 upgrade.



Zappo A601

£54.99

(Calculus 0543 251275)

Before you say it, no - the price isn't a printing mistake. The Zappo A601 RAM expansion may be a damned fine piece of kit, but it's also very expensive. Why such a high price tag? We wish we knew. The board certainly doesn't offer anything particularly new in terms of A600 RAM expansion, coming with 1Mb and a battery-backed clock.

Unless you really enjoy blowing money, save your pennies. It may be well-designed and of a very high quality of manufacture, but it's still £17 more expensive than Ashcom's equally good offering.

A600 upgrade.

A1200 MEMORY MATTERS

With A1200 memory expansions with more than 4Mb of 32-bit RAM, the extra memory lives in the same address space as the PCMCIA slot memory. So you cannot connect a 32-bit RAM expansion larger than 4Mb and a PCMCIA memory expansion simultaneously.

AmiTek 600

£45 Silica Systems 081 309 1111

Based around the 256x4 DRAM chips, the AmiTek 600 card doubles the amount of memory inside your A600 from 1 to 2Mb. It also has a battery-backed clock so there's no excuse for missing that important meeting once this card is installed. The clock can also date stamp your files, so you'll know exactly when you wrote that snotty letter to your bank manager. The AmiTek 600 is a well-designed card that looks very similar to Power Computing's PC601. If it wasn't for the darker shade of green and higher price tag, you might confuse them.

A600 upgrade.

PC1204

£185

(Power Computing 0234 843388)

The A1200's basic 2Mb of RAM may seem like a lot, but it's peanuts if you use your Amiga for anything other than playing games. For the serious user, a RAM expansion is definitely required and Power Computing has delivered the goods with the PC1204 board. For £185 you get 4Mb of 32-bit RAM, a battery-backed clock and space for a maths co-processor rated up to 50MHz. Even without the FPU fitting a PC1204 will more than double the speed of your A1200. This board is well-designed, affordable and the best choice for A1200 users.

A1200 upgrade.

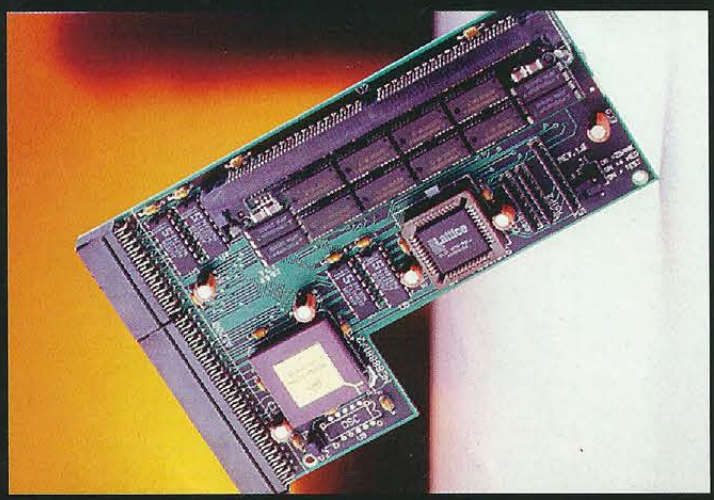
MBX1200C

£145.95

(MicroPace UK 0753 551888)

MicroPace's MBX1200 board has space for up to 8Mb of 32-bit RAM, a battery-backed clock and it comes as standard with a 14.2MHz 68881 maths co-processor, making it ideal for users who need a really swift Amiga. Although the basic price doesn't include any RAM, the MBX board can be expanded using SIMM modules. This knocks up the price substantially, so consider this when making your buying decision. The MBX1200 is a great little board, but it's not quite as cheap as it may appear. Even fitting just 2Mb to the board will add an extra £72 pounds to the price. Taking it up to a full 8Mb will cost you an extra £230.

A1200 upgrade.



AX128

£199

(Ashcom 0530 411485)

Ashcom's AX128 is a RAM expansion card for the Amiga 1200 that offers a total of 8Mb of 32-bit expansion space complete with a battery-backed clock, something that is sadly missing from the standard A1200. The board also has space for a maths co-processor. Simply by fitting the chip and the quartz timing crystal necessary to keep everything in sync, the AX128 will totally transform your A1200. The basic board has 4Mb of 32-bit RAM, and a fully-populated 8Mb board can be bought for just £100 more.

The AX128 is a very impressive RAM expansion card It's nicely-designed and well-built, and although it is slightly more expensive than Power Computing's PC1204, the AX128 is more expandable, so it may be a better investment in the long run.

A1200 upgrade.

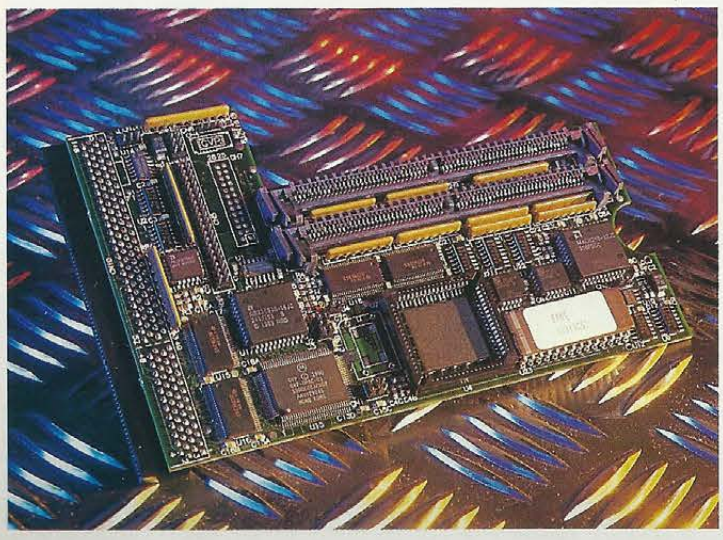
GVP SCSI/RAM Plus

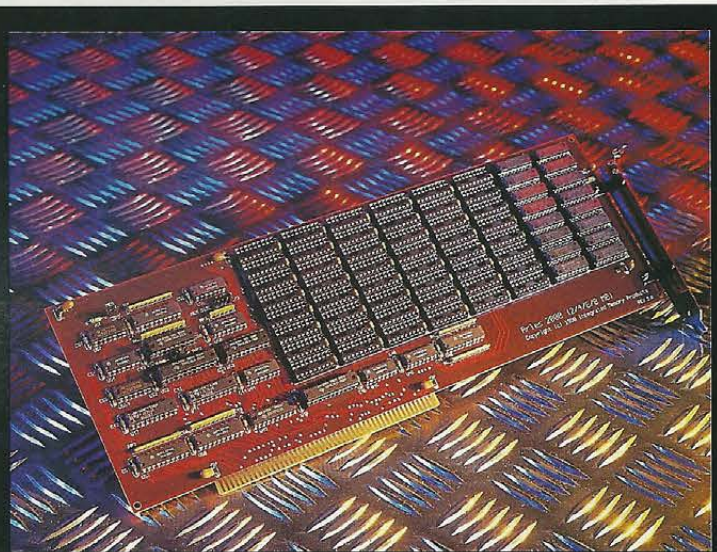
£199

(Silica Systems 081 309 1111)

GVP has two boards to offer A1200 owners, the A1230 Turbo accelerator card (a 68030 accelerator plus RAM expansion) and this, the SCSI/RAM Plus card. The GVP card fits to the trapdoor connector and has a maximum of 8Mb of 32-bit RAM (although the basic card comes unpopulated), through SIMM modules, a very handy SCSI hard disk controller and space for an 68882 maths co-processor. Any FPU rated up to 40 MHz can be fitted. GVP also sells a card with 4Mb of 32-bit SIMM RAM plus a 33 MHz 68882 FPU for £399. The only problem is the price, £200 for an unpopulated card with a SCSI controller is too expensive.

A1200 upgrade.





Aries A2000

£129

(Power Computing 0234 843388)

The Aries A2000 provides a low cost method of expanding the memory of your A1500 or A2000 beyond the basic 1Mb. The board fits inside the machine via a Zorro slot and comes as standard with 2Mb of RAM. It can be expanded up to a maximum of 8Mb using standard 1Mbx4DRAM chips. Alternatively, Power will sell you a full 8Mb card for £249.

The Aries card may not be the most exciting RAM expansion under the sun, but it gets the job done for very little cash indeed. Unless you need something a bit fancier, this is the one to go for.

A1500 and A2000 upgrade.

ON THE CARDS

The PCMCIA card is a relative newcomer to the Amiga, even though it has been in existence for several years. But is the time right to pick one of these credit card-sized memory marvels?

Although the concept of a memory card has been with us for some years, it was first defined by JEIDA, the Japanese Electronic Industry Development Association, in 1985, memory cards are still very much in their infancy as far as the vast majority of Amiga users are concerned.

The memory card is now universally known as the PCMCIA card and is named after the Personal Computer Memory Card International Association, which was formed in 1989 to establish and maintain worldwide standards for the cards.

The cards, there are three types, are all about the same length and width of a credit card and are either 3.3mm, 5.0 or 10.5mm thick, and were originally developed for PCs and particularly portable computers. It was with the advent of the A600 and A1200, the only Amigas with PCMCIA slots, that memory cards became reality for the Amiga.

The cards are inserted into the a standard 68-pin PCMCIA slot on the side of the A600 and A1200 to provide you with additional RAM, or they can be configured to act as a storage medium, an alternative to the floppy or hard disk.

So, the PCMCIA card has a dual purpose as either a quick, easy, and relatively cheap form of RAM upgrade (4Mb will set you back less than £200, 2Mb less than £130), or as a reliable and extremely portable data storage medium.

For example if you wanted to send a large animation file from Britain to America, you could either send it on a fragile SyQuest cartridge or a bulky hard drive, or you could pop a PCMCIA card in a small padded envelope and send it winging its way to the United States.

Equally, it is far easier to use a PCMCIA card as a RAM upgrade, rather than connecting the conventional 1Mb baseboards via the trapdoor slot.

THE ROLE OF THE PCMCIA

The Personal Computer Memory Card International Association was formed in 1989 and now has more than 300 members, mainly manufacturers of computers, software, semi-conductor components, connectors and peripherals.

The Association's aims are to establish and maintain a worldwide standard for PCMCIA cards, and to promote the standard and educate the market about its benefits. This covers technical and strategic planning, and marketing aspects of the cards.

PCMCIA cards such as this from Amitex are the future for Amiga expansion, did you know that? Well find out more, read on...

For both these reasons the PCMCIA card is already an interesting proposition for Amiga users, and there are likely to be developments over the next 12 months, such as the strongly rumoured fax/modem PCMCIA card, that should make the cards of even more interest to Amiga users.

Despite what you may have heard from the more Luddite of Amiga users as they wandered around shows looking lovingly at RAM expansion that weighed tonnes, and waffled tediously about the good old days when peripherals were solid, trusty peices of metal, there is undoubtedly a future for PCMCIA cards.

The question is whether or not Commodore is really committed to throwing the Amiga into the game as a major player in the cards' development – as we go to press, this remains to be seen.

It is true that the cards were originally developed with the PC in mind and this remains their strongest market place. It is also true that portable computers are seen by many manufacturers as the obvious companion of the PCMCIA card.

But it is equally true that the Amiga and its users have surprised the more traditional computer world by their desire to grasp and make use of the newest and most forward-looking technology. PCMCIA is just such as standard.

However, because of the close attentions of the Personal Computer Memory Card International Association there seems every reason to suspect that the cards will be fully compatible, Commodore has already done its bit by providing the slots on the A600 and A1200, so the onus now falls on the manufacturers to write the necessary drivers so that the cards can be used on the Amiga.

SET THE STANDARD

The PCMCIA card slot that you see on the A1200 and A600 is no new fad you know, the basis of the PCMCIA standard is the 68-pin-and-socket type of card that was defined by the Japanese Electronic Industry Development Association all the way back in 1985.

Manufacturers were quick to recognise the benefits of such a card, but in the absence of a standard to regulate their development several incompatible cards began to appear on the market.

The primary aim of the standard is to enable system and card manufacturers to build products that can be operated by users who lack any knowledge of the underlying technology.

Although the PCMCIA was concerned at first purely with the use of the cards with personal computers (PCs), it is now committed to ensuring the compatibility of the cards across a wide range of computers and not only that, it is also looking to ensure compatibility with other consumer electronics products such as digital cameras. And all of this is even more good news for Amiga owners.

The PCMCIA standard covers the physical dimensions of the cards, electrical specifications, protocols and file formats.

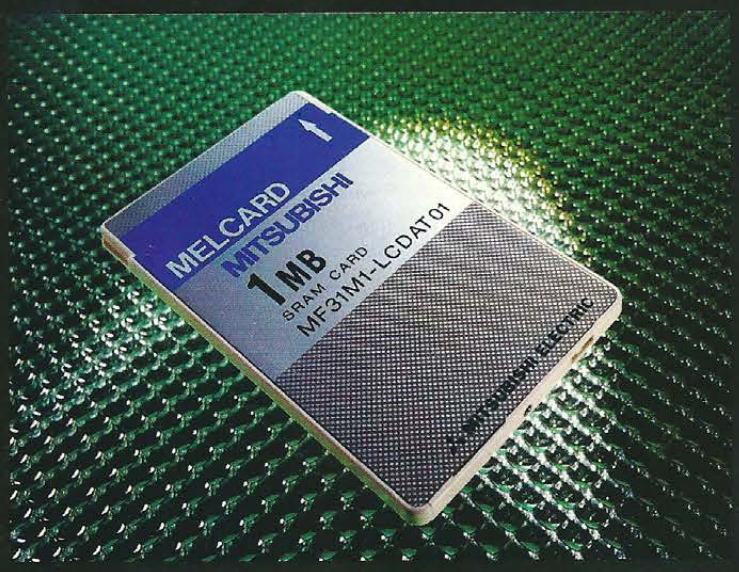
The standard actually dictates that cards should be 2.126-inches wide by 3.37-inches long, and that they have 68 pins,

Memory expansion using PCMCIA couldn't be easier, no fiddling about, just slot it in.

that they interface with both eight and 16-bit buses and support up to 64Mb of memory. The standard currently covers three compatible card thicknesses (3.3mm, 5.0mm, and 10.5mm), enabling developers to include a range of integrated circuit technologies on their cards.

The PCMCIA standard also states that computer manufacturers can build double or eventriple deck slotsto accept combinations of the three card types.

THE AMIGA AND PCMCIA: YOU DECIDE



This is 4Mb of RAM on a device about the same size as the average credit card. Or would you really prefer to carry a full-board around with you?

Many Amiga owners balked at the idea of having to use a flimsy little slot with which to upgrade their machines. But when it's this easy why moan?

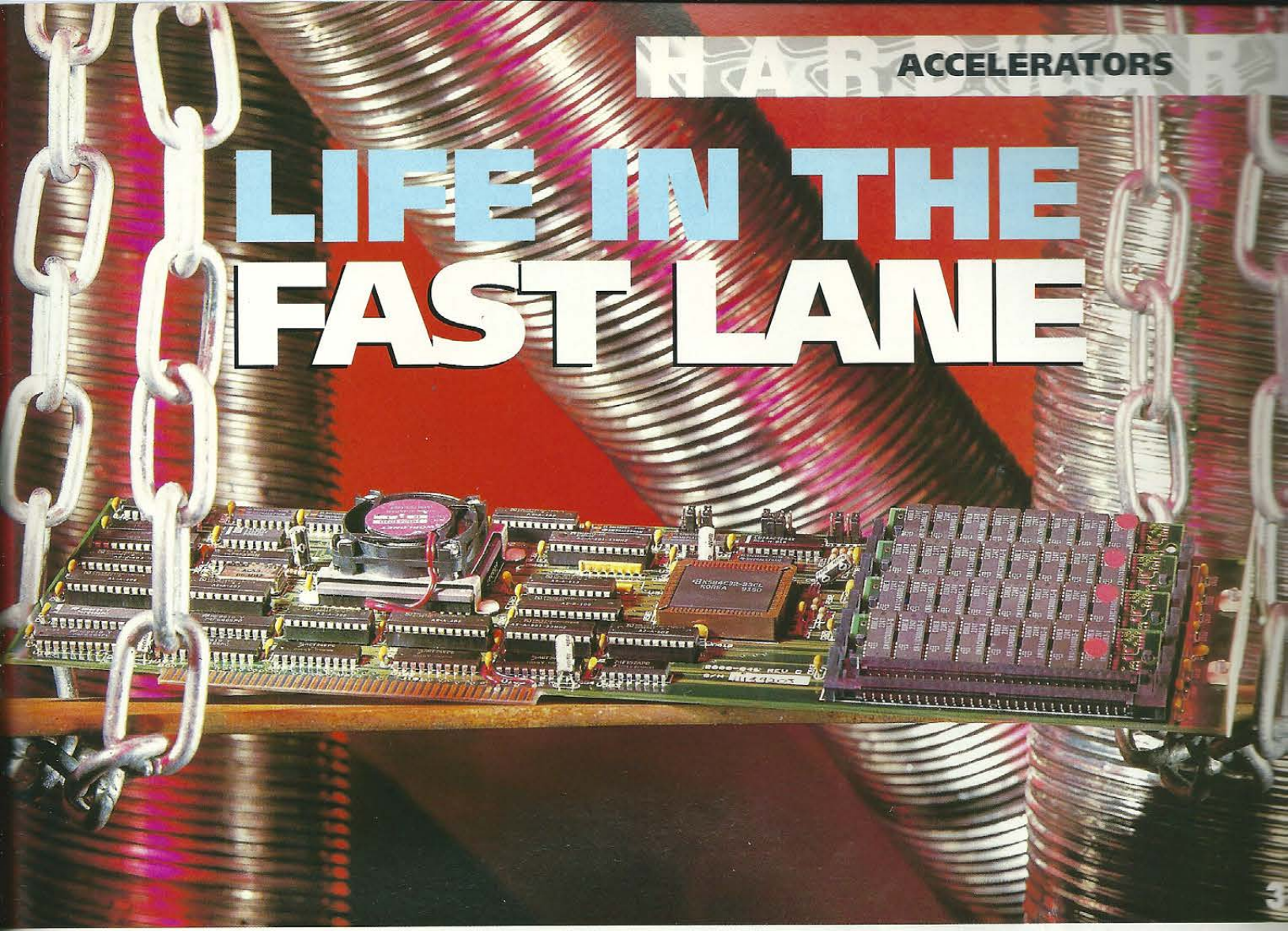
Although the A600 can only be expanded to a maximum of two Mb through its trapdoor expansion, it is possible to increase the machine's memory further by using a PCMCIA card. The Amiga cards are available with either 2 or 4Mb.

Also available are S-RAM cards (smart cards) that are non-volatile (they don't lose their contents when you switch off your machine) thanks to a built in battery. The Amiga treats these cards as simply another form of storage device, so you can save and load programs on to them in an instant - PCMCIA S-Ram cards are considerably faster than even a hard disk.

Quite a few different makes of PCMCIA card are available, but they all sell for pretty much the same price and offer the same sor of specification (£129 for a 2Mb card and £179 for a 4Mb card).

Also worth checking out are the Calculus Smart card, the AmiTek PCM card and the Power Computing PCMCIA card. We expect more cards on the market in the very near future.

LIFE IN THE FAST LANE



Your Amiga is no slouch when it comes to processing power, but to really get on the move you need an accelerator board. If you want a turbo-charged Amiga, then here's what we recommend...

Even a basic A600 is a pretty mean performer when compared to the home computers that were commonplace just a few years back. With its power-packed Motorola 68000 processor running at a very respectable 7.14MHz, the A600 can complete complex calculations at a formidable rate.

For most applications, this sort of performance is more than adequate, but try using your Amiga for more maths-intensive applications such as ray-tracing, desktop publishing or even playing a flight simulator, and you can often be left waiting.

Commodore has been quick to address this problem with the release of the A1200 and the A4000, both of which are based around faster versions of the standard 68000 processor. The A1200 uses the 68020 processor that is about 2.4 times faster than a standard A600. The 68030-based A4000 runs 7.6 times faster than the A600 and the 68040 A4000 is a massive 38 times faster. But what do you do if you own a standard 68000-based Amiga or an A1200 and these ratings aren't enough? You get yourself a processor accelerator card, that's what!

Processor accelerator cards work by replacing the main processor Amiga with a faster processor. At the time of writing, three enhanced processors were available (the 68020, 68030 and 68040) with another waiting in the wings (the 68060). Fitting one of these processors to your machine will speed up virtually every aspect of your Amiga's operation – even the Workbench. But even these mighty processors can leave you waiting if you do a lot of maths-intensive work (ray-tracing, for example), so you may also want to consider buying a maths co-processor (also known as an FPU – short for Floating Point Unit). An FPU is a chip specifically designed to perform complex calculations and will speed up a processor when added to it.

Both the A1200 and the A4000-030 can be fitted with a maths co-processor that will speed them up considerably. For example, installing an A1200 with a RAM expansion card fitted with a 40Mhz 68882 FPU would increase performance by 700 per cent.

RAM (Random Access Memory) is an important consideration when buying a processor accelerator for your machine. Because all Motorola 68nnn series processors from the 68020 onwards are true 32-bit, running a processor accelerator using the 16-bit RAM inside an A600, A500, A1500 or A2000 is limiting. A true 32-bit processor handles 32 bits of data simultaneously, so forcing it to use 16-bit RAM (so, only supplying the 32-bit processor with half that amount of data) will cause a bottleneck that can slow the fastest processor card. You should therefore always buy a processor card that is capable of handling 32-bit RAM as standard and splash out on a couple of megs of memory while you're at it.

SOLID STATE CARDS

Two accelerator cards that deserve mention are the A5000-16 for the A500 and the B5000-25 for the A500 and A1500, both from Solid State Leisure.

We called SSL on 0933 650677 to check price and availability, and got a recorded message saying: "Thank you for calling ACL Distribution. Unfortunately, due to the recent increase in demand for the A5000, we are temporarily only taking orders by fax on 0933 311790. "

We faxed ACL on that number asking for details of the two accelerator cards four weeks before our deadline. At the time of going to press we had not received a reply. Therefore we are unable to include details of price and availability.

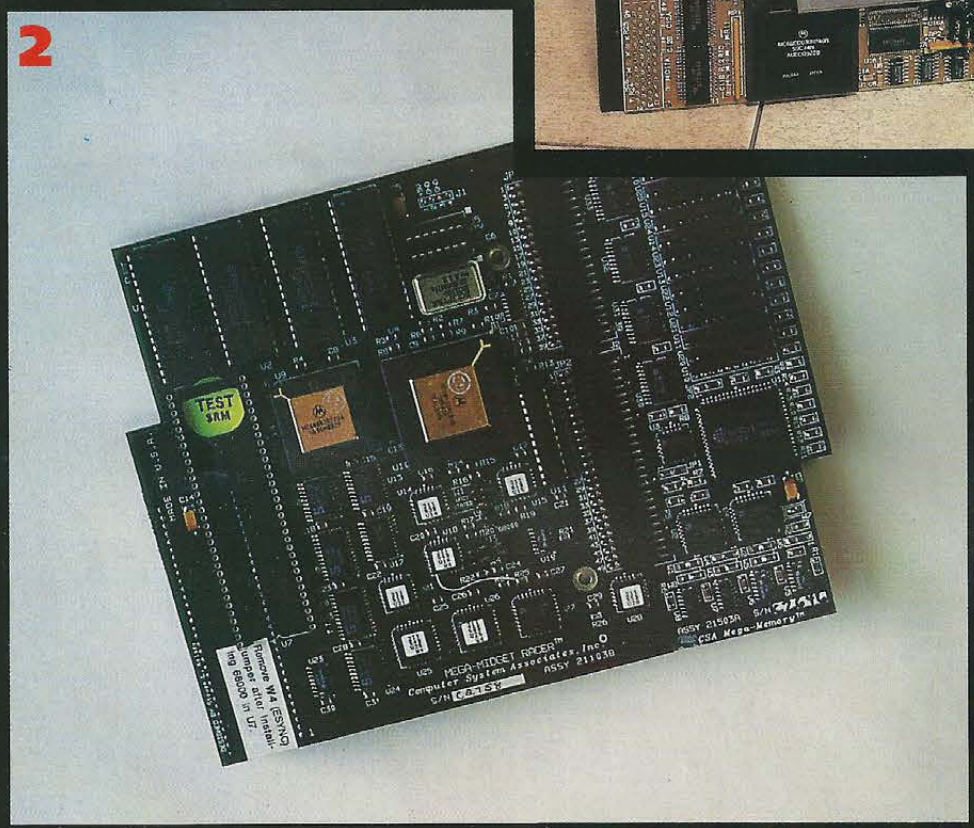
However, should you find an A5000, it is a 16 MHz card based around the 68030 with 1Mb of 32-bit RAM and a 68881 maths co-processor.

The B5000 is a 25MHz 68030-based accelerator that increases the performance of an A500 or A1500 by more than ten times. Both accelerators must be fitted internally.

GVP A1230 Turbo Plus
£299
(Silica Systems 081-309 1111)

The A1230 Turbo Plus card fits to the A1200 via its trapdoor connector and is based around GVP's A530 hard drive plus processor accelerator card for the A500. It adds a 40MHz 68030 processor, a 68882 maths co-processor and provides space for up to 32Mb of 32-bit RAM using GVP's standard 16Mb SIMM modules. If you use the cheaper 1Mb SIMM modules, this drops to a still impressive 4Mb (taking your A1200 up to a total of 6Mb of 32-bit expansion). The A1230 Turbo board transforms the A1200 into a machine that is faster than the A4000-030.

A1200 compatible.

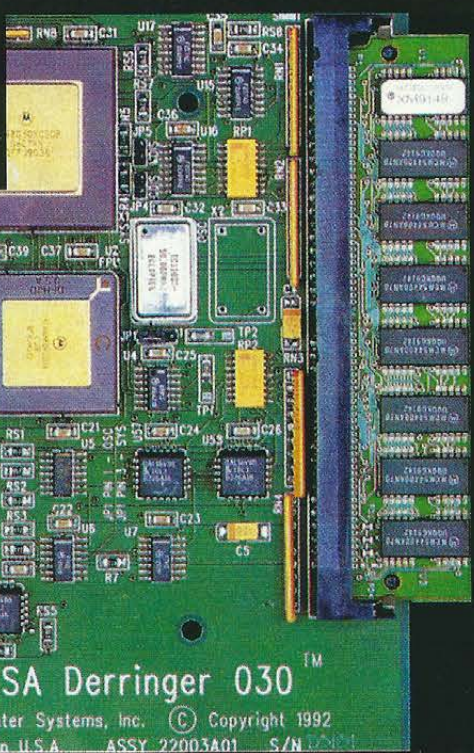


CSA MegaMidget Racer
£350
(Omega Projects 0942 682206

The MegaMidget board comes as standard with the same specification as the new Derringer board. The great thing about the MegaMidget Racer is its modular design – if you buy a 1Mb 25MHz card now, you can upgrade it to a power-packed 38MHz 6803 equipped with a 50MHz 68882 FPU and up to 8Mb of 32 bit RAM.

The MegaMidget Racer is fitted in the same way as the Derringer board, and it speeds up the A500 considerably. If you fit the top-of-the range MegaMidget racer then you've got a machine that can knock the spots off of an A4000-030

A500 compatible



CSA Derringer
£299
(Omega Projects 0942 682206)

If you want the power of an A3000-25 inside your machine, then CSA's much-vaunted Derringer board may be for you. Equipped with a 25MHz 68030 and 1Mb of 32-bit RAM, the Derringer certainly offers value for money. Boasting the same performance as a standard A3000-25, the Derringer totally transforms an A500 or A1500.

Like previous boards from CSA, the Derringer is fitted internally by removing the 68000 from its socket and then replacing it with the board. This invalidates your warranty (are there any A500s left that still have warranties?), so this should be considered. If you can face this loss, then the Derringer represents the biggest accelerator bargain ever.

A500 and A1500 compatible.

4

GVP A530
£499
(Silica Systems 081-309 1111)

The A530 has been with us for a while now, but it still manages to lead the pack in affordable A500 processor accelerators. In fact it has just come down in price by about £150, making it incredible value. Unlike most 68030 cards for the A500, the A530 is a 'snap on' solution that plugs directly into the A500's bus connector. This means you won't invalidate your warranty, which is unavoidable if you fit a conventional processor board. The A530 comes complete with a 52Mb SCSI hard drive and space for 16Mb of 32-bit RAM. It comes with 1Mb of RAM as standard.

Although the A530 doesn't come as standard with a maths co-processor, this can be fitted as an option to further increase the board's performance. Even the standard A530 runs rings around an A3000-25, making this an ideal choice for A500 owners who need both a hard drive and processor card.

A500 compatible.

ADSpeed
£159
(Power Computing 0234 843388)

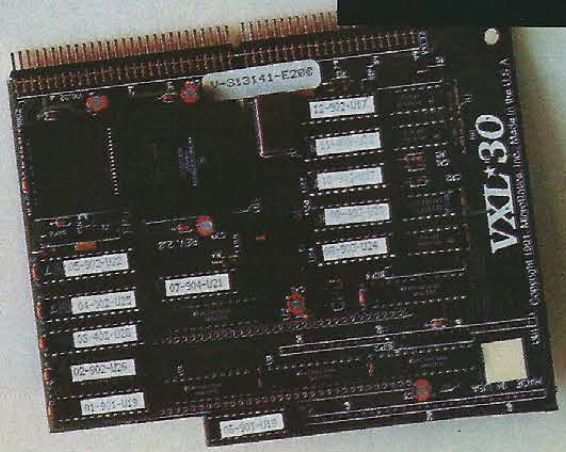
At the very bottom of the accelerators pile (in specification terms at least) comes ICD's ADSpeed This board is based around a modified version of the 68000 processor that doubles the speed of the central processor to 14.3 MHz. This, coupled with the built-in 16K static RAM cache, should double the speed of most operations.

ADSpeed may appear to be the perfect choice for users on a tight budget, but the increase in system performance isn't really that great. If you're serious about an accelerator, go for an 030 card.

A500 and A2000 compatible.

5

6



VXL-30
£400
(MicroPace UK Ltd 0753 551888)

One of the original low cost 030 accelerators, MicroBotics' VXL-30 is an impressive board that fits inside any A500 or A2000. Like many other boards, the VXL-30 is installed by removing the Amiga's 68000 chip and replacing it with the board. As standard, it comes with a 25MHz 030 with no maths co-processor or 32-bit RAM, but both can be added. However, RAM expansion for the VXL is quite expensive (around £170 for 2Mb of 32-bit RAM).

The VXL-30 is an impressive piece of hardware, but it has lost its edge in terms of value for money. If MicroPace were to drop the price to match its competitors, the VXL-30 would be worth considering. As it is, the cheaper alternatives are too tempting.

A500 and A2000 compatible

GVP G-Force 030
£399
(Silica Systems 081-309 1111)

GVP is renowned for its processor accelerators and the latest G-Force card from the company isn't going to change that view. The G-Force card fits to the A1500 or A2000 via the CPU slot and provides Workstation-like power (making it more than nine times faster than an A500) It comes as standard with 4Mb of 32-bit RAM and a very fast SCSI-2 hard disk interface. The board also has a 25 MHz 68030 that can be upgraded to a 40 or 50MHz 68030, further increasing the board's performance.

Like all GVP's accelerator cards, the G-Force card features GVP's exclusive Kickstart re-mapping technology that enables the Amiga's operating system to be transferred to 32-bit RAM, giving a considerable increase in overall system performance.

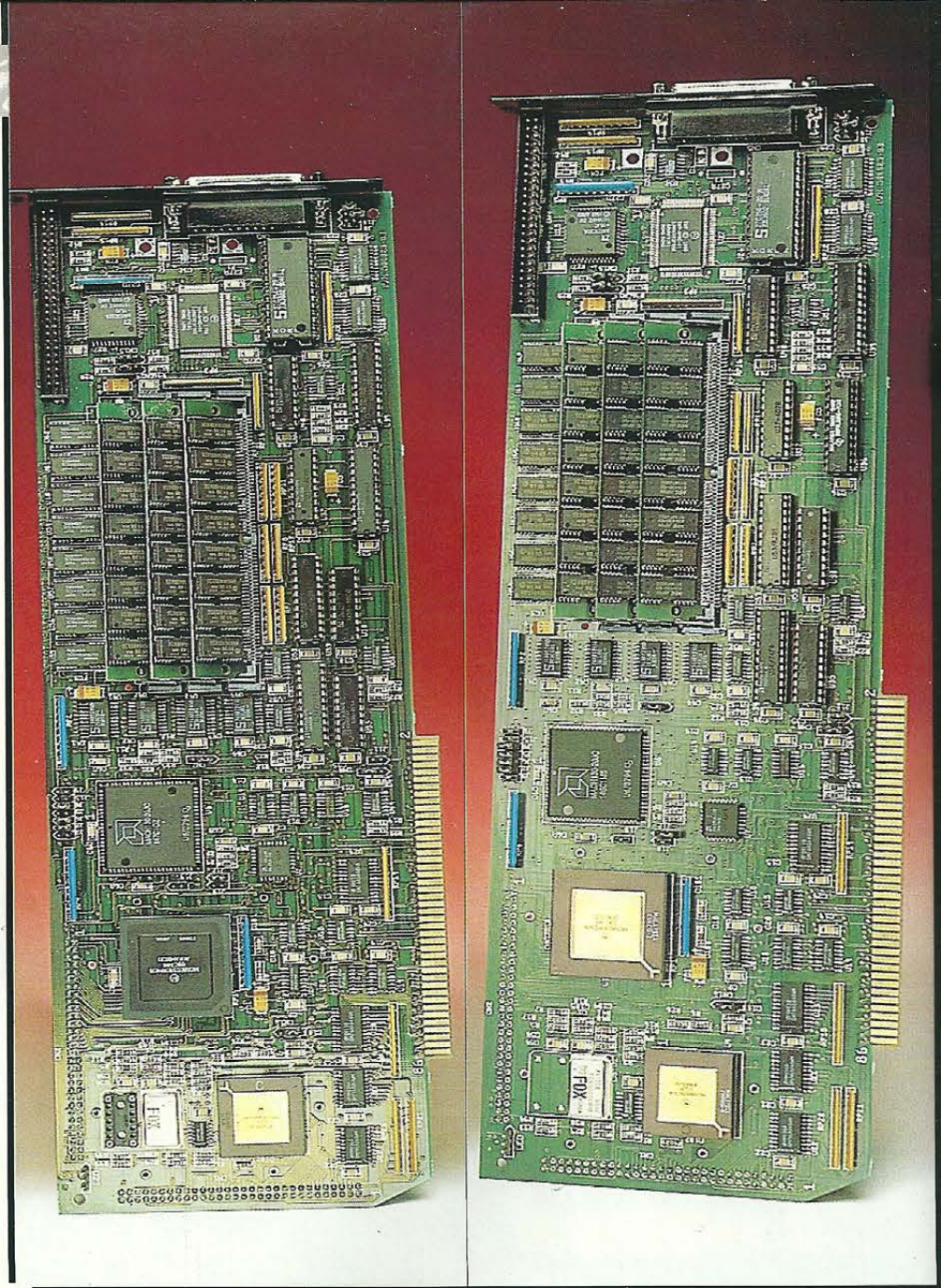
A1500 and A2000 compatible.

GVP G-Force 040
£1,299
(Silica Systems 081-309 1111)

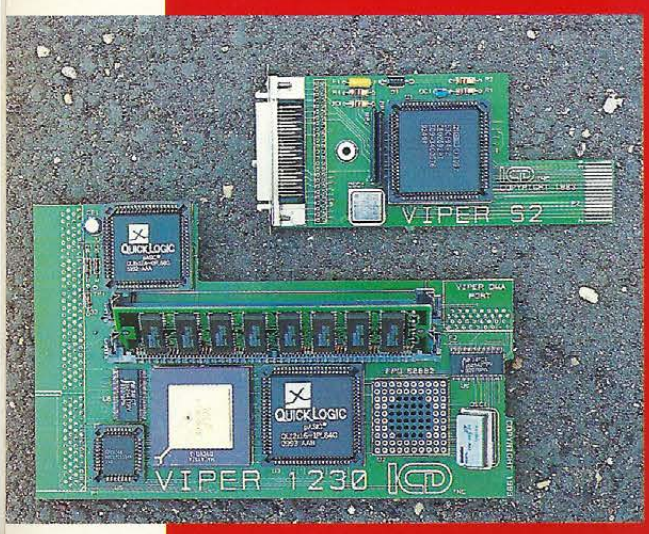
If you thought that the A4000-040 was the fastest Amiga ever, then you should check out GVP's G-Force 040-33 card for the Amiga 1500 and 2000. Based around a 33MHz 68040 (that's 8MHz faster than the A4000-040's processor), the G-Force 040 is currently the fastest processor accelerator card available for any Amiga. It installs inside the CPU slot on an Amiga 2000 and provides the sort of lightening fast processing power that 24-bit ray-tracing and animation fanatics require.

The board offers up to 64Mb of 32-bit RAM expansion, a very high speed SCSI-II hard disk controller as well as GVP's exclusive Kickstart re-mapping technology. For true power users who want the very best that money can buy, the GVP G-Force 040 card is the only serious choice.

A2000 and A1500 compatible.



BEST OF THE REST



A2630
£920
(Commodore UK 0628 770088)
Commodore's A2630 processor accelerator card for the A1500 and A2000 was one of the first accelerators to be launched based around the 68030. It comes as standard with a 25 MHz 68030 chip equipped with an additional 68882 maths co-processor and room for 32-bit RAM expansion (although the basic unit comes as standard with 4Mb of 32-bit RAM). Although stocks are starting to dwindle, you may still be able to pick this card up at a cheap price.

A1500 and A2000 compatible.

Zeus 040
£799
(MicroPace 0755 551888)
If you want your Amiga 500 to give an Amiga 4000 a run for its money, then the Zeus board may be for you. For just £799 you get a 28MHz 040 accelerator that wi totally transform your A500. The only problem with this fine product is findin one – it seems that many UK distributor have dropped Progressive products due supply problems.

A500 compati

Viper 1230
£TBA
(ICD/Power Computing 0234 843388)
ICD's new A1200 accelerator offers a ful 68030 clocked at 40MHz with provision f a maths co-processor and up to 32Mb of 32-bit RAM. An even faster 50 MHz versi is also available.

The board's most exciting feature is extra expandability that it offers. Throu the use of a DMA port, an optional Vipe S2 card can be connected that adds high speed SCSI-2 compatibility to your A120

A1200 compati

GVP

WORLD CLASS PERIPHERALS FOR THE AMIGA

NOW AT NEW LOW PRICES!

ACCELERATORS

FOR AMIGA 1500 AND 2000

If you use your Amiga for DTP, ray tracing, graphics or any other serious application, you'll appreciate the power that an accelerator brings. Accelerators replace the main processor with a faster version and by doing so the speed of the Amiga is dramatically improved.

GVP offer a range of A1500/A2000 accelerators that simply outstrip the competition for speed and specifications. Their G-Force range includes the fastest Amiga accelerator available (the 68040 33MHz version) whilst offering a range of functions, such as 32-bit RAM upgrades, SCSI interfaces and maths co-processors. If you're looking for ways to boost the power of your Amiga, then you can't beat the GVP G-Force range!

G-FORCE ACCELERATORS	030 25MHz	030 40MHz	030 50MHz	040 33MHz
Speed MIPS*	7.48	12.1	15	30
Processor	68030EC	68030EC	68030	68040
Maths Co-Pro.	68882 included	68882 included	68030 included	In 68040 processor
Std 32-bit RAM	1Mb	4Mb	4Mb	4Mb
Max 32-bit RAM	13Mb	16Mb	16Mb	32Mb
Extras	SCSI	SCSI	SCSI	SCSI Ser/Par
PRICE	£399 INC VAT UPG 0110	£699 INC VAT UPG 0430	£999 INC VAT UPG 0533	£1299 INC VAT UPG 0740

*MIPS: Millions of instructions / second, a normal Amiga runs at .87 MIPS

PLUG-IN HARD DRIVE & ACCELERATOR

FOR AMIGA 500 AND AMIGA 500PLUS

The A530 is a unique combination of a hard drive, RAM board and an accelerator. Inside is a full Motorola 68EC030 processor running at 40MHz making your Amiga faster than you thought possible. The A530, with a maths co-processor, is up to 300 times faster than a standard A500! The new processor and 32-bit SIMMs is joined by up to 8Mb of 32-bit RAM, which further enhances its performance.

Features Include:

- *40MHz 68030EC Processor*
- *Up to 8Mb 32-bit Memory, 1Mb fitted*
- *Cut Off Switch For Game Compatibility*
- *Designer Styling to Match the A500*
- *Dedicated Power Supply and Fan Unlike Many Competitors*
- *Mini-slot for Future Expansions*
- *Factory Installed Hard Disk*
- *High Speed DMA SCSI Controller*

A530 HARD DRIVE & 40MHz ACCELERATOR

42Mb	80Mb	120Mb
~~£699~~ £499	~~£799~~ £599	~~£899~~ £699
INC VAT - HAR 0962	INC VAT - HAR 0968	INC VAT - HAR 0974

PLUG-IN HARD DRIVE

FOR AMIGA 500 AND AMIGA 500PLUS

A hard drive will have an immediate effect on your Amiga. Where you used to constantly swap disks, wait for files and programs to load and sit around waiting for disk accesses, you'll now be pushed to keep up with your Amiga! Hard drives work in the same way as floppy disks, but can hold a great deal more information and access this data much quicker.

The A500-HD8+ provides the ultimate in hard drive performance, it can also increase the memory of your Amiga, and provide PC compatibility. Features include:

- *Ultra Fast Access SCSI HD*
- *Up to 8Mb of FAST RAM*
- *Mini-slot for Future Expansions*
- *Cut Off Switch For Game Compatibility*
- *Designer Styling to Match the A500*
- *Dedicated Power Supply and Fan Unlike Many Competitors*
- *High Speed DMA SCSI Controller - Can Handle 7 Devices*

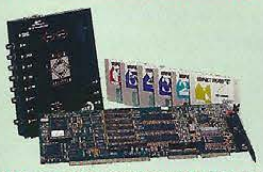
PC EMULATOR
PLUGS INTO THE HD8+ OR A530 TO ALLOW YOU TO RUN PC COMPATIBLE SOFTWARE ON YOUR AMIGA
286-16MHz EMU 0500 £99 INC VAT

HD8+ HARD DRIVES

42Mb	80Mb	120Mb
~~£299~~ £249	~~£399~~ £349	~~£499~~ £399
INC VAT - HAR 0840	INC VAT - HAR 0888	INC VAT - HAR 0922

GRAPHICS CARD

FOR A1500/A2000/A3000/A4000



ALL-IN-ONE GRAPHICS CARD

Impact Vision 24 is a fully featured video card. Unlike other graphics cards which require you to buy extra modules later, IV24 has everything you could want from a video board built-in!

Included with IV24 is GVP's custom Video Interface Unit (VIU). This gives you more choices for in and outputting video signals than any other Amiga peripheral on the market. VIU-CT splitter provides additional RGB, Y, R-Y and B-Y output.

FREE SOFTWARE WITH IV24

Create stunning 3D rendered images, retouch captured images and wipe between 2 video sources with 50 packaged video transitions for production studio effects. Also included is MacroPaint 2, a powerful 24-bit graphics package which can paint in 16.8 million colours.

- *1.5Mb 24-bit, 16.8million Colour Buffer*
- *Real-time Framegrabber/Digitiser*
- *De-interlaced, Video Flicker Fixer*
- *Movable/Sizable PIP (Picture-in-Picture)*
- *2 Video Genlock (RGB & Composite)*
- *768 x 580 Resolution*
- *Captured Image Retouching/Processing*
- *Titling/Character Generation*
- *Real-time 24-bit Painting*
- *Animation/3D Rendering*
- *FREE! Caligari 24, MacroPaint 2, MyLad and Desktop Darkroom Software*

A1500/A2000 ADAPTOR - £49.95 - GVA 5224

IV24 inc VIU-S	IV24 inc VIU-CT
~~£1499~~ £999	~~£1899~~ £1299
INC VAT - VID 7024	INC VAT - VID 7124

VIDEO GENLOCK

FOR ALL AMIGAS

G-Lock is a fully featured Genlock, which allows you to mix Amiga text and images with moving video pictures. You can then send the combined result back to your video recorder for recording.

- *Two Composite Video Inputs or S-Video (Y/C) Input*
- *Simultaneous Composite & S-Video and RGB Output*
- *Video Processor - Real Time Software Control of Video Attributes (Sharpness, Gain, Brightness etc)*
- *ARexx Compatible*
- *Works with Flicker Fixers*
- *Multiple Keyer Modes*
- *Full Audio Support*

G-LOCK ~~£349~~ £299
INC VAT - VID 2500

HARD DRIVE CARD

FOR A1500/A2000/A3000/A4000

The HC8+ hard drive card gives the ultimate in hard drive performance and can be used to increase your Amiga's RAM.

- *High Speed DMA SCSI Controller - Can Handle 7 Devices*
- *Ultra Fast Access*
- *SCSI Hard Drive*
- *Up to 8Mb of FAST RAM*
- *Direct Memory Access Style Design*

0Mb	40Mb	80Mb	120Mb
£129	£299	£349	£429
INC VAT - HAR 1300	INC VAT - HAR 1340	INC VAT - HAR1356	INC VAT - HAR 1425

IMAGE PROCESSING

FOR ALL AMIGAS WITH 3Mb RAM

Image FX is a complete solution for all your image creation and editing needs. It has a vast range of facilities, can read and write to many other different file formats and directly controls a wide variety of hardware.

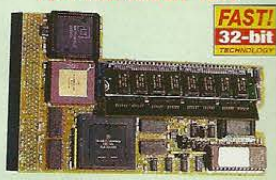
- *24-bit Painting*
- *ARexx Compatible*
- *Virtual Memory Support*
- *Load, Save and Convert to the Following Formats: ANIM, BMP, Clipboard, DCTV, DPIIE, GIF, HAM-E, ILBM, IMPULSE, JPEG, RENDITION, SCULPT, TARGA, TIFF AND MORE*
- *Scanning, Framgrabbing & 24-bit Board Support Comes with Modules for Several Popular Hardware Devices: JX100, IV24, AA Chipset*
- *Create Animations*
- *Numerous Special Effects Edge Feathering, Shading, Alpha Channel, Morphing, Compositing etc*

CINEMORPH INCLUDED! WORTH £49.95 - SEE BELOW

IMAGE F/X £199.95
INC VAT - ASI 2002

40MHz ACCELERATOR

FOR THE AMIGA 1200



Other A1200 cards claiming to be accelerators only add maths co-processors and extra RAM, whilst the A1230 can provide both of these PLUS an enhanced CPU. This replacement CPU upgrades the A1200's existing processor with a 68030EC processor running at 40MHz!

32-bit RAM and a maths co-processor can also be added, enhancing performance still further. The A1230 doesn't void your Amiga warranty, and is also compatible with PCMCIA standard cards, not preventing their use!

- *The First True A1200 Accelerator*
- *68030EC Processor Running at 40MHz*
- *Up to 32Mb of 32-bit RAM*
- *Easy Fitting Trapdoor Expansion - Doesn't Void Your Warranty*
- *Doesn't Disable PCMCIA Interface*
- *Optional 68882 Co-processor - Twice the Speed of a 68881*

A1230 40MHz ACCELERATOR

0Mb RAM	4Mb RAM + 40MHz 68882 FPU
NEW! £299	~~£599~~ £499
INC VAT - UPG 1230	INC VAT - UPG 1234

SOUND SAMPLER

FOR ALL AMIGAS

Capture sound from an external source and play it back on your Amiga. With GVP's Digital Sound Studio (DSS) you can create your own audio effects for use in games, or make jingles!

- *Holds up to 31 Samples in Memory At Once*
- *Real-time Oscilloscope, Spectrum Analysis, Echo and Reverberation*
- *Graphic Editing of Wave Forms*
- *Stereo or Mono Operation*
- *.MOD File & MIDI Compatible*

DSS £39.95
INC VAT - MUS 2500

SCSI/RAM EXPANSION

FOR THE AMIGA 1200

Adding RAM or a hard drive to your Amiga will have a considerable impact on its speed. The GVP SCSI/RAM allows you to enhance your Amiga with both. Its SCSI hard drive interface is one of the fastest available, whilst its 32-bit RAM upgrade is based on the same technology as that featured in the best selling A1230.

- *Built-in, Full SCSI Hard Drive Interface*
- *Optional 8Mb of 32-bit RAM*
- *Optional 68882 Maths Co-processor*
- *Easy to Fit and Doesn't Void Warranty*

SCSI CABLE KIT - £49 INC VAT - HAR 1245

0Mb RAM	4Mb RAM + 33MHz 68882 FPU
NEW! £199	NEW! £399
INC VAT - HAR 1200	INC VAT - HAR 1233

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INSIDE the AMIGA

Your Amiga is a very different to other home computers. It is more versatile, it is faster and costs less money. And it's got more power for fewer MHz. Why is this? Well, the custom chips make a huge difference... we explain

When the Amiga was conceived all those years ago in deepest California, it was designed to be a very different machine to what was then available. Its developers thought of it as having a control system that anyone could use and most importantly, it was intended to be the most versatile machine around. The Hi-Toro team (see the *Encyclopaedia of the Amiga* for full details of the Amiga's early history) that was developing the machine, realised that the state of chip technology in the early 1980s meant that a single Motorola 68000 CPU wasn't capable of producing the sort of results they had in mind for the Amiga. This meant either hanging around and waiting for Motorola to develop a new, faster and more versatile chip or finding another route around the problem. This route was to develop the PAD as it became known. The PAD stood for Paula, Agnus, Denise – three chips that took the strain from the central processing unit and changed the way that millions of people see computing.

But before we get into the various roles and tasks that the Amiga's chips carry out, we will need to get a rough idea of how a normal, work-a-day computer works. Basically a computer is composed of four parts. These are:

RAM: Random Access Memory. When a program runs, it normally runs from RAM. This is where data is stored as long as the computer is switched on. Most people only measure RAM in kilobytes (or megabytes), but you should also remember that a 32-bit processor needs true 32-bit RAM if you want to maximise its performance.

The CPU: the Central Processing Unit. This is the main chip, it handles the number crunching that turns thousands of pieces of numeric data into pictures and words on screen, and sound from the speakers. The Amiga 500 has a 16-bit processor (a processor that can handle 16-bits of data at one time – that one time is a fraction of a fraction of a second though), the A1200 on the other hand, is 32-bit.

The Data-Bus: this controls the flow of information from CPU to RAM. Data-buses are calibrated (like the CPU and RAM) in bits. For example, a 16-bit processor will need a 16-bit bus if you want to get the best from it. If you have a data-bus that is too weak for the processor, then your data will be bottle-necked before it can do any good.

The PCB: the Printed Circuit Board. This is the (usually green) board that you see when you open up your Amiga (we wouldn't recommend this if your machine is still under guarantee) on which the chips, the data paths, the capacitors etc are secured.

As you can imagine, processing all the data you demand, as well as controlling the disk drives, the screen image, the sound output and keeping a weather-eye on the RAM puts a great deal of strain on the CPU. Now let's have a look at the way an Amiga 500, for example, works. You can include all the previously mentioned chips and pieces, but then you need to throw what follows into the equation:

Paula: this is basically a four-channel stereo sound chip. Paula takes the digital sound input and turns it into the analogue form that the speakers can understand and use.

Agnus: this is the main PAD chip and it's incredibly versatile. Agnus contains the Blitter (BLock Image TransferER – there are two Ts to avoid pronouncing it as the Blighter!) and the controls the manipulation of graphics and display data. When it isn't busy doing this, it also deals with reading data from disk.

Denise: another very versatile piece of design. Denise not only keeps a constant check on the screen (it tracks the actual screen draw process) but it also contains the graphics co-processor that we all lovingly call 'the Copper'. This enables Denise to make use of several graphics effects – such as the pull-down menus that make Workbench and most Amiga programs so easy to use. Denise also looks after hardware sprites such as the mouse pointer and the drawer icons. Oh, it also keeps track of, and controls, the mouse itself.

Gary: yes another chip. Gary stands for GateARraY.

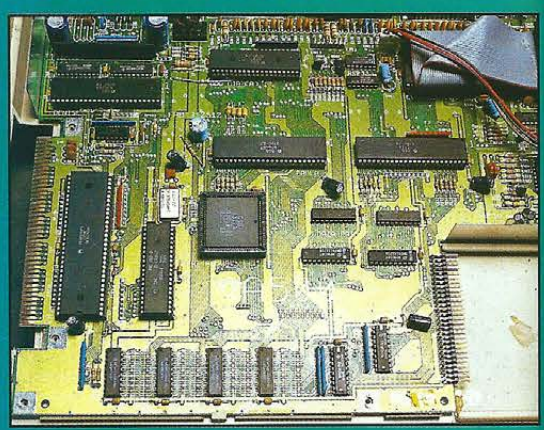
CUSTOMS & HISTORY

The Amiga's custom chips are not a new addition to the range, far from it. The very basic prototype was designed around the concept that has grown and developed from there.

The A500 (left) was the first Amiga to really impact on home users with its PAD set-up (Paula Agnus Denise) of chips that enables the main 68000 processor to work overtime and increase its power.

Next up in terms of development for the home user was the A600 (middle). This made use of the sparky new ECS (Extended ChipSet): newer more advanced chips that once again pushed the 68000 to its limits, and some would say beyond.

Of course today's must have machine is the A1200 (far right). Not only does this come with the AGA (Advanced Graphics Architecture) it also has 32-bit processing.



Gary takes care of the various interfaces, such as the keyboard and the ports. It also handles the flow of data to peripherals.

Now you've got your head around these concepts we will throw into the Amiga equation, the idea of DMA, Direct Memory Access, and you have an incredibly powerful system. Let's explain...

DMA enables the Amiga's own chip to go to RAM without bothering the CPU at all. This speeds up the system incredibly because the custom chips can be working away at the same time as the processor on complimentary tasks.

Since the late lamented Amiga 500 first hit the scene in the late 1980s, there have been several changes to the custom chips. These are as follows:

ECS Denise: first seen in the A500Plus, the Enhanced Chip Set version of Denise enabled the Amiga to take on the new Super Hi-Res and Productivity modes.

Gayle: this is an update to dear old Gary, it was brought in to handle the new strains provided by the A600's (and A1200's) PCMCIA slot as well as doing Gary's old tasks.

Super Gary: an upgraded Gary for the A4000 and A1200 that is able to handle the new IDE hard disk as well as the standard input/output.

Fat, Fatter, ECS Fatter Agnus: this was brought in on the A500 Plus to handle the new 2Mb of Chip RAM standard.

Ramsey, Super Ramsey: as you might have guessed, Ramsey looks after the RAM in the A4000 and A1200.

Lisa: this new chip (A4000 and A1200) takes over from Denise in the new AA – also known as Double A – chip set.

SuperAmber: a godsend for A1200 and A4000 users, Amber is a built-in flicker fixer.

Alice: goodbye Agnus, hello Alice, at least if you're an A1200 and A4000 owner.

There you go then. These small pieces of silicon wizardry are what makes the Amiga such a different, and more versatile machine compared to the rest of the computing community. Look after them.

Multitasking explained

The Amiga is a strange beast... because it can do one thing that the rest of the computing community can't: the Amiga can truly multitask.

If you have a friend or colleague who owns a PC, they've probably rabbited on about how, with Microsoft's Windows frontend, they can multitask too.

Frankly, this is rubbish, but to understand why, you really have to understand the difference between memory-sharing and multitasking.

Memory-sharing, which is what other machines such as the Atari ST and the Apple Macintosh range do, is a system whereby it looks very much like the computer is doing two things at once.

For example, using Microsoft's Windows front end gives the illusion that you can have numerous windows open on the desktop (Workbench) each with an application running.

The truth of the matter is that only the application in the 'Active' window is actually doing anything - and, as a side point, even having Windows running will take an 8Mb RAM overhead. For example, if you had a word processor and an on-screen clock running at the same time, the machine's Central Processing Unit (the CPU) would have to stop providing any processing power to the word processor if it wanted to update the clock.

Now, with a fast enough processor, this means only missing a beat for a nanosecond, too fast for we poor humans to appreciate, but consider if you were trying to run a word processor and a 3D rendering program.

If you wanted to render an object any more complex than a flat line, that would be it, no word processing for a few hours.

What happens here is that the processor has to choose which application to use, then the correct memory has to be addressed for the relevant data to be accessed and used.

These other machines have never heard of Fast and Chip RAM, all they have is RAM – and this is given a right clobbering by the amount of work it is forced to do. Hence the average PC requires at least 4Mb to think about doing anything with Windows (even open it up) and more realistically, 10Mb to begin to work at what might be considered a half-decent speed.

The Amiga's custom chips, such as dear old Agnus here, really do give you the edge.

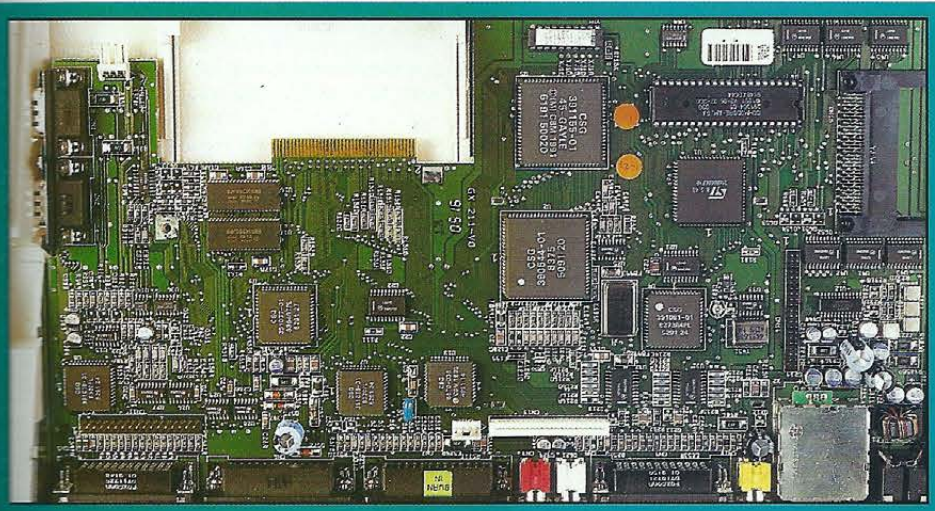
Multitasking, which is what machines such as the Amiga, a few very high-end workstations and NeXT machine do. It means that you can have several windows open with several applications running simultaneously.

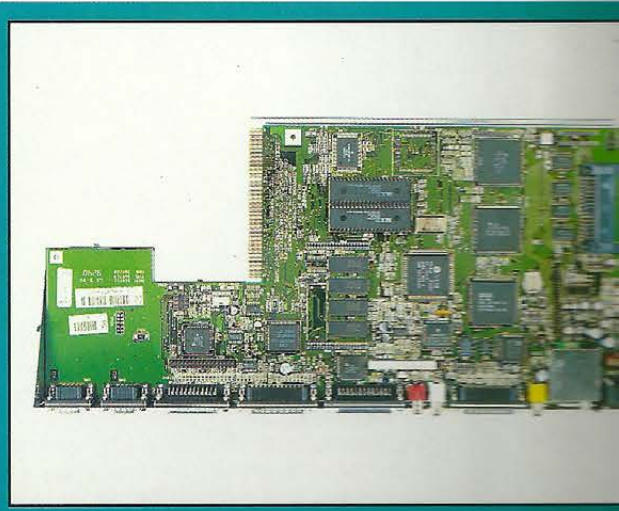
Apart from the difference in operating systems, the reason the Amiga can multitask comes down to its custom chips.

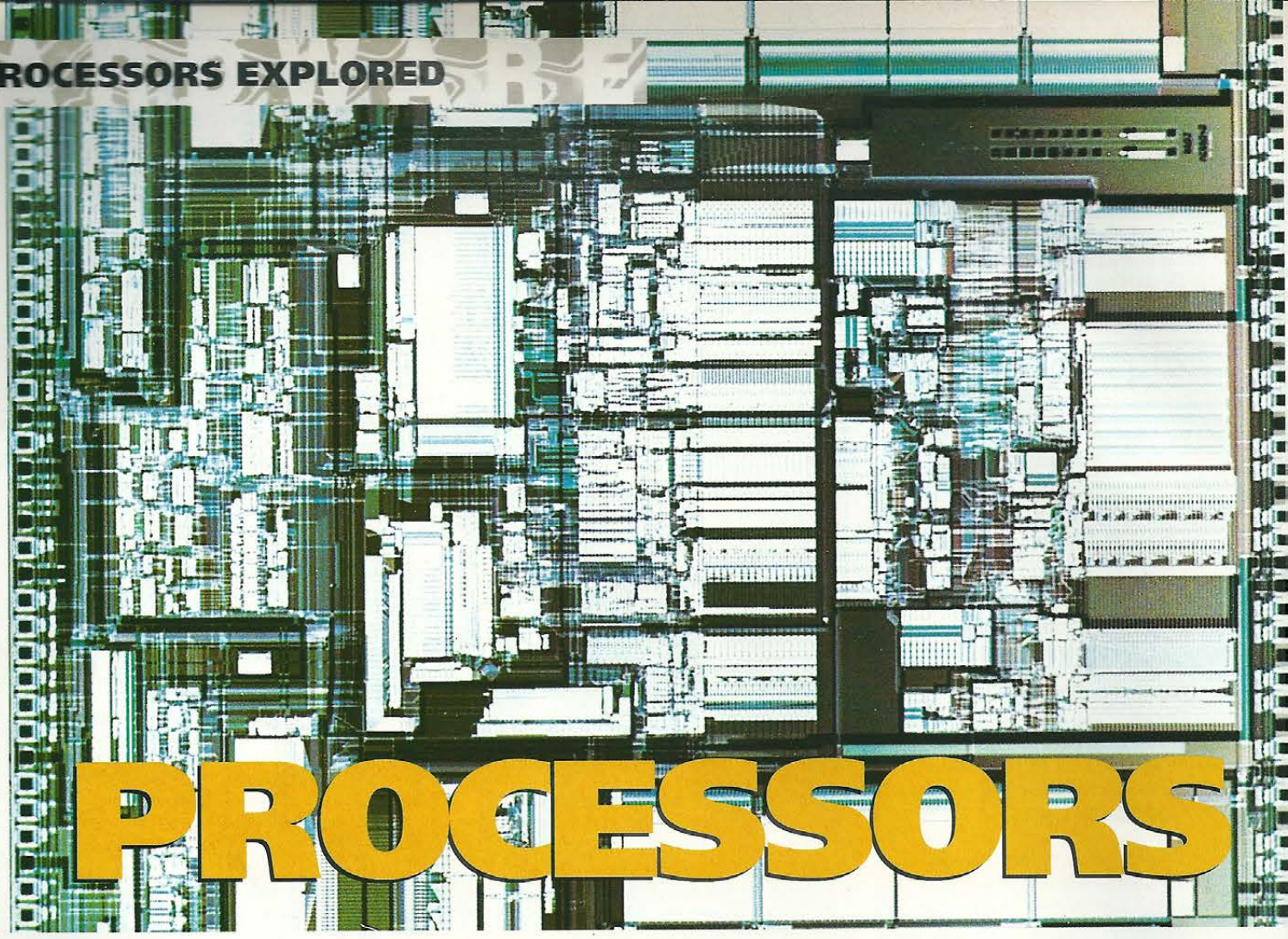
Where other machines have to chuck all of the processing tasks at the CPU, the Amiga can lighten the workload by using the custom chips instead.

This cuts the work of the CPU right down to a minimum. With the addition of the Chip RAM (RAM that is used by both the CPU and the custom chips) and Fast RAM (RAM that is used by just the CPU) with which to split the tasks your Amiga can be rendering an image in the background while you're doing a bit of word processing – that's multitasking.

There you go then, your Amiga – the most versatile home computer ever.







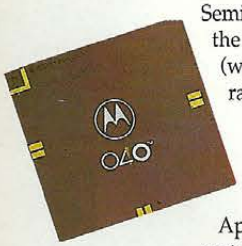
PROCESSORS

If you could choose the heart of your computer which chip would it be, the Intel Central Processing Unit used by PCs or one of the Motorola family that have been used in the Amiga ever since the machine was first launched way back in 1985? We match Intel's 80486 and Motorola's 68040 in a head to head contest

To put Motorola's 68040 and Intel's 80486 Central Processing Units in perspective remember that both are the products of a decade old development race.

Motorola started life as Galvin Manufacturing Co in Chicago during the late 1920s. It made battery eliminators for radios (so they could use mains). Motorola expanded into two-way radios for police cars but it wasn't until the 1950s that it became interested in semiconductors – it couldn't have done it any earlier as they had to be discovered first.

Motorola now employs more than 100,000 people and had a 1992 turnover of $13.3 billion. It's divided into seven divisions. Motorola Semiconductor Products Division make the 68000 range of microprocessors (with the 68040 the current top of the range).



Although at the heart of the Amiga and Atari computers the 68000 series is largely dependent on the continuing support of Apple Computers, by far its largest customer. Despite the 68040's power, modern GUI (Graphical User Interface) based operating systems always want more: not everyone is convinced that Motorola can deliver much more.

Oddly, Motorola does not agree with this analysis. The company is already hard at work on the successor to the 68040 and expects it to appear towards the end of this year or at the beginning of 1994.

Intel, which turned over $5.7 billion dollars in 1992, is in many ways the archetypal one product company – it makes chips, and its main profits come from sales of the 80x86 family, most of which go int IBM-compatible PCs.

Founded in 1968 to make memory chips (RAM

THE FUTURE

In some ways, it's already here. Intel is shipping samples of the Pentium, which would have been called the 80586 if Intel hadn't been told it couldn't copyright a number. The Pentium is the current state-of-the-art in chip technology with over three million transistors. It will eventually run programs at about twice the speed of the 80486, and looks like being the effective end of the road for this kind of chip. It is massively difficult to produce – it's already running two years late, making it hideously expensive. When you can buy one it will cost more than $1,000.

Motorola is also on the move with the 68060. Why no 68050? Well, chips are developed in parallel. The design of these chip generations overlaps, and Motorola found that the 68060 was so much better and so far advanced that it didn't make sense to introduce the 68050, so it stopped development work on it and scrapped it. Instead, the 68060 will appear either at the end of this year or the beginning of the next.

The 68060 will be a 3.3 volt chip, intended for low power operations. Despite its size it should dissipate no more than 6w of heat. It's fully static, which means that when not doing much it can run more slowly, using less power, and when doing nothing it can stop completely without losing track of information in its registers, starting up again without missing a beat.

It will contain more than two million transistors using 0.5 micron technology for high speed operation – initially 66Mhz and will run programs three times faster than the 68040.

Random Access Memory) it created the world's first integrated microprocessor – the 4004 in 1971. This was a measely little 4-bit processor – incredibly limited by todays standards (even an A500 use a 16-bit processor, the A1200 uses a 32-bit processor) was the direct ancestor of the 8086 family of chips.

Its current top of the line Intel microprocessor is the 80486 (or i486 as Intel now likes to style it), a chip so popular that Intel can't make enough of them (luckily, others are willing to help out).

Bags of chips

Yet, even as we write this, two years of development work on the 80486's successor is bearing fruit with the Pentium chip – a 486 with go faster stripes hoped by Intel to have to beating of Motorola/Apple/IBMs newest, top secret processor. However, it will be another two years before the Pentium is cheap enough appear on the desktop.

Both Motorola and Intel must 'maintain backward compatibility' – they must make sure that their new chips work with earlier versions in order to meet customer demands that the new chips run old programs. Thus Motorola's 68040 has buried within it the 68000, 68020 and 68030. Intel's 80486 contains the 8086, 80286 and the 80386.

This imposes limitations on the designers as well as extra expenses in terms of transistors, die size, design time, features and performance.
Both the 80486 and the 68040 come from the CISC (Complex Instruction Set Computing) era. The future is in RISC (Reduced Instruction Set Computing). RISC chips complete their few simple instructions in one clock cycle, CISC chips have hundreds of complex instructions.

The 68040 has many RISC elements, and can in fact complete most instructions in one cycle, helped by a six level pipeline. Pipelines enable processors to cope with several instructions at once.

In the 68040 the pipeline stages are: Instruction Prefetch, Instruction decode, Effective address calculate, Effective address fetch, Execute and Write back. As soon as an instruction clears the first stage a second one can enter it and so on until up to six are being processed simultaneously.

64-bit bursts

The 80486 uses an eight stage pipeline and can carry out simple memory reads, writes and register to register operations, for example, in one cycle. The most complex integer instruction – 16-bit multiply – takes between 13 and 26 cycles.

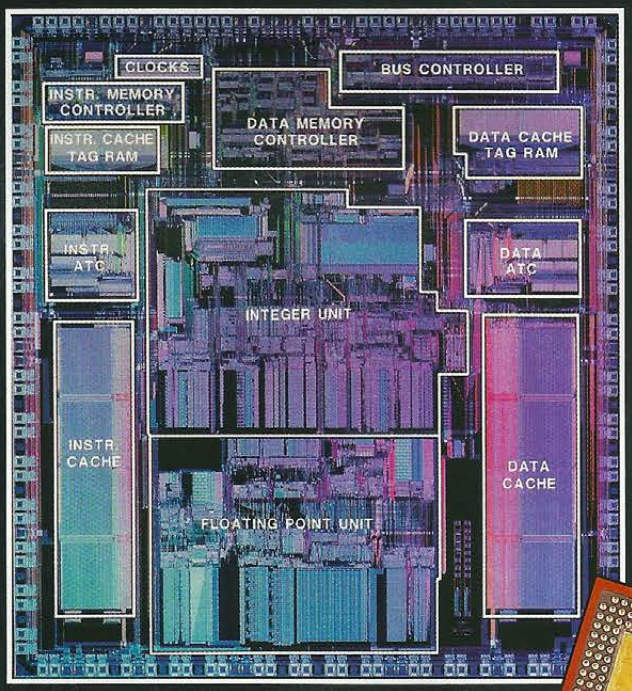
Obviously, whether a multiply operation is faster as a series of one cycle register to register adds or a single complex instruction depends on the code. A good compiler will do whatever runs fastest. So, in the best scenario, the fastest 80486 will do the job about twice as quickly as the fastest 68040. In the worst case it will do it at about one quarter the speed. Clearly, determining which runs programs faster depends on how you use them.

Both processors include on-chip caching with Snooping and Burst mode. Caching means that Instructions and data are fetched, and written to, a fast RAM cache built into the chip. Burst mode means that the cache RAM (and other RAM on the bus) is loaded in at least 64-bit bursts from slower system RAM. In the Mac, the Burst mode of the 68040 can shift graphics data at up to 20Mb per second. Bus snooping overcomes the problem of what

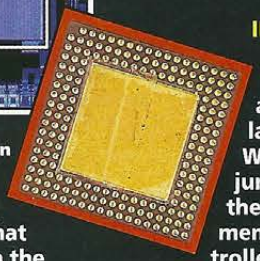
486 v 040: TECH SPECS

FEATURE	80486	68040
Die size	619x414mils	567x610mils
No. of Transistors	1.18 million	1.17 million
Address bus lines	32	32
Data bus lines	32	32
Memory model	Segmented	Flat
Maximum speed	66MHz	40Mhz
Cache	8K data and code	4K data, 4k code
FPU	yes	yes
No of Vax MIPs	45	35
MMU	yes	yes
Multiprocessor support	yes	yes
Instruction pipelining	yes	yes

THE 68040 DISSECTED



The 68040 is the heart of the A4000-40 but you can even put one in your A500, see pages 31-34 for details.



Take off the hard shell and this is what you find underneath: the 68040 stripped bare...

This sliver of silicon is just 567by610 mils, that 's less than half an inch square yet it contains everything necessary to run a full-blown graphics-based workstation.

Take a look at the tiny pads around the edge – they are too small to have wires attached conventionally. Instead connections are simply pressed into place. Now let's explore this little powerhouse more depth:

CLOCKS
These make sure that every operation on the chip remains in strict lockstep. No clock means there's no processing.

INTEGER UNIT
This carries out all the instructions that don't involve floating point maths including stuff like bit rotations etc.

FLOATING POINT UNIT
Carries out complex maths involving floating point operations – such as sine and log operations. It calculates 100s of times faster than software.

BUS CONTROLLER
This looks after numbers going in and out of the chip on to the external memory and data buses.

DATA MEMORY CONTROLLER
Looks after the data cache. It also contains the data memory management unit and bus snooping controller.

INSTRUCTION MEMORY CONTROLLER
Looks after the Instruction Cache. Contains the instruction memory management unit & data bus controller.

INSTRUCTION ATC
Instruction address translation cache. Works in conjunction with the instruction memory controller

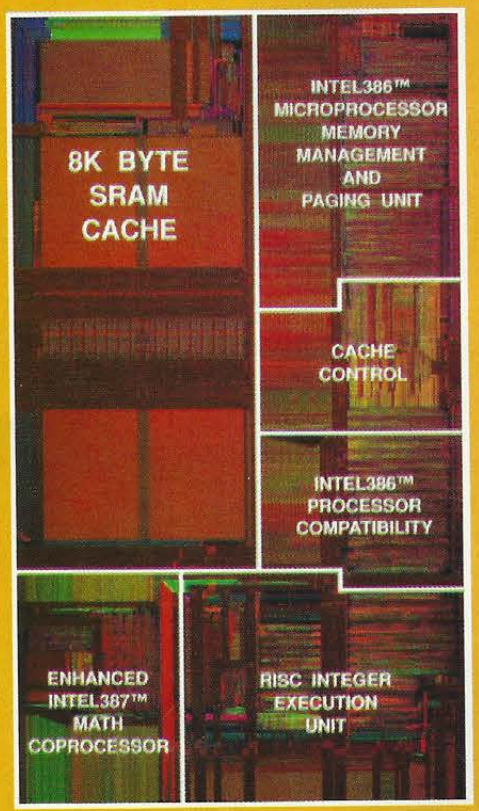
DATA ATC
Data address translation controller. This works in conjunction with the data memory controller.

INSTRUCTION CACHE
Instructions are separated out from the data and cached separately for greater efficiency

DATA CACHE
A write-through cache. Data is read from it, but when written to it main memory must be updated.

THE i80486 DISSECTED

The detailing is so fine that, like a butterfly's wings, the light is refracted from the surface producing much of the colour you see here. The whole thing is just 619 by 414 mils (thousandths of an inch).



WRITE THROUGH 8K RAM CACHE
A mixture of data and instructions is loaded into fast on-board RAM to keep the high speed pipelines fed. Failure to find data in the cache results in slow-downs as main memory is accessed. All writes to the cache are copied through into main memory.

MMU
Memory Management Unit looks after main memory. Paging means that it can pretend memory on disk is really main memory, providing far more memory than actually exists for programs but at the expense of speed – a high cost.

CACHE CONTROL
Does what it says, it looks after the cache, makes sure it stays synchronised with main memory, empties and fills it.

FPU
Floating point unit. This carries out floating point mathematics in hardware which is hundreds of times faster than doing the same thing in software.

INTEGER UNIT
This is where most of the program instructions are carried out. The RISC label is a reflection of its ability to carry out simple instructions more efficiently than earlier processors in the series. Authors should use simple instructions where possible for speed gains even though all complex instructions are also supported.

happens when an external device uses DMA (Direct Memory Access), for example, to write to system RAM whose contents are currently in the cache.

Bus snooping lets the processor see that the RAM has been changed. It can then mark the cache as dirty and update it to keep them synchronised. Both processors can do this.

Both processors contain an FPU (Floating Point Unit). This handles complex floating point mathematics in hardware.

The 80486 conforms to IEEE 754 (which guarantees specific maths operations are available in specific formats), with up to 80-bit representation of floating point numbers.

Floating point calculations can take up to 73 cycles on the 80486 but since these are carried out in parallel with integer instructions in the 80486 they don't really count. FPU operations on the 68040 are similar. Many familiar personal computer programs use no FPU instructions at all.

Memory manager

An interesting point is that while the 80486 FPU is truly backward compatible with the stand-alone 8087, 80287 and 80387 maths co-processors that preceded it the 68040 FPU is not fully compatible with the 68882 on which it is based.

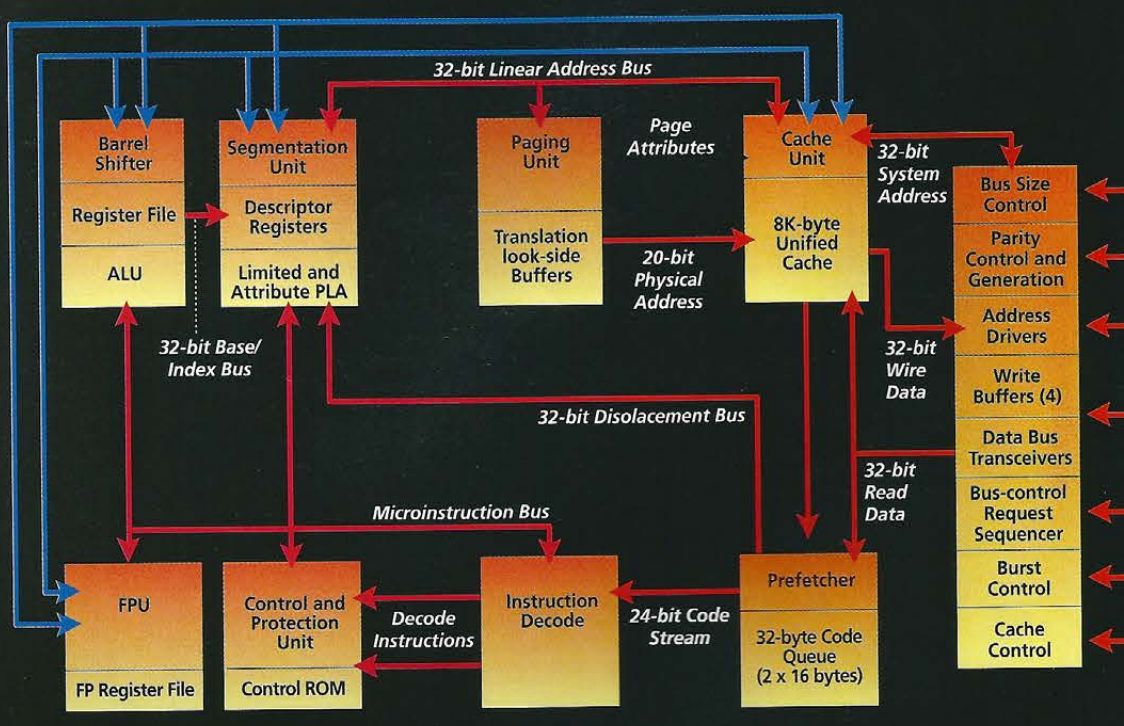
For example, some trigonometrical operations are no longer supported and must be emulated in software, complicating the upgrade process.

The MMU (Memory Management Unit) built into both chips enables the operating system to protect areas of memory from the depredations of rogue programs, making multi-tasking more reliable.

The 80486 inherited memory management from the 80386, but the 68040 memory management unit is more sophisticated than that of the 68030 although it isn't as flexible, limiting page sizes to 4k or 8k, for example.

IN THE BIG BLUE CORNER – THE i486

This diagram shows only the high points. Data comes in and leaves via the system interface, which translates into the pins on the physical chip. Incoming data is held in the cache from where it goes to the prefetcher. The address and the instruction are then handled separately. The instruction is decoded, goes to the control ROM and then on to the internal microinstruction bus. What happens after that depends on what it was. Most are broken up and the bits acted on separately. Floating point instructions are routed to the FPU, integer instructions in the ALU (Arithmetic Logic Unit). The results of all this work are routed back out to the cache, which automatically writes them through into the main system memory. As you can see, most of the time the chip will be dealing with data held in cache with greatly reduced external system bus activity.



Also, some of the instructions are implemented differently. This mainly affects operating systems, but can still mean an OS upgrade for the new chip.

So which is best? In raw computing terms the fastest 66Mhz 80486 is faster in MHz than a 40Mhz 68040. The 486 is more profitable and makes more money than the 68040.

RISCy business

But then again Jeffery Archer makes more money than Kurt Vonnegut! In real terms, the 68000 series chips are conceptually simpler and easier to work with than Intel's chips. They are also a hell of a lot cheaper and consequently appear in a wider range of computing platforms.

Unfortunately, the truth is that both chips are dinosaurs, huge ungainly monsters astonishing more for their complexity and longevity than their elegance. If these chips appeared today, out of the blue, they would die commercially. We owe both to large existing markets for PCs, Apple Macs and of course to the Amiga. In the case of the 68040 Apple and the Macintosh series have been the driving force, and we Amiga owners have been in the excellent position of being able to make the most of this progress. The 80486 exists only because of the IBM PC-compatible market. And with Apple planning to make all its new PowerPC machines compatible with both Mac and PC 'standards' who can say how long the aged PC has left? Apple is also planning to move to a RISC processor for its next generation machines. This means that the Amiga community is set to benefit once again from Motorola's pioneering efforts. The 68060 bodes well for all of us, keep up with ***Amiga Format*** to keep up with all the developments!

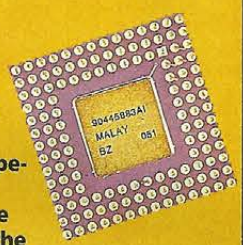
INTEL HISTORY

1978: 8086

A cut down version of this chip launched the PC. The 8086 has 20 address lines and 16 data lines. It worked with the 8087 maths co-processor. 1Mb address space. Horrible.

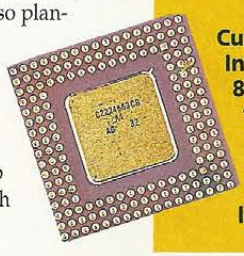
1982: 80286

Described as "Brain dead" by Bill Gates, this chip had 24 address lines and 16 data lines. It could run in a new Protected mode that gave it a 16Mb address space but it was a relative failure on the PC, its main market.



1985: 80386

A full 32-bit chip, 32 address and data lines, 4Gb address space, Flat Memory Model, Protected mode and a special new mode that enabled it to behave like lots 8086 chips – that's the main reason for its success.



1989: 80486

Currently the most popular chip for PCs. Internally, it's twice as efficient as the 80386 (whose architecture it uses) and therefore runs twice as fast at the same clock speed. It contains a built in Floating Point Unit and has 8k of cache memory on board. It's a lovely little mover.

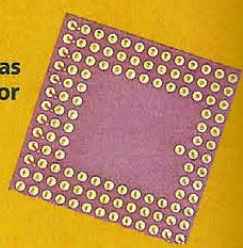
MOTOROLA HISTORY

1979: 68000

Full 32-bit internal architecture it has 16 data and 24 address lines externally. However, there's no support for a maths co-processor. It's still a very popular chip (after all there are still A500s being sold) and since its introduction more than 60,000,000 units have been sold.

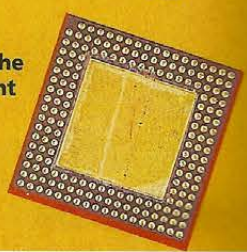
1984: 68020

The next generation of Motorola chip supports full 32-line address and data paths externally. The 68020. Can interface to maths co-processor and memory management unit.



1987: 68030

A full 32-bit chip with FPU and MMU built in. It also has separate 256-byte caches for data and instructions. In some ways this was an interim release and the chip lacked sufficient clout for workstations.



1989: 68040

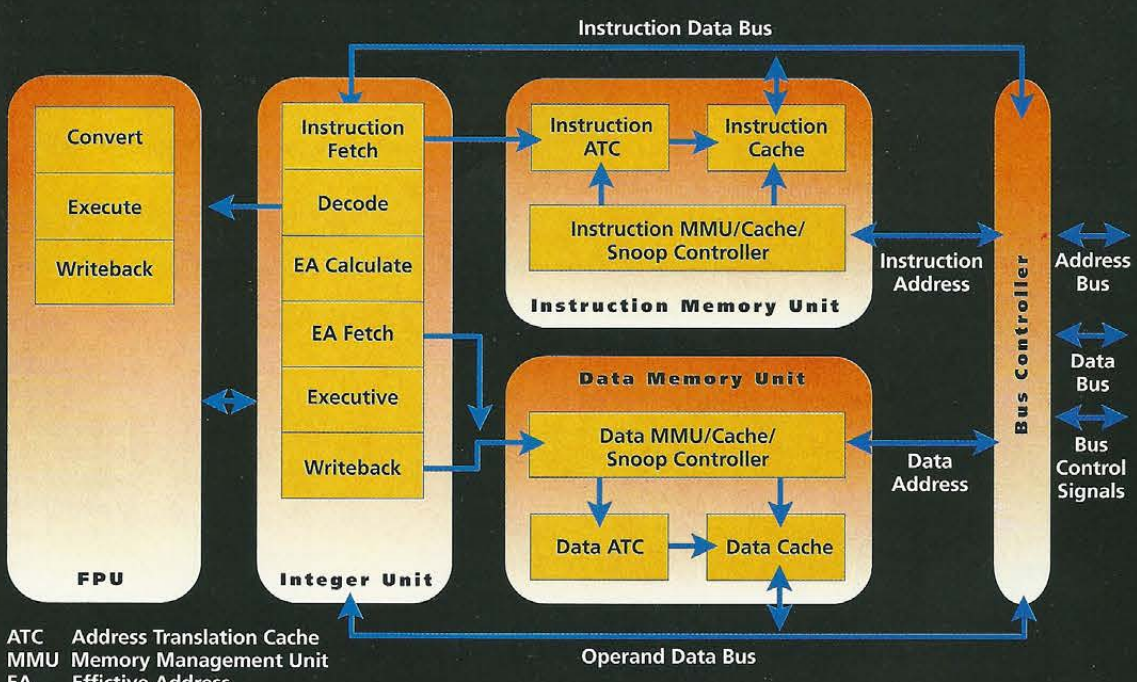
Current state of the art in the 68000 series. A fast, efficient chip with everything the 68030 has as well as burst mode operation, bus snooping and 4k caches for data and instructions.

IN THE AMIGA CORNER – THE 68040

The 68040 is far simpler in conception than the 80486 even though it contains a comparable number of transistors. There is a pleasing symmetry to the design of the chip. Note the separation of the cache into instructions and data with corresponding bus paths. Separating out the data and instructions adds to the 68040's efficiency.

Once the instruction has been through the data memory unit it goes to the integer unit and its six stage pipeline. Instructions intended for the FPU are passed on and return back through the integer unit, which may well be waiting for the results.

The final stage is to write back to the data and address caches and then out to system memory. Note that although instructions are handled one per clock cycle it's actually several clock cycles between inputting an instruction and getting the results back.



ATC Address Translation Cache
MMU Memory Management Unit
EA Effective Address

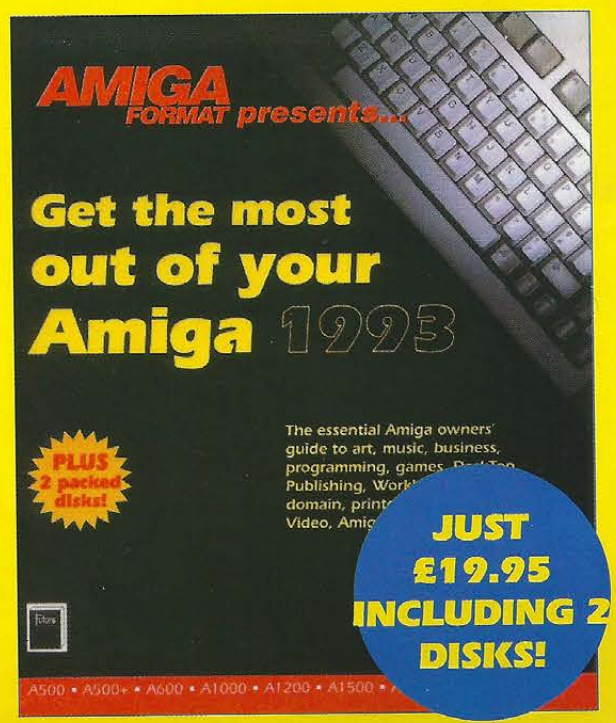
BOOK OFFER

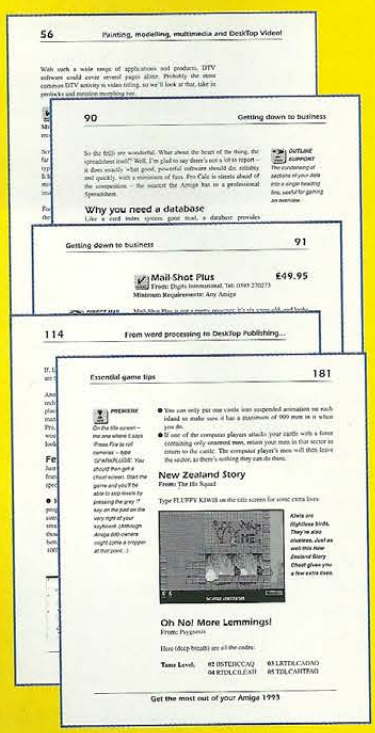
WHAT'S YOUR AMIGA GOOD FOR?

ANSWER:

- Computer art
- Desktop video
- Games
- 3D modelling
- Comms
- Programming
- Multimedia
- Business
- Word processing
- Desktop publishing
- Music

(...Cont. on p2194)





Get the Most out of your Amiga 1993 is the third edition of the best-selling Amiga title first launched in 1991. The aim is simple: to produce the most authoritative, comprehensive and up-to-date guide to the Amiga, its uses and its software.

Separate sections are devoted to specific subjects like music, word processing etc. and they're structured so as to provide background information about that area followed by specific product recommendations.

The Amiga market continues to expand at a terrific rate following last year's hardware launches. Because of this, Get the Most... has been completely rewritten for 1993, and in the process has swelled to well over 300 pages. Also included are two disks packed with specially-selected public domain and shareware software.

The Amiga is the most powerful, versatile and cost-effective computer there is. Find out just what yours can do with **Get the Most out of your Amiga 1993**.

- 300+ pages
- 90 reviews
- 50+ game tips
- 1.5Mb software

Get the Most out of your Amiga 1993 Priority Order Form

Get the Most out of your Amiga 1993 will be available in the shops, but you can order a copy of this book right now, direct from our own Mail Order department. Postage and packing is FREE – you don't even need a stamp to send this order off!

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Method of payment (please tick one):

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CARD NUMBER
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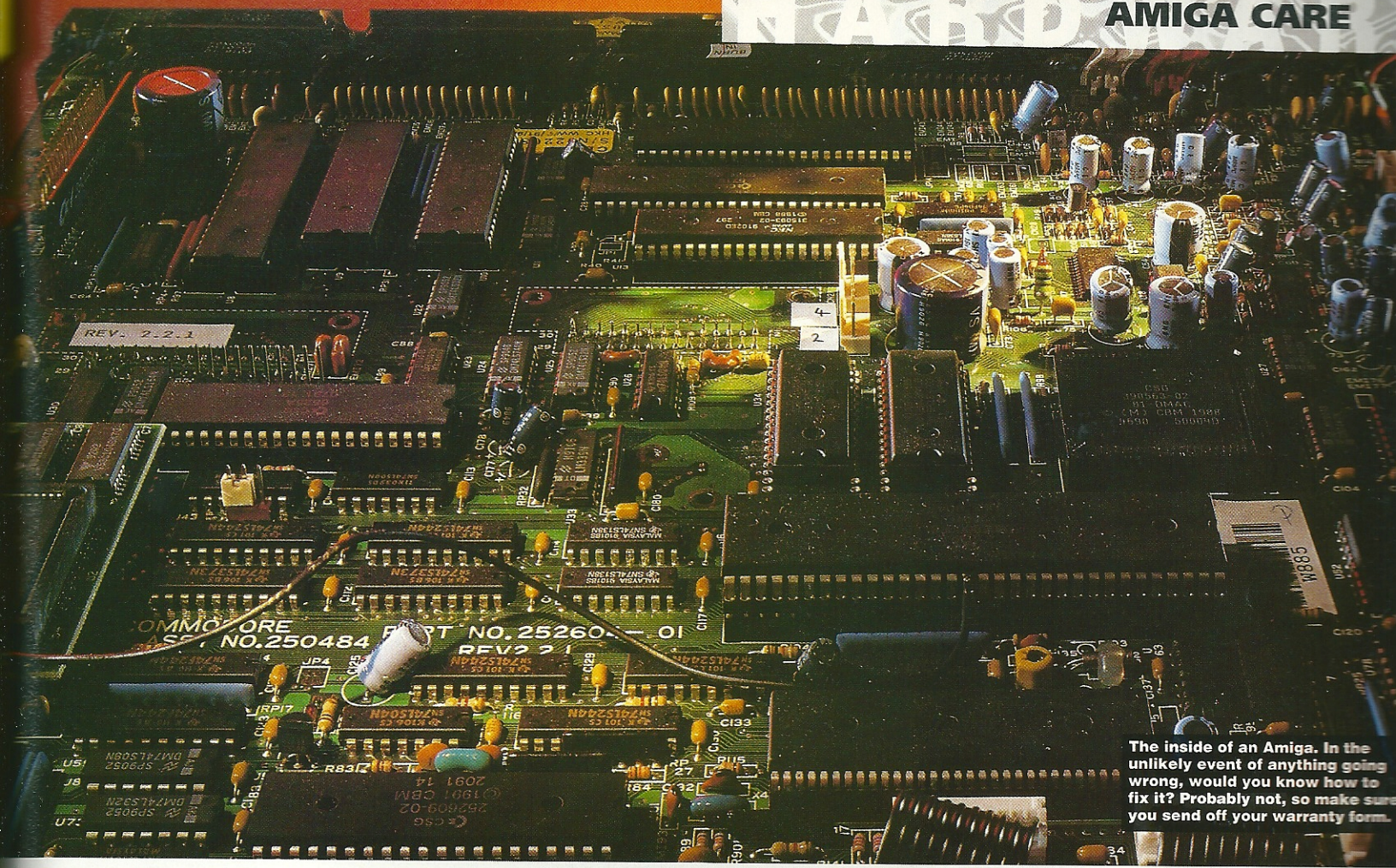


The inside of an Amiga. In the unlikely event of anything going wrong, would you know how to fix it? Probably not, so make sure you send off your warranty form.

WHAT'S IN THE WARRANTY

Although we are looking at all the best in Amiga hardware, you shouldn't forget about the most important piece of all – your Amiga. So take some time and some tips on care of your machine...

As soon as you take delivery of (or walk out of the shop with) your brand new Amiga it becomes the least important piece of hardware you own. A strange thought, but true. You are far more likely to take care of an external CD-ROM drive, a joystick, a printer or even a mouse than you are to take any interest in your Amiga. The reason for this is that you, like most people, probably believe that your Amiga is immortal.

It isn't.

It will go wrong. It will develop faults. It will need repairing, and this will cost you money.

But before you start thinking that you've bought the wrong machine, or that yours hasn't gone wrong so far, so this must be rubbish, consider this thought; all machines go wrong sooner or later, luckily the Amiga comes with a piece of paper that goes some way to protect you against this.

When you get your Amiga, the first thing to do is to control your desire to plug it in and boot up your favourite game or start some work with *Imagine*, or connect up your new ICD, GVP or AdIDE Novia hard disk. Instead, sit calmly at your kitchen table and fill out the warranty.

This small piece of paper will give you peace of mind because it ensures that Commodore, and subsequently Wang the company that currently holds the UK franchise for Amiga repairs, will have your name and address. Like all such documents, the Amiga Warranty looks fairly daunting, but you should treat it seriously. Here's what you'll find in the warranty:

Front page: take note of the 28 day limitation on this document, and make sure that you've hung on to your receipt.

Page 1: (a) In-Home warranty. Yes this actually does mean that Commodore's repair agents (Wang UK) will knock on your front door and attempt to mend your faulty Amiga. If you have an A4000-40 or A4000-30 the warranty will say 'on-site' rather than 'in-home', this is because Commodore assumes that all A4000 owners are serious business people who only use their machines at work. The rest of the warranty is the same as the home-users' except that you don't get asked to join the Commodore Registered Users Club.

b) *Commodore will provide this service on a four working day basis* – well not exactly Commodore, it will be Wang. The 'four working day basis' means that if you were to phone them on Friday the 1st, a technician would be on your front porch at the latest by Thursday the 7th – this excludes Saturday and Sunday (because they're not work days).

c) Model: just write Amiga or CDTV in here.

d) Model No: – make sure to fill this in (A500, A500 Plus, A600, A600HD, A1200, A4000-40 A4000-

30, A2000, A1500, A3000, or CDTV) so that when the engineer turns up, he or she will bring the correct parts and be aware of what the problem might be.

e) Serial No: again, make sure to fill this in, and to take note of it yourself. The serial number is on the underside of your machine on a small sticker. With the A1200 you might find that the sticker says: Model: A1200 No: 1234567 the second number is the serial number so write this one down.

f) Telephone number: this is your telephone number.

g) Commodore Customer Care Helpdesk 081-231 3700. If you do encounter any problems, then this is the first number that you should call.

Page 2 – this is the page with the lilac coloured strip running down it, and a blue box with the words: *Conditions of In-Home Warranty to the Customer*, and to the best of our knowledge this is what it all means:

This warranty applies only to products manufactured and sold by or on behalf of Commodore – fairly straightforward this one. It doesn't say Commodore (UK) so one could assume that products bought in Europe or the United States would fall under this warranty... until you read point six (below) that is.

BENEATH THE SURFACE

Because the Amiga now makes use of Surface Mount Technology (SMT) in machines subsequent to the A600, Commodore claims that the chances of faulty Amigas are limited, so you shouldn't have to call on the services of Wang anyway.

Why is this? Well, SMT means that all the chips – the main Motorola processor, the logic chips and the custom chips – are actually soldered to the motherboard inside the Amiga. This takes over from the previous system whereby the chips were fitted into sockets that were welded to the board.

Surface Mount Technology ensures that chips cannot come loose accidentally (as had happened occasionally with machines such as the A500). That's the upside of the equation. On the downside is the fact that A600, A1200 and A4000 users cannot simply upgrade their Amigas by opening the casing and fitting new chips unless you are an expert with the soldering iron. No, if you want to upgrade your SMT'ed chips, you will have to get an expert to do the job for you.

Please read this warranty notice carefully... we couldn't agree more. People just do not take the time to read the small print, you should make sure to for your own sake.

Your Commodore product is guaranteed by Commodore against defects in materials and workmanship appearing within one year of the date of purchase. You must make your claim under this warranty within the one year period. Commodore has full discretion on whether or not to repair and/or replace any defective product covered by this warranty.

Now, this last line does seem to be just a little at odds with the rest of the document; Commodore will only repair the items that it wants to. What it does however, is to cover itself against people who throw their Amigas down the stairs in a fit of pique, who smash them with a hammer in order to unloosen screws and so on. If your Amiga has suffered from damage through no fault of yours, then Commodore (via Wang) will fix it for you.

The statements in this warranty are in addition to your statutory rights as a consumer and do not diminish those rights in any way. – this again is more straightforward than it looks. Commodore is bound to include this in the warranty. In order to find out exactly what your statutory rights are, you should call the Consumer Association on 071-486 5544.

We now come on to points one to seven:

1 *You will be required to provide proof of purchase and proof that any defect arose within the one year period.* – well the proof of purchase shouldn't be a problem, a receipt will do. However, if you were given your Amiga as a present, you will have to ask the person who gave you the gift to hand over the receipt as well. As for proof that the defect arose within the year, this really only applies towards the end of the year in question.

So we phoned the Helpline number and asked how we would offer such proof, we were told the following by a lady on that line: "I've never come across that. Well, I don't know if I should be telling you this, but we do bend the rules a bit." She then transferred us to another lady who worked for 'Warranties'. She told us: "Yes, (proving the date) would be extremely difficult. Between you and me, it's just there for looks."

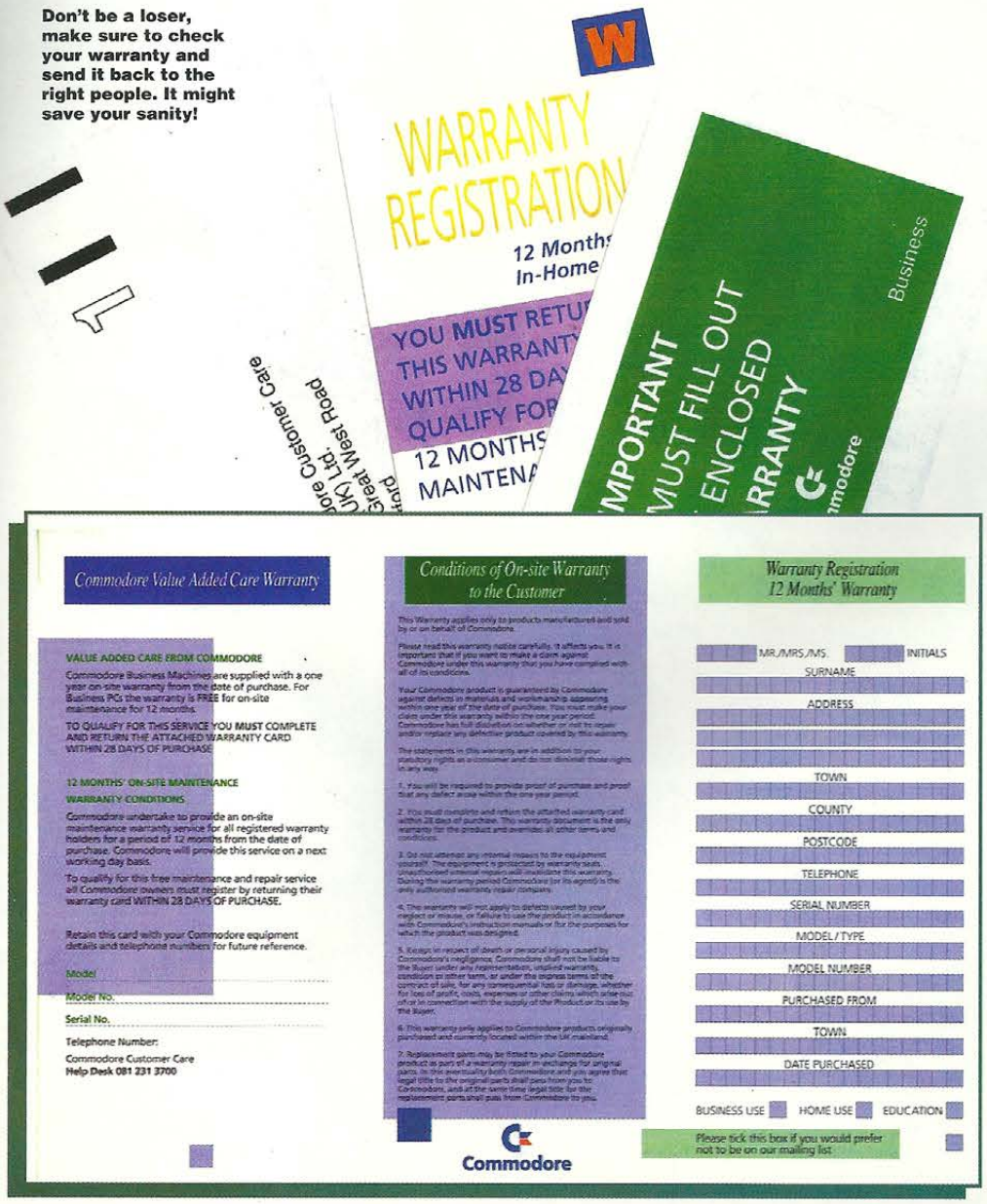
Because proving the date on which your Amiga stopped working is nearly impossible (unless you have a lawyer prepared to notorise a proof for you), this attitude is a very good thing indeed.

2 *You must complete and return the attached warranty card within 28 days of purchase. This warranty document is the only warranty for the product and overrides all other terms and conditions.*

The last line of this small paragraph does not, however, override your usual rights as a consumer.

3 *Do not attempt any internal repairs to the equipment yourself. The equipment is protected by warranty seals. Unauthorised internal repairs will invalidate this*

Don't be a loser, make sure to check your warranty and send it back to the right people. It might save your sanity!



warranty. During the warranty period Commodore (or its agent) is the only authorised warranty repair company.

This has confused Amiga owners for a long time mainly because of the phrase 'internal repairs'. Many people will quite happily go out and buy a new hard disk for their A1200, A600 (and all the rest of Commodore's range), open their machine, fit the hard disk and work happily with it, blissfully unaware that this upgrading is actually considered by Commodore to be 'internal repairs'. What Commodore actually means is that you must not break the warranty seals on your Amiga.

Happily however, there is still a way of fitting hard disks and other upgrades that would normally involve invalidating the warranty, and still remaining within the terms of the warranty. What you have to do is to take your Amiga to a dealer recognised by Commodore. Phone Commodore on 0628 770088 for details of Commodore-authorised dealers.

inch available. Check that the unit has an external power supply. At the very least this should be an optional extra that you should immediately purchase for your own sake.

Although the Amiga can (just about) power an external hard drive, assuming that you've not much RAM installed and that your external floppy drive i an extremely low-power device, it's really rather a rash thing to do.

Remember, the drive takes up your expansion slot, and although some drives have through-ports, most don't. And that means that you're limited to Trapdoor RAM expansions that can increase your Chip RAM but not your Fast RAM. Most drives enable you to add RAM in some form or other, ofte in the form of SIMMs (Single In-line Memory Modules) that are widely available.

Another thing that you might want is a drive disable switch. These are less important now that games manufacturers accept that many Amigas have hard drives fitted, but there are still some games that refuse to function correctly unless any external RAM and hard drive has been disconnected. A switch that performs this function is much more convenient than physically unplugging the drive, and far less wearing on the edge connectors. I you don't play games you don't need to worry about this

The Commodore warranty covers all the company's products, including the A570 CD-ROM drive pictured above. Make sure you read the small print in your warranty and return it to Commodore immediately.

4 *This warranty will not apply to defects caused by your neglect or misuse, or failure to use the product in accordance with Commodore's instruction manuals or for the purposes for which the product was designed.*

The interesting points in this paragraph are the words neglect and misuse. Neglect means a situation such as spilling coffee into the machine (because you have made a habit of putting coffee cups on top of your Amiga). Misuse could be a situation where you have taken a disk from a drive while that drive was still accessing the disk, or where you have plugged in or unplugged a peripheral from your Amiga while it was still powered-up. So make sure to keep in mind that, even if Wang is prepared to 'bend the rules' a little, you are not covered against everyday wear and tear (or your own negligence). You are covered against faults in the hardware. If you want to be really covered, you will need to extend your own insurance.

5 *Except in respect of death or personal injury caused by Commodore's negligence, Commodore shall not be liable to the Buyer under any representation, implied warranty, condition or other term, or under the express terms of the contract of sale, for any consequential loss or damage, whether for loss of profit, costs, expenses or other claims which arise out of or in connection with the supply of the Product or its use by the buyer.*

Interesting one this, especially the first line. The *Except in respect of death or personal injury...* means that unless you can prove that your Amiga came with a fault such as a defective capacitor that made it explode and give you 90 per cent burns, then Commodore won't be liable – in the event of your death, the process of proof could be difficult!

The next few lines are a little more dense and difficult to work out. For a start they appear to have been lifted from a longer document in which you have been defined as 'the Buyer'.

Basically this section means that if you are using your Amiga for a business, and your Amiga goes wrong (say for example that you're using a spreadsheet and a database and you store the data on the hard disk of your A600HD that then proceeds to fail causing all the data to be lost and your business to go under, then it's not Commodore's fault). An interesting one this and a potential legal minefield.

To this end, Commodore has further protected itself with the clause about other warranties or contracts. This means that if you bought your Amiga from a dealer that had its own warranty or contract of sale that covered against loss of profit or expenses, this contract would not apply to Commodore. A situation could arise whereby a dealer offered such a contract but then went bust – in this event, Commodore isn't liable.

6 *This warranty only applies to Commodore products originally purchased and currently located within the UK mainland.*

The only thing to watch out for here is that if you were to move overseas (including Eire), this warranty would not apply.

7 *Replacement parts may be fitted to your Commodore product as part of a warranty repair in exchange for original parts. In this eventuality both Commodore and you agree that legal title to the original parts shall pass from you to Commodore, and at the same time legal title for the replacement parts shall pass from Commodore to you.*

This basically means that you don't end up owning two A4000 motherboards, and that Commodore can take away the faulty hardware, mend it, and re-use it.

And that's about it for your warranty card. We really can't stress how important it is for you to send back your card within the 28 day limit. Despite all the clauses and the sub-clauses, it makes sense to have the 12 months free in-home (or in-office) cover. If you've already gone past the 28-days, then we seriously suggest that you think about insurance.

Finally, the Commodore Registered Users Club. You are asked to join this club (and pay £17.95 for the pleasure). This entitles you to a news-letter and also enables Commodore to have your name on a mailing list, because as far as we could see there is nowhere to indicate that you don't want to be included on a list (the warranty card includes a tick-box). Having tried to get information from Commodore about this club, and having been shoved from telephonic pillar to post without further enlightenment, we can only leave the choice of membership up to you.

HARD DIS

Amiga Format has recently been extolling the virtues of hard disks for the Amiga. Why should this be? Why should you care? What is in it for you? Read the next few pages and you'll more than find out...

When the first Amiga hard disk drives appeared, even a 20Mb unit cost roughly the same as the Amiga itself – and you were rich indeed if you were able to buy anything larger than 40Mb. In fact, you'd have been lucky to find anything bigger than that.

There were other problems too; drives were incompatible with each other, had to be unplugged before you could play any games and prevented you from adding anything else to the Amiga's expansion port. But things have changed, and now an internal 120Mb drive for your A600 or A1200 will set you back only around £300 or so.

External units have dropped in price too – and normally incorporate features such as a SCSI expansion port for extra peripherals, the ability to add RAM and even accelerator and emulation cards.

Prices now, especially of the lower-capacity units, are such that every Amiga owner should seriously consider buying a hard disk. If you still need convincing, try using an HD-equipped Amiga for a day or two, and then go back to your floppy disk-based system where everything takes far longer to load, you're forever running out of space to store files, and you are limited when it comes to the number of fonts and commodities you can have on your Workbench boot disk.

There are, basically, three different kinds of hard drive for your Amiga. First, the external units that plug in to the A500 and A500 Plus, and are for the most part, SCSI-compatible. These days, most of the SCSI models come with external SCSI interfaces built in, for daisy-chaining other devices.

Next are the internal IDE drives for the A600, A1200 and A4000. Commodore has already included an IDE interface for these computers, and has left room for such a drive to be fitted internally.

Finally, if you've got an A1500, A2000, A3000 or

whether or not to repair and/or replace any defective product covered by this warranty.

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CARING FOR YOUR DRIVE

There is one adage regarding hard disks that you should bear in mind:

'Hard disks are superb for storing large amounts of valuable data in one place. This equates nicely with the statement that hard disks are superb for losing large amounts of valuable data from one place.'

Caring of your hard disk(s) is not an activity you should take lightly. The longer you use a hard disk, the more you will come to rely on it, so when the day comes that it does crash, you will either be bereft or you will be prepared. Be prepared.

Hard disks is a relatively robust piece of equipment. The disk itself is sealed in an air-tight container, so there's little chance of dust or dirt getting in and damaging it.

However, there are still some precautions that you should take. Of course, you should be fairly gentle with the drive – don't throw it around – and, if it's an external unit, try not to keep plugging and unplugging it from your Amiga – this will wear out the edge connectors.

If you buy an old drive, beware because it might not be auto-parking. The heads of a hard disk drive should 'park' before the drive is turned off, they should move to a position where a jolt to the unit won't make the read-write heads collide with the disk's surface. This would result in lost data and probably a damaged disk. So always remember to park the drive (this usually happens from software level) before moving it. If you are buying secondhand, make sure to get the parking software into the bargain.

All new drives auto-park, but some older ones require you to run a special utility to do this. However, never run a parking utility on an auto-park drive – you may damage the mechanism.

You may find that after a few months' use, the performance of your disk starts to suffer – it slows down when accessing programs, and your Amiga takes longer to boot up. There is a reason for this: files and programs are not usually stored in one chunk on a disk, in order for them to fit on a disk, the Amiga places the information where it can on the disk. The addresses for the data are then held in the Directory in the form of Tracks, Sectors and Blocks. This means that every time you save a file from your word processor or a new graphic from *DPaint* your Amiga has to find a place to store them. Equally, every time you erase a file a new space is opened up to be filled later. So, the longer you use you HD, the more fragmentary the data becomes. This slows down the disk access and forces the read/write heads to skip hither and thither all over the disk as it attempts to piece together files. All of this increases the chances of a head-crash (the R/W head actually crashing into the magnetic media). But you can defragment the disk using specialised software.

A disk defragmentor will take all the parts of a file and collect them together again – so that the disk head has less work to do. However, there is a (slight) risk involved in this procedure. If there's an interruption to the defragmenting process for example, a power failure, it's possible that some of your files may be lost.

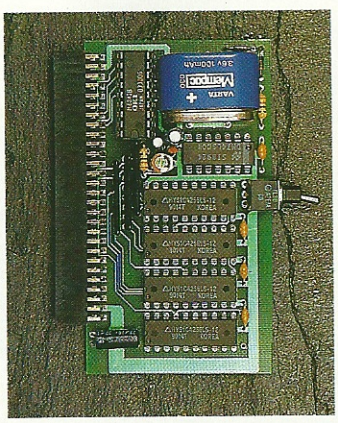
For that reason, it's vitally important that you back up your data before you defragment a drive.

inch available. Check that the unit has an external power supply. At the very least this should be an optional extra that you should immediately purchase for your own sake.

Although the Amiga can (just about) power an external hard drive, assuming that you've not much RAM installed and that your external floppy drive is an extremely low-power device, it's really rather a rash thing to do.

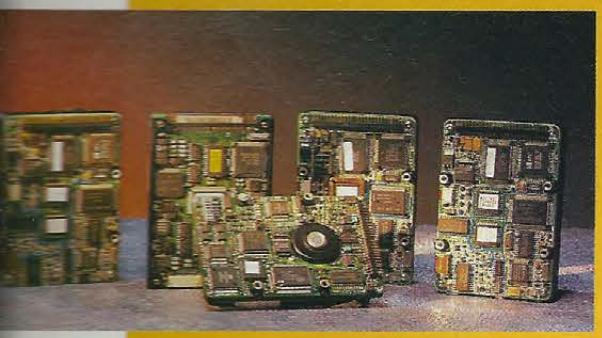
Remember, the drive takes up your expansion slot, and although some drives have through-ports, most don't. And that means that you're limited to Trapdoor RAM expansions that can increase your Chip RAM but not your Fast RAM. Most drives enable you to add RAM in some form or other, often in the form of SIMMs (Single In-line Memory Modules) that are widely available.

Another thing that you might want is a drive disable switch. These are less important now that games manufacturers accept that many Amigas have hard drives fitted, but there are still some games that refuse to function correctly unless any external RAM and hard drive has been disconnected. A switch that performs this function is much more convenient than physically unplugging the drive, and far less wearing on the edge connectors. If you don't play games you don't need to worry about this



There is more than way to use a hard disk depending on the type of Amiga you have. The A500 for example, makes use of SCSI drives, but remember that this will limit your choice of RAM upgrade to the Trapdoor kind (above). The alternative might be to get an A1200 or an A4000 (right) that use neater internal IDE-type drives. Of course, forking out for an A1200 is beyond some people's pockets, unless you go for the A500 trade up (see *Amiga Format* issue 49 for more information on this!).

IDE AND SCSI



IDE stands for Intelligent Drive Electronics and SCSI stands for Small Computer System Interface. IDE drives are currently to be found inside the A4000-40, the A4000-30, the A600 and the A1200. At present SCSI drives are in the A1500, 2000, 3000, 500, 500 Plus.

Commodore recently switched from SCSI to IDE because IDE is more common than SCSI, mainly because the PC world has adopted IDE as a standard, and therefore IDE is cheaper.

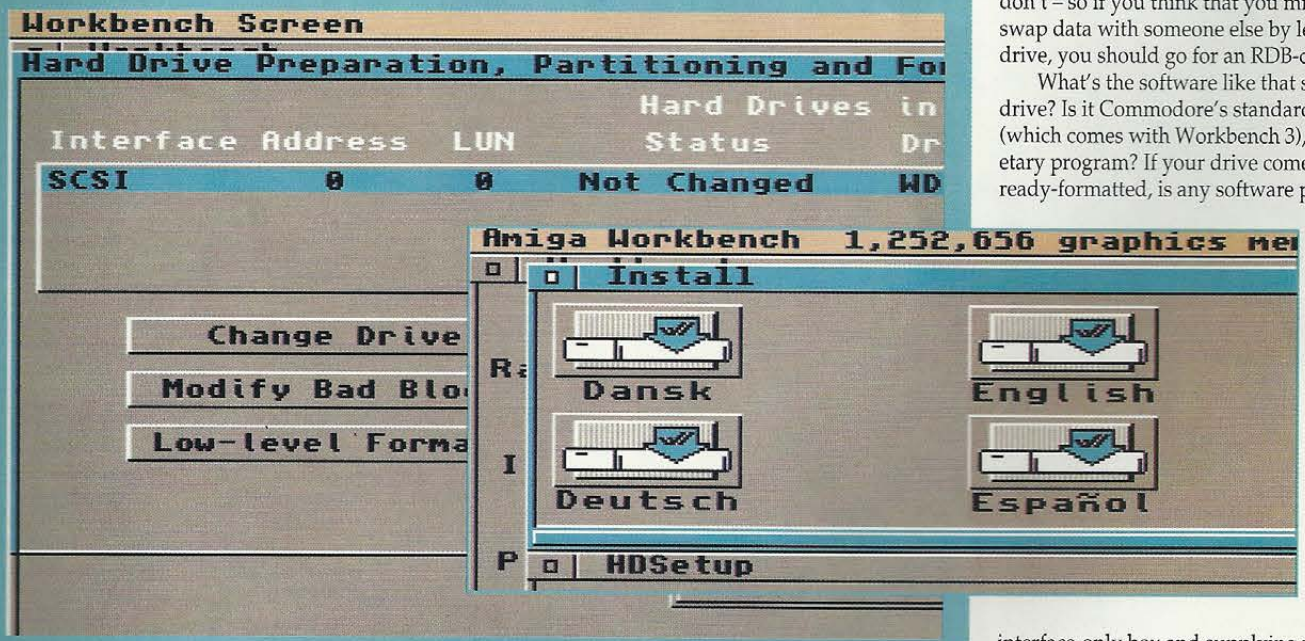
IDE, as its name suggests, can only cope with drives (hard and floppy). SCSI is more versatile, you can run seven peripherals from one SCSI controller, these peripherals include drives, but you can also use printers, tape streamers, networks and scanners.

Generally speaking though, SCSI peripherals are more expensive.

The other major difference between the two is that when you buy an IDE drive, you get the drive and the controlling hardware as one unit. But when you buy a SCSI device, you need to get a separate controller to link in with the SCSI port on your machine. This is one of the reasons that SCSI is generally more expensive than its IDE counterparts.

Happily for all those people who have upgraded from SCSI-A500s to IDE-A1200s and now find their SCSI hardware useless, you can now get a SCSI connector from ICD via Power Computing that will enable you to use a SCSI device with your A4000 and A1200.

SIZE DOES MATTER



When Commodore decided to change from SCSI to IDE, there was no mucking about! In fact the change happened so fast that even the A1200's initial *HDInstall* still refers to SCSI. Don't let this worry you. it still works with IDE. And look at the number of different languages you can use...

When buying a hard drive, go for the largest capacity that you can afford. 42Mb may seem like far too much space when compared to a floppy disk, but you'll soon find that it fills up.

If you do buy a large drive, it's a good idea to partition it. This makes the physical unit appear as two or more separate disks – DH0:, DH1: and so on. There are several advantages to this. The first is that it makes disk organisation easier – you can keep your Workbench files on one partition and all your work on another.

However, a more important consideration is that if a virus attacks your boot disk, all your other partitions should still be safe – so your work won't be destroyed, just the boot partition. And you did back that up, didn't you?

Is there a fan included in the unit? Most disk drives themselves don't get particularly hot, but any RAM expansion in the case could get hot – and without a fan you could run the risk of the unit overheating.

If you've got a SCSI unit, is the external SCSI port included in the price, or is it an extra? If it's extra, is that a problem? For many people, the only peripheral that they'll add to the expansion port is the hard drive, so not having the ability to chain other SCSI devices to it isn't a problem. But if you think that you're going to want to add another drive or two, or perhaps a scanner or a SyQuest drive, then the question becomes far more important – and if this is the case, you'll certainly want to make sure that you have a SCSI unit rather than IDE.

Is your unit Rigid Disk Block (RDB) compatible? Commodore has laid down a standard for Amiga hard drives that means, theoretically at least, that drive controlling software and hard drives from different manufacturers are all compatible. Central to this standard is the RDB. This is a table of information about the drive, including which partitions are in use, which file system they use and so on. This table is written to a section of the disk itself so that any software such as disk repair programs, defragmentors and the like can read it off and know just how the drive has been set up. In principle, this means that a drive formatted on one Amiga can be used with no problems on another, even if it's a different model. In practice, although most drive manufacturers support the RDB standard, some don't – so if you think that you might ever want to swap data with someone else by lending them your drive, you should go for an RDB-compatible unit.

What's the software like that ships with your drive? Is it Commodore's standard *HDToolBox* (which comes with Workbench 3), or is it a proprietary program? If your drive comes ready-formatted, is any software provided at all? The least that you'll need is a utility to partition a drive (most people keep one partition for Workbench, and another for their programs and files). Ideally, you should be able to low-level format the drive – especially if you're buying an interface-only box and supplying your own drive because many are pre-formatted for PCs and will have to be re-formatted before you can make any use of them on your Amiga.

Internal drives

The choice for A600, A1200 and A4000 owners is simpler because these Amigas come with IDE interfaces built-in, so it's just a case of buying a compatible drive and installing it – or, if you're at all nervous of pulling your Amiga apart, having it installed by your dealer. Remember that installing a drive yourself will invalidate your warranty, and for that reason alone many people won't want to do the job themselves. Basically, you can use any 2.5-inch

IDE drive that is sold as being Amiga-compatible. Your only real choice is the capacity of the drive. Shop around the adverts in magazines such as ***Amiga Format*** and *Amiga Shopper* to find the best deals – a 120Mb drive is likely to cost you about £300, and if you really need a large capacity unit you will find 160Mb drives are starting to appear.

The problem is that, unlike a SCSI drive, you can only use a maximum of two drives from an IDE controller – and we've never seen anyone fitting two drives into an A600 or A1200. The power supply may well have trouble running both drives for a start, so it's not really an experiment that can be recommended.

Whether you fit a drive yourself or have it fitted by a dealer, make sure that you get the *HDToolKit* program from Commodore so that you can format and partition the drive. You may find that you have to buy this separately – but it really is essential. Unless, of course, the people who supply the drive also supply their own software that performs a similar function.

A600 owners should ensure that they have Kickstart 37.300 ROMs or higher because there are problems with using a hard drive with earlier versions. To check this, select 'About...' from the Workbench menu. If you find that you've got Kickstart 37.299 then you'll have to have the ROMs in your machine upgraded before you can use a hard drive. A1200 owners won't have this problem.

Hard cards

If you're buying an internal drive on a card for an A1500, A2000, A3000 or A4000, many of the questions you need to ask are the same as those for external units. Decide whether you want a SCSI or IDE solution – SCSI is probably preferable here, because if you're using a high-performance Amiga you may well want to add more storage capacity later. Check whether you can add RAM to the card – that saves using another expansion slot for adding memory. And do make sure that the card is totally compatible with your model of Amiga before you buy. Finally, you must remember to check that set-up software is included, whether it be Commodore's own or a proprietary program.

BACKING UP YOUR DATA

We know that many people don't take the next piece of advice at all seriously; if you are one of those people then on your own read/write heads be it. This is not a case of might... you WILL regret not taking this seriously. You should take a back-up of your data every month – or more frequently if you have really important work on your hard disk. Many people don't bother – they consider it just too much hassle to copy all their files to floppy disks. Many people regret this decision.

There are a number of ways to back-up. The least efficient is just to copy each file manually to floppy disks. This takes ages, and requires a lot of floppies. A far better way is to get hold of a program called *Quarterback* from Central Coast Software (it even includes a 'disk optimiser' – Defragmentor. Call 0101-512 328 6650 for more info).

If you have a large disk and need to back-up frequently, it may be worth looking at a heavy duty device such as the tried and tested technology of a tape streamer, or an external hard disk reserved for back-ups.

To use one of these you'll need a SCSI interface – and this may be something that you need to consider when you're specifying your original disk interface.

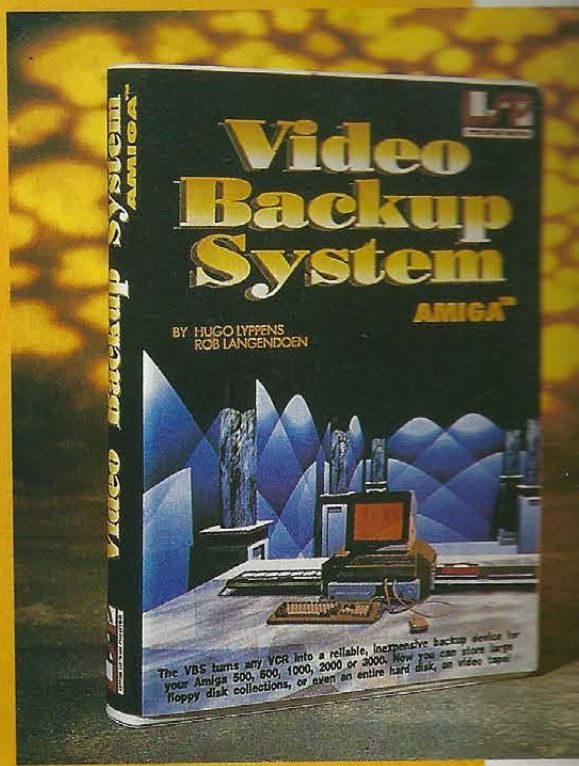
It's far faster to back up all your data to a streamer or another hard drive than it is to floppies, and restoring is simply a case of dragging one icon to another.

Many people partition their drive (see boxout – Size Does Matter) and back up one partition to another. This is fine if all you're concerned about is a software problem wiping out your files, but is no protection against a hardware failure.

If you use this method, you should still back up to floppies from time to time.

Finally, a relatively new product could be the answer to your back-up needs. It's called the Video Back-up System, and it costs £59.99 from Power Computing (0234 843388). It consists of software and a connector that links the serial port of your Amiga to your video recorder. Believe it or not, it then saves all your data to a standard video cassette.

In essence, it's a kind of tape streamer, but the price is about a tenth of the cheapest streamer. Video Back-up System recently received an *Amiga Format* Gold award of 93 per cent in issue 45, and is highly recommended.



The Video Back-Up System is one of the more interesting ways of backing up your data.

RECOMMENDATIONS

If you're looking for an external hard drive for your A500 or A500Plus, one company stands head and shoulders above the rest: Great Valley Products, or GVP as it's more commonly known. The HD8 Plus costs just £299 for a 42Mb version.

The HD8 Plus can have up to 8Mb of RAM fitted internally, and also has a mini-slot into which a PC emulator from the same company can be fitted (it emulates a 16MHz 286 PC, and costs £99). It's a SCSI unit, so it can handle up to six external devices all at once.

The other external GVP hard disk is the A530, that includes a 40MHz 68030 accelerator to really power up your Amiga. Prices for this start at £499 for a 42Mb drive. GVP also produces expansion card interfaces and drives for the modular Amigas such as the A2000. All GVP products are available from Silica Systems on 081-309 1111. If you're looking for an external drive on a budget, you could do worse than look at the AlfaPower HD, that is distributed by Golden Image (081-365 1102). This costs £199 for the 40Mb version, and includes a range of features including space for up to 8Mb of RAM and separate drive and RAM disable switches.

It can only use IDE drives, but there's space inside for one 3.5-inch or two 2.5-inch units.

Those of you looking for internal IDE drives have an easier choice because all drives are very similar in performance (some say that Quantum drives are the fastest, but the difference is negligible), and your best bet is to shop around and see what prices dealers are offering.

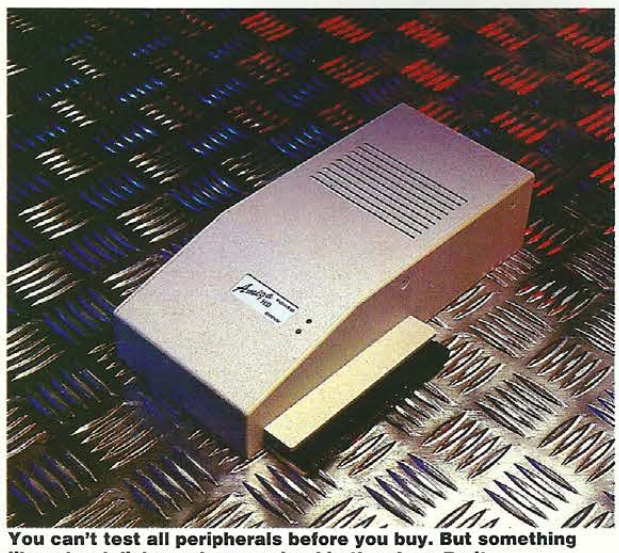
Don't forget to ask what sort of documentation and software is included, before you buy.

BUY THE WAY

It looks good, it's big, powerful, fully of really excellent features; it's got zillions of buttons and could probably print out at trillions of dots per inch, but do you need it to write letter to your bank manager?

Do you really need all those extra features? We advise you to avoid the jargon and look at the price tag...

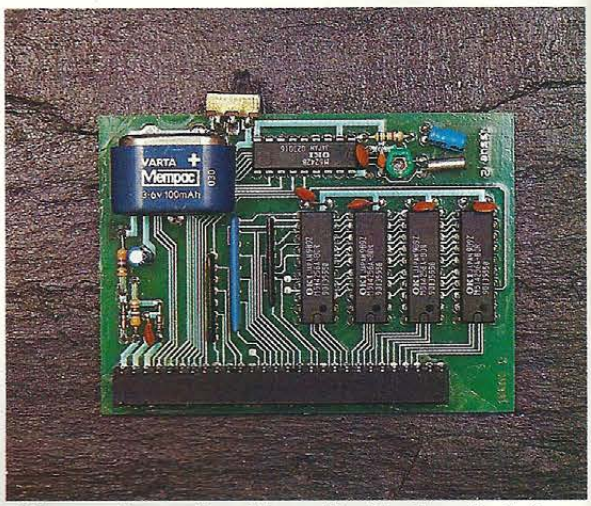
The computer market, more so than any other market in the world, is ruled by specifications. With Amiga hardware it isn't so much how good the case looks as what's inside it. It's all too easy to be tempted by hardware that has features you're never going to use, power you're never going to harness and a price tag that would bruise even the toughest of credit cards. The most important step you should take before you buy a piece of hardware is to carefully assess your needs. Work out what you need. Once you've done that, build a little bit of leeway into your calculations and then start looking at the price lists. When you have picked out the add-on you require, shop around before spending your cash. You'll find that some of the mail order chains can offer discounts over high street shops. Oh, you should also try to get the shop to throw in the appropriate leads and if you've got cash, ask for a discount. Let's look at details now:



You can't test all peripherals before you buy. But something like a hard disk can be examined in the shop. Do it.

Hard Drives

These come in a bewildering number of different sizes and formats and although they are undoubtedly useful devices they are also very expensive. The easiest mistake you can make is to look at the number of disks in your collection and get a megabyte of hard drive space for each one. You can keep infrequently accessed programs on floppy disk and transfer them to hard drive on the odd occasion that you use them, which also makes programs much easier to use. In the vast majority of cases, the maximum space you'll need is 40Mb. However, if you use lots of samples and/or pictures then you will need more space.



RAM expansions such as this are ideal first buys for Amiga owners, but be sure to get the right kind of RAM for you.

Monitors

If all you're going to use your Amiga for is gameplaying, then quite frankly, a decent modern television is perfectly good (particularly the Sony range). If you're going to do lots of textual work then get a decent monochrome monitor for about £90 as letters are considerably easier to read in black and white. If you're going to be doing lots of graphics work then it might be worth investing in a high resolution monitor, but only if you're going to be working in the higher HAM resolutions. If you're going to be working at a relatively low (300x200) resolution then a medium resolution like the Philips CM8833 is perfectly adequate.

RAM expansions

These have become hugely popular over the last five years. The vast majority of Amiga users are extremely unlikely to need more than 2Mb of RAM. Exceptions to this rule are those creating large picture files (particularly scans), animations or samples.

Printers

These are excellent and thoroughly useful items, as with other hardware though, work out what kind of print quality you need. If all you're doing is printing out the odd letter, program listing or database then a 9 pin dot matrix printer is perfectly adequate. You can pick these up for around £150. If you want better quality then don't get a 24- pin printer but chose a bubblejet job such as the Canon BJ-20. Bubblejets, and inkjets, offer great quality (at about 300 dpi) and only cost around £200. Finally, only bother with a laser printer if you need very high quality printouts (for instance for your business) as these cost a fortune to maintain and are outrageously expensive.

Joysticks

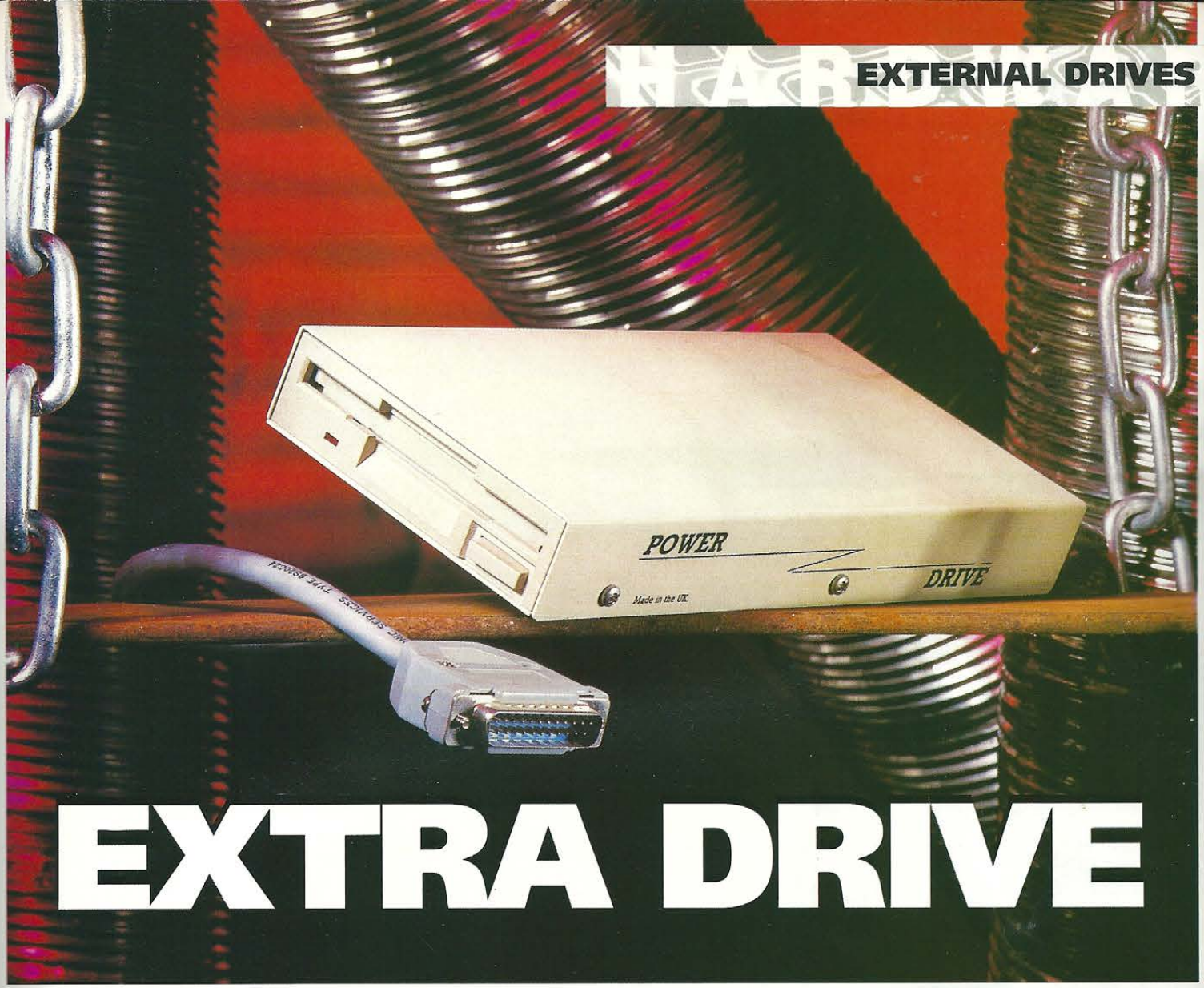
These have changed enormously over the last year or so, thanks mainly to product licensing. Basically steer clear of novelty joysticks in odd shapes as these are extremely uncomfortable on the hands and don't last terribly long.

Extra floppies

These don't vary a great deal in price or features, but they are incredibly useful.

Accelerators

These should be avoided unless you're a power user with serious processing demands. If you simply want quicker screen updates on your favourite flight simulator then forget it.



EXTRA DRIVE

An external floppy disk drive can make your life a lot easier by cutting down on the time you spend swapping disks, but what are the other advantages, what are high density and double density disks, and what are the best external floppy disk drives for your Amiga? Read on to find the answers

Your Amiga already comes with a floppy drive as standard – so why on earth would you want to fit another one? Well, there are plenty of reasons; for instance, if you don't have a hard disk, working with just one floppy drive is nigh-on impossible. All that swapping of your Workbench disk for your program disk is a real pain – it's far better to be able to put the Workbench disk in one drive and leave it there for the entire session, using your second drive to load programs, save data and so on. If you do a lot of copying of floppies, a second (and maybe even a third) drive is also useful. Rather than saving a disk's contents to memory (or a hard drive), swapping the disk for a blank one and writing it all out again, you can do the whole operation in one swoop.

Need more reasons? OK, many games these days come on two (or more) disks. And there's nothing more frustrating than having to swap disks when you're half way through getting the highest score in the universe, just because the Amiga wants to play you a tune alerting you of the fact. Put one disk in each of your two drives, and you're laughing – the Amiga will see the second disk there and won't bother you by asking for it.

Finally, if your internal floppy drive dies, you have two alternatives: to get it replaced, or just to use an external unit as your main drive. Many people opt for the second option – it's actually cheaper, in many cases, to just ignore the internal drive and buy a new external one than it is to have the internal unit replaced by a dealer.

Daisy-chaining

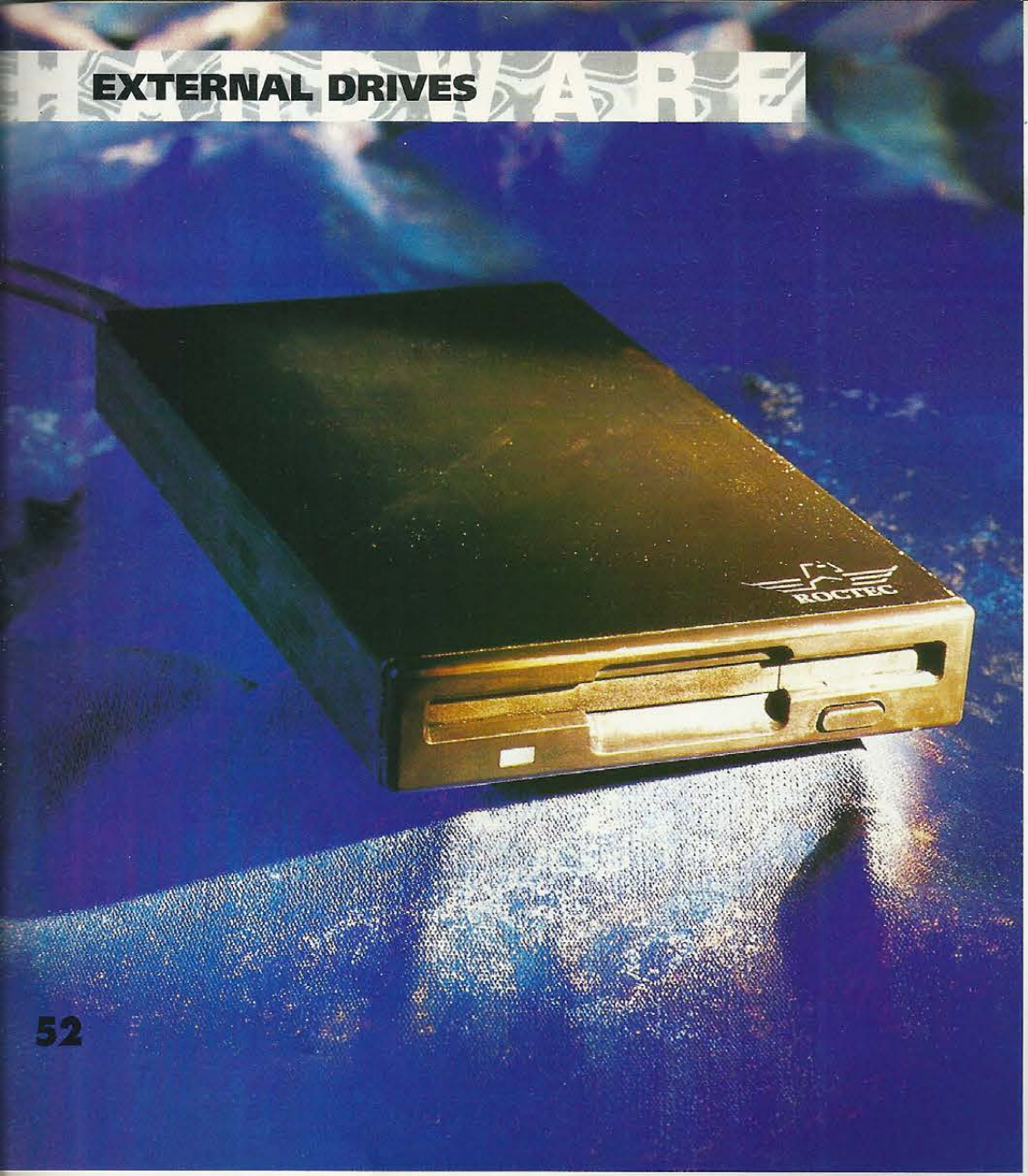
It's possible to add up to three external drives to the Amiga – the internal unit is referred to as DF0:, and the three externals as DF1: to DF3:. You connect extra externals by daisy chaining them – connect the first to the Amiga, the second to the through-port on the back of the first and so on.

However, be warned: the Amiga has to provide power for the drives from its main power supply, and connecting more than one can put a strain on it by sapping far too much energy. If you're going to use more than one external drive, you're much better off buying units with external power supplies, so that your Amiga doesn't need to provide the current itself. Or, of course, buy a twin disk unit such as Power Computing's Power Dual Drive, which has two drives and a power supply in the same fetching case – so you save having loads of cabling lying around the place, too.

Choosing a drive

External floppy disk drives are all very similar to one another – after all, there's not much required, other than the basic mechanics and a case to put them in. For that reason, there's not a great deal to choose between them for the potential buyer. However, there are a couple of rules of thumb that you should follow.

For starters, consider where you're going to be using your Amiga. Will it be in a clean, tidy environment? Or do you make a habit of leaving half-drunk



The RocTec drive comes in a fetching black case which is made of metal. This rugged design build means that it is likely to last a lot longer than many of the plastic models.

cups of coffee on any available surface? If it's the latter, then make sure that you go for a drive that doesn't have ventilation holes on the top – some do, and one drop of liquid through these holes can ruin your day. There's also the distinct possibility that, if your work environment 'busy', the drive may well find itself flying to the floor as the cables get hopelessly tangled and you scrabble around the back of your Amiga, trying to sort out the mess. Will a drive in a plastic case stand up to this sort of treatment? Possibly, but you might be better off going for a metal unit. Finally, some drives – such as Cumana's CAX 354 – don't have flat sides, so you can't stand the unit on its edge. That's no problem if you anticipate sticking it on the top of, say, an A500 Plus, but if you've a desktop Amiga such as the A1500 or A4000, you might want to stand it on its side next to the main box, to save desktop real-estate.

HD v DD

All Amigas except the A4000 use double density (DD) disks to store information. For a long time this was the industry standard, and virtually all PCs use the same type of disk. However, there's a limit to the amount of data that can be stored on such a disk – and with graphics files and the like getting larger and larger, double density disks are being pushed to their limits.

For that reason, the industry created high density (HD) disks – which, as their name implies, can store more data than their DD cousins. (Getting on for twice as much, in fact.) Unfortunately, though, you need a different disk drive to read HD disks – if you format them in a normal drive, you'll only get the same amount of storage as from a DD disk. On the other hand, you can read and write double density disks in a high density disk drive with no problem.

So far, only the Amiga A4000 comes with a high density floppy drive as standard – and at the time of writing there are very few external versions available for other Amigas. However, now that Commodore has officially endorsed the concept you can expect to see more models coming on to the market in the near future.

Once you start making use of dual external drives such as this one from power, you won't regret it.

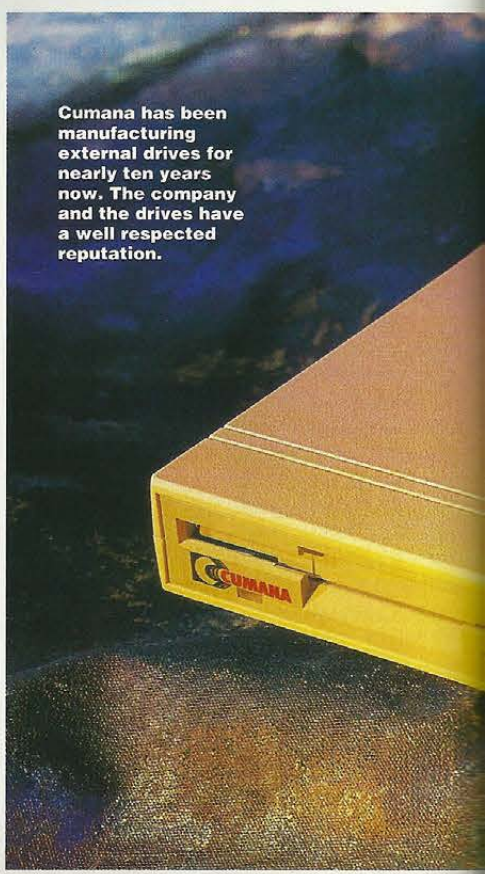
What's available?

There are plenty of external drives on the market – it's not fair to try to list them all, since we're bound to miss one or two out. In reality, most people will buy on price considerations alone – and even then, most of the drives available cost within £15 or so of each other.

The cheapest you'll find is probably the Zappo, from Indi Direct (0606 43860), which costs £45, if you shop around the dealers you may be able to shave a couple of pounds budget prices. Budget on £50 to £60 for a single drive, including postage.

One of the most popular drives around is the Roctec, distributed by Silica. This has been around for a while, and for a long time was the cheapest – and slimmest – drive available. Its metal casing comes in cream or a rather sexy black, and the drive is very quiet in operation. Indeed, I often forget that the thing's there at all – it's certainly far quieter than the Amiga's internal unit.

Another very popular manufacturer and retailer is



Cumana has been manufacturing external drives for nearly ten years now. The company and the drives have a well respected reputation.

The Zappo drive is a very solid, slim drive which is about as compact as they come.

Power Computing, which has a range of drives including the Power Dual Drive. Its workhorse is the PC880E, but the company also has an 880B and a package of 880B and *XCopy* software.

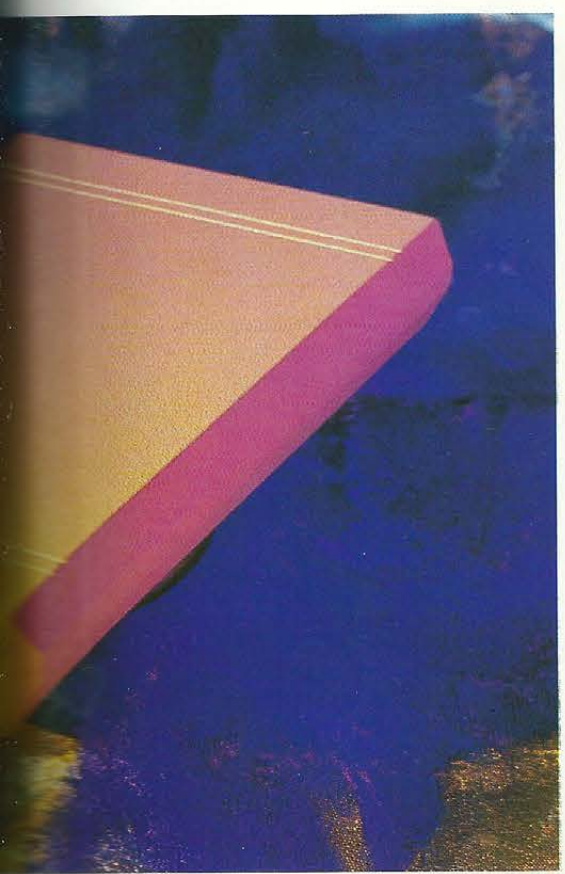
The 880B has a switch that stops any data being written to a disk's bootblock – an anti-virus measure that gives a little more peace of mind.

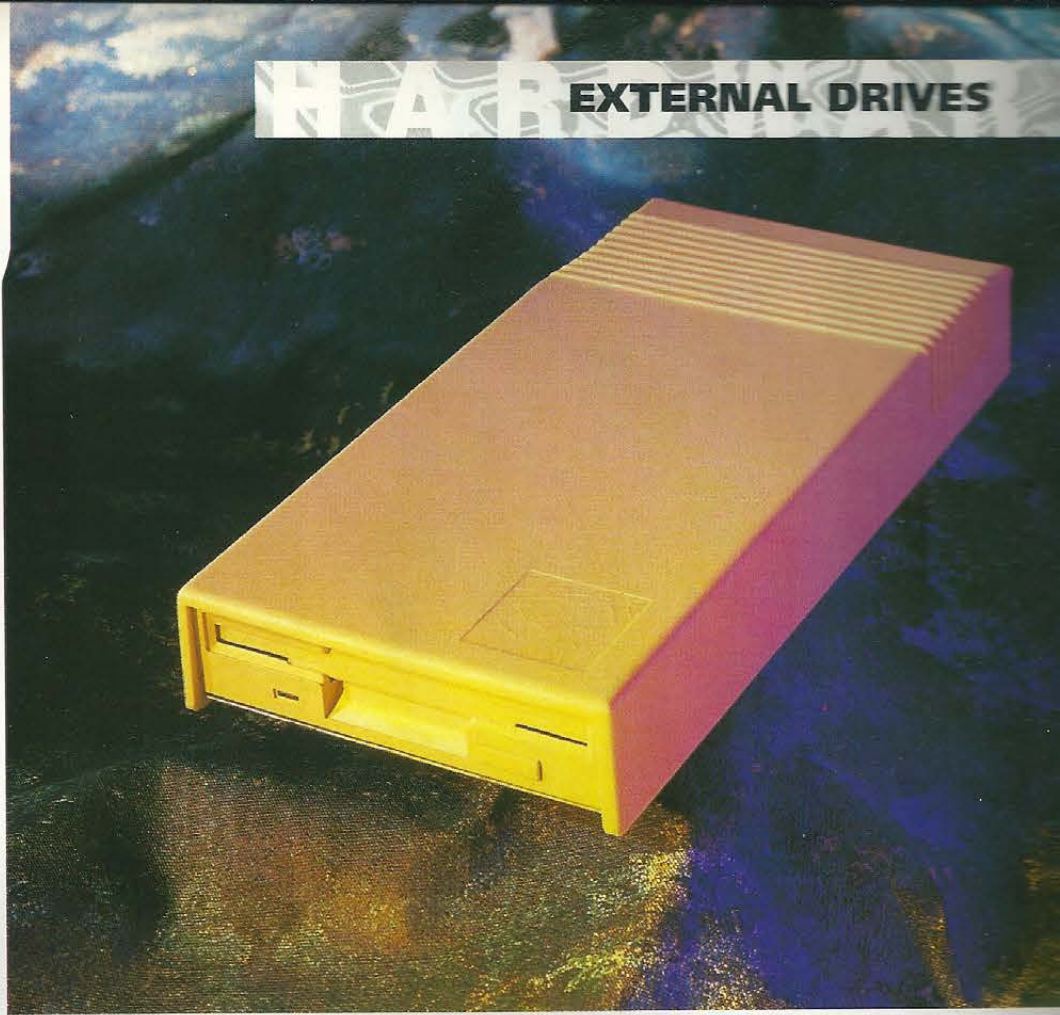
The 880B/*XCopy* package also has an extra chip that helps to speed up copying, and which will enable you to copy non-standard disks.

There's only one high density drive on the market at the moment – although more are expected in the next few weeks.

Currently, your choice is restricted to the Power HD, from Power Computing. And at £129, it's not particularly cheap.

Given that only the A4000 so far has a built-in HD drive, you may find that buying an HD drive leaves you with a stock of disks that none of your friends can read.





Despite a rather flimsy plastic case, the wonderfully named PC880B performs well. However, it does suffer from the same fault as many of these units, namely a connecting lead which could be longer.

Maintenance

There's not a great deal that you can do to a floppy drive in the way of maintenance – they're delicate pieces of machinery, and often you can make things worse rather than better if you start fiddling.

However, there are some simple procedures that can help to ensure your drive never gives you any serious trouble.

Every so often, you should clean the disk heads using a special head cleaning disk. This acts like a cassette or video cleaning tape – you soak the actual floppy portion of the disk in alcohol, and this is then transferred to the heads, so removing any dirt or oxide that has collected there. If you're having problems with disk errors on a number of different disks, this is the first thing to try – your heads have probably become dirty. This kind of problem becomes most obvious when you try using disks formatted on somebody else's machine.

Try to avoid removing a floppy disk while the drive is acessing it, as this may prove fatal to both magnetic media and drive. Never prod around inside your disk drive with a screwdriver or other metal object. The drive heads are very delicate, and it doesn't require much force to knock them out of alignment. Also, many screwdrivers are slightly magnetised, and putting a magnet next to a disk drive head is a sure route to disaster.

OTHER PEOPLE'S DISKS

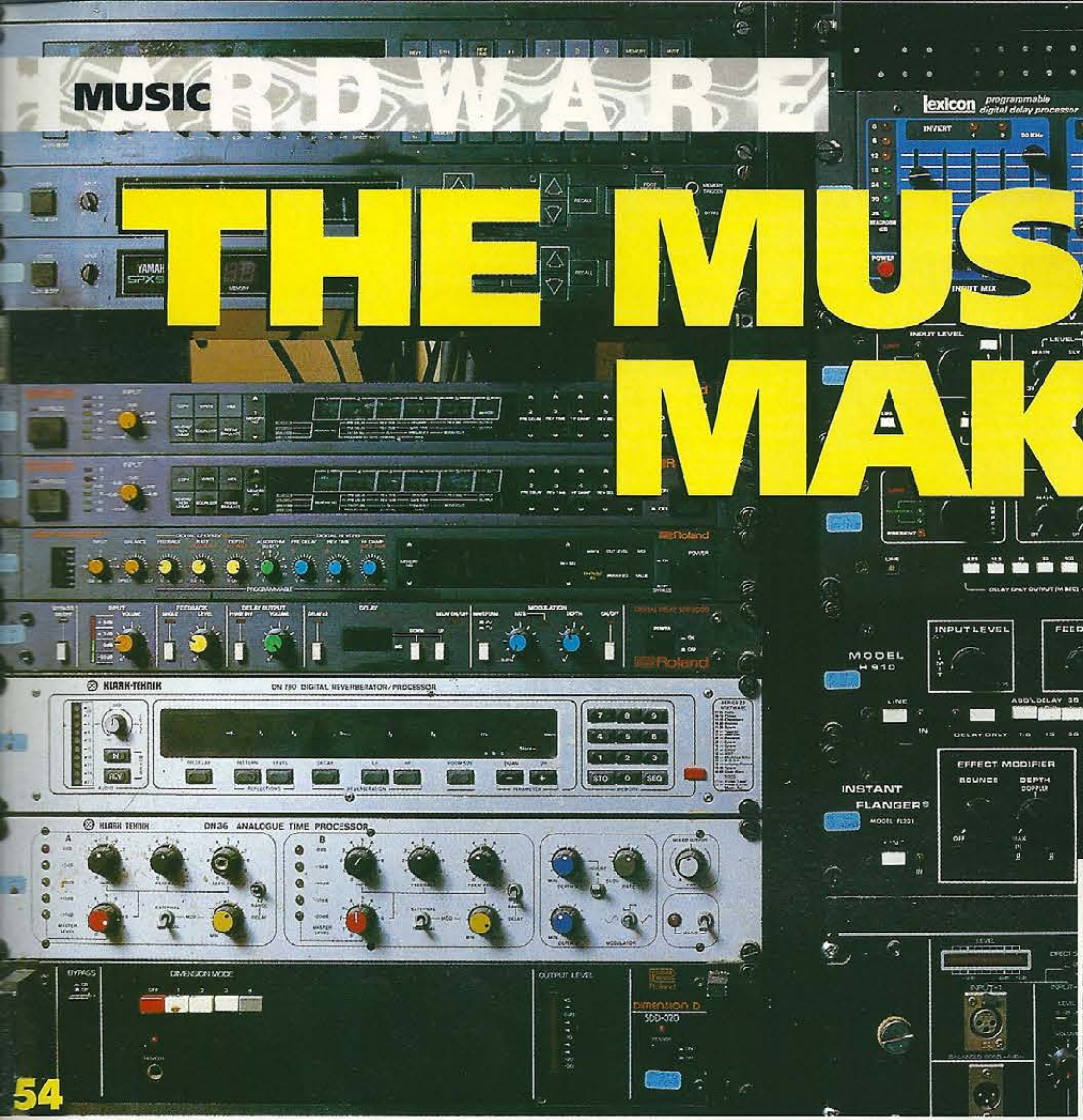
Because Amigas, IBM-compatible PCs, Macs and Atari STs all use 3.5-inch floppy disks, it would be reasonable to expect that you could easily read disks from one machine in any other. Reasonable, but rather naive. It is possible, but it requires a little fiddling with software – each machine uses its own format for storing the data, so to read disks from other machines you have to translate your Amiga's format into something readable by the others.

The way to transfer files from one machine to another is to make sure that the disk is formatted as an IBM PC disk. The PC can read this as standard, the Mac comes with a utility called Apple File Exchange that enables it read PC disks, and the ST can be persuaded via its operating system to read and write DOS-format disks (although it's not 100 per cent reliable at this).

The Amiga is slightly different to this: it needs an extra piece of software to read and write the PC format. In the past, there have been two main programs to do this job: CrossDOS, a piece of commercial software, and *MessyDOS*, a Public Domain program available from any PD house. *MessyDOS* is the more complex of the two to install – it involves lots of altering the startup-sequence and adding device drivers – but has the advantage that it's free.

Owners of Amigas with Workbench 3 (the A1200 and A4000) don't need to worry about getting either of these two packages: *CrossDOS* is built in, so check your manuals for details of how to use it.

THE MUSIC MAKERS



Using your Amiga and music hardware you can compose a symphony or create a three-minute pop classic, but first you need to know your MIDI from your multi-tracker. So if you want to make tracks in the music business follow our expert advice

We've all heard the tremendous music-making potential of the Amiga. Soundtracks to games and Public Domain demos stun and startle at every turn. But plug in some peripherals and so much more becomes possible.

Listen to any song in the charts these days and you can pretty well guarantee a computer has been at the heart of its production. And, like any computer, the Amiga is perfectly capable of giving you the power to create your own professional-standard recordings. With the right software and additional hardware you could be making a bid for superstardom, or at least having a terrific wheeze knocking up your own tunes to impress your friends.

But don't think you have to be trained in music to make music. As with many other fields of creative endeavour, computers make it easy to create music without you having to spend years grappling with keyboard technique, music theory and all manner of guff that you happily ignored at school. In fact, most successful technology-based songwriters will happily admit to having no formal musical training.

So how's it done? For starters you'll need a means of generating sounds. It's possible to make a noise just using the Amiga and a cheap sampling package – usually some software and a plug-in cartridge that can record snippets of sound so you can play them back as melodies (see ***AFS*** *3 – The Complete Beginner's Guide* for details). However, for real composing power you need some heavyweight sound-generating peripherals.

Make a big noise

There's a mind-boggling array of sound equipment out there that can interact with your Amiga, the four most significant types of which are:

THE SYNTHESIZER – a box of electronics that enables you to create various timbres, or types of sound. So if you want a flute sound, the synth would put out a sine wave, which is pretty near what the acoustic instrument produces when you blow it. Add a little white noise to the start of the note for that breathy effect and you're away.

All modern synths come with sounds, or 'patches' programmed in by the maker and assigned to memory locations, along with the facility to edit those sounds to create your own new noises.

THE SAMPLER – a sampler enables you to record sounds, edit them and play them back at different pitches. However, a dedicated sampler offers far more power than a cartridge-based set-up – more sample memory, better sound quality, better editing facilities and the like.

THE MULTI-TRACKER – although synthesizing sounds and playing back samples is all very well, let's not overlook 'real' instruments. There is, as yet, no electronic gadget that can replace the human voice, so if you plan to add vocals to your song you'll need some way of recording them. A multi-tracker can record audio signals in much the same manner as a domestic cassette recorder. But while the cassette machine has only two channels – left and right for stereo reproduction – multi-trackers, as the name suggests, offer several tracks so you can layer vocal harmonies, record guitar parts and even

Your Amiga is ideally suited to making music of all styles, whether it's industrial, techno or medieval chants but to get in the groove you'll need the contents of some, or maybe even all, of these boxes.

get your mate in there with their saxophone. Tracks can be played back at the same time and mixed in with what your synths and samplers are doing.

THE SIGNAL PROCESSOR – this type of device doesn't create or record sounds but modifies existing sounds so they can be controlled better or given special treatments. For example, one form of processing is compression, which effectively smooths out fluctuating volume levels in a recording.

Special treatments include reverberation, which can make your synth sound like it's being played in a cathedral; chorus, which 'thickens' a weedy sound by duplicating the signal at a slightly different pitch; and pitch-shifting, which will take whatever sound is being effected and re-create it at, say, an octave lower or five tones higher.

Of course, you need a way of getting your Amiga to talk to all this kit. The key to communication, and it's something that has revolutionised music recording over the past 10 years, is...

MIDI

The Musical Instrument Digital Interface was first mooted back in 1981. A bunch of American chaps were trying to find a standard means of getting electronic instruments to communicate with each other. At the time, keyboard players were having to contend with leaping from synth to synth to access different sounds – all very well for budding Rick Wakemans, but a pain otherwise. An interface standard offered the facility to control various synths from one master keyboard or from a computer, and so electronic instruments began sprouting 5-pin DIN sockets as the music equipment manufacturing industry adopted MIDI.

The Amiga does not come supplied with a MIDI interface, so your first step into serious music production means buying one (see the MIDI Interfaces panel). Plug it into the serial port, connect it to a MIDI-equipped keyboard and tone generator with appropriately wired 5-pin DIN leads and you're nearly ready to party.

Now I know this is a hardware guide, but your keyboard and computer are just going to sit there doing nothing until you get to grips with the software side of things, the most significant aspect of which is...

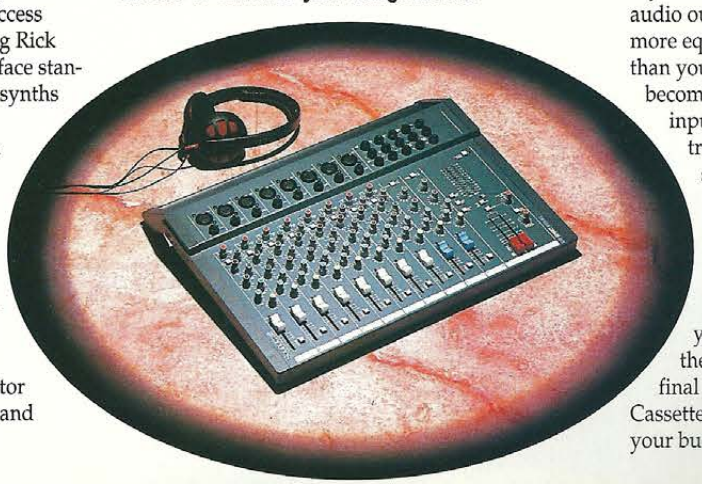
Sequencing

A MIDI sequencer is software that enables your Amiga to record MIDI events (see AFS1 – The Complete Software Guide for some recommended programs). "So what's a MIDI event, then?" I hear you cry. The simple act of pressing a key on the MIDI keyboard triggers what's called a Note On event. Taking your finger off the key triggers a... wait for it... Note Off event. But MIDI is even cleverer than that.

The speed at which you hit a note governs how loud that note sounds, so Velocity information is also transmitted to the sequencer and recorded. If your keyboard is equipped with Aftertouch – a means by which you alter the sound of a sustained note by pressing the held-down key harder after the initial strike – that forms part of the note data.

Then there's Modulation, Pitch Bend, Sustain, Main Volume – see the What's MIDI? section for more info on the data flying about in the system.

The Spirit Folio12:2 mixer offers a wide range of effects to enhance your Amiga music.



When all these events have been recorded, you'll have a set of MIDI instructions that can be transmitted to a tone generator for playback. It could also be transmitted to the synthesizer built in to your keyboard, or to a separate tone or sampling module – it depends on the sound you're after.

A standard MIDI set-up can address up to 16 different devices because there are 16 MIDI channels, so you could record your drum parts on, say, channel 10 and have them going to a drum machine (a tone module dedicated to producing high-quality percussion sounds) which is set up only to receive data on channel 10.

Then record the piano part on channel one and send that to a synth with a particularly good piano sound on it, have the bass running on channel two, strings on three, and so forth.

MIDI-equipped signal processors can also be manipulated. If you want the reverb effect to change to chorus-with-reverb part-way through the song, you can get the sequencer to send a Program Change command to it, just like the commands that would switch patches on your synths.

In sync

Now to hook up the multi-track recorder. If you're using a tape-based system, perhaps a cassette portastudio, an open-reel tape deck or even a digital multi-track, you'll need to synchronise the tape to the sequencer.

There are a number of ways of doing this, but all use code 'striped' to a track of the multi-track which contains information that a synchronising device can read. The code is converted by the sync box and converted into MIDI signals that the sequencer can read and thus tick along in time with the tape. So if you've recorded a MIDI sequence and you want to add vocals on tape, hook the tape deck up to the Amiga via the sync box. As the tape plays, and as you record your warblings to one of the tracks, the code on another track is read by the sync box and converted into messages that can be sent over MIDI to tell the sequencer where in the track it's supposed to be. If you stop the tape, rewind it a bit and hit play again, the sync box can then calculate how far from the beginning of the tape you are, thanks to the information in the code, and set the sequencer going again from the appropriate point.

Audio

Having got everything telling everything else what to do over MIDI, you'll need some way of hearing what it all sounds like. In a simple set-up with just, say, a tone module or keyboard synth, plugging the audio outs into your hi-fi will do. As you collect more equipment and end up with more audio outs than you know what to do with, an audio mixer becomes necessary. It's simply a number of audio inputs, each with its own tone and volume controls, that all feed down into a stereo pair for sending to an amplifier. Signal processors units can be connected either between the instrument and console, or to the mixer's auxiliary outputs and inputs so you can control how much effect is on which channel. Once all the levels are balanced and you've decided where in the stereo spectrum the sounds will sit, using the Pan control, the final mix can be recorded directly to tape. Cassette, reel-to-reel or digital audio tape? Whatever your budget can run to.

MUSIC MAKERS: We heartily recommend...

Here's the kind of hardware you'll need to start making a healthy noise. Let's assume you've already got a hi-fi that will adequately cope with the output of your set-up, provided you go easy with it. Please remember that synthesizer and sampler signals are uncompressed, so take care not to blow your speakers

MIDI Interfaces

The first step of the MIDI chain is an inexpensive one. Datel makes a perfectly useful interface that plugs into the serial port to get your Amiga MIDI literate for only £25.

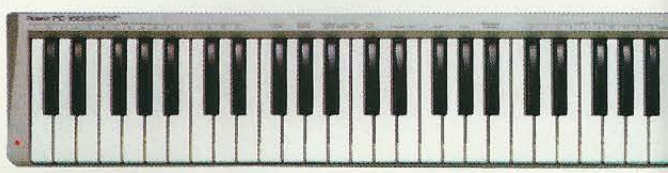
If you're going to be synchronising your sequencer to tape, however, then check out Dr T's £249 Phantom, which not only features a MIDI interface but is a full-blown SMPTE read/write generator to boot.

The Datel MIDI Master interface plugs into the serial port of your Amiga and enables you to use a MIDI system.

Keyboards

The prime function of a keyboard in a MIDI set-up is for inputting MIDI data. It's easier to use a piano-style keyboard for this than a mouse or QWERTY keyboard. As such, all you really need is what's called a mother keyboard. Roland produces the cost-effective PC-150 (£139), which is aimed squarely at the desktop music market. As you go up in price you get weighted keys, more controllers and many more features all-round – Akai's MX1000 (£1,199) offers state-of-the-art MIDI control, at a price.

Many people, however, opt for a keyboard with built-in synth. It provides the means to key information in, plus some on-board sounds to play with. A good, entry-level option is Yamaha's SY35, which has full-size keys and 120 sounds available. For the bigger of budget, Korg's Wavestation EX (£1,495) of incredible sound editing facilities and is reckoned to be one of the most expressive keyboard synths available.



Roland's PC-150 keyboard (above) is at the lower end of the price range a £139, nearer the top of the scale is Akai's MX1000 at £1,199.

Routing

Once you've got MIDI data coming out of your Amiga, you'll need to route it to the various devices in the set-up. One way of avoiding tanglesome cable runs and having to keep unplugging MIDI leads is to invest in a MIDI switcher that routes the signal at the touch of the touch of a button, for quick re-patching. Future History Products' FS1 is a sturdy model at £16.50.

A multiple MIDI Thru' box, as mentioned in the MIDI section, can be had for as little as £14.95 from Philip Rees. The same company produces the useful MIDI Merge units, that enable you to 'blend' two MIDI data streams into one signal without them corrupting each other. Prices start from £69.95.

Thru' switches can save you from the horrors of lengths of cable coiling around your Amiga.

Synth modules

Modules are keyboard-less affairs that offer all the sounds of their keyed brethren, but take up far less space. Rate them on their polyphony (how many notes they can play at the same time – typically between 16 and 32), multi-timbrality (how many sounds they can play at the same time). Also take into account whether the synth module has on-board effects because if it does this can save you the cost of having to buy an external signal processor.

If you are on a tight budget then Roland's General MIDI SC-7 is certainly worth considering at £273, while the SC-155 Sound Canv (£715) offers very good voice-editing facilities. Yamaha's TG500 (£999) and Korg's Wavestation A/D (£1,521) up the price stakes considerably and both of them give professional quality results in a rack-mount format.

The Yamaha TG500 synth module gives professional-quality results... but costs £999. If music be the food...

Samplers

Sampling is one of the most creative aspects of hi-tech music making. It's also one of the most expensive when you go beyond plug-in sample cartridges, such as Microdeal's Clarity 16 (£149).

Akai has made a worthy attempt to keep costs low with its £799 S01, which offers 16-bit (CD-quality) sampling, a 1Mb expandable memory to sample your sounds into and eight-voice multi-timbrality.

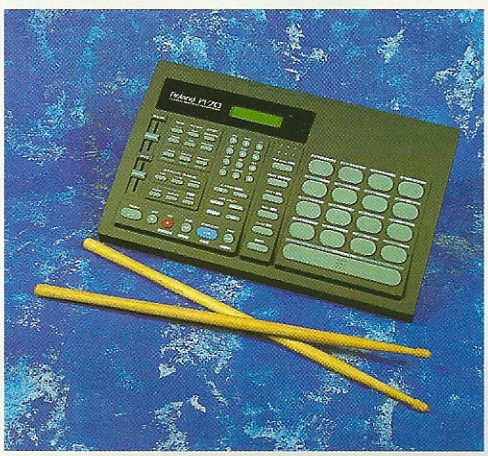
As prices go up, so do specifications. The Akai S1100 has long been considered the industry-standard sampler, with its on-board effects, 24-bit processing and £3,299 price tag. An alternative option to a straight sampler is to go for a sampler/keyboard combination such as E-mu's popular Emax 2, a 2Mb machine at £1,810.

Akai's SO1 sampler produces CD-quality results and is good value for money at £799.

Percussion

Drum machines offer high-quality percussion sounds and, er, that's about it in the sonic stakes. They also have on-board sequencers for stand-alone percussion sequencing, that are entirely redundant if you use the Amiga as a sequencer, but are extremely handy for freeing up space on your sampler if all you need is access to some quality drum voices.

Alesis' SR-16 is probably the biggest-selling budget drum machine. For £299 you get 233 very good sampled percussion sounds. Roland is also a big player in this market, and its acclaimed £645 R-70 offers great sounds and flexibility.



The Roland R-70 drum machine is one of the market leaders. It offers 70 sounds and costs £645.

Signal processors

For a simple set-up, the single most useful device is a digital reverb unit. This will add ambience to otherwise dry sounds, creating depth to the mix. Alesis' £249 Microverb 3 is a good choice and combines useful reverb and delay presets.

If you want to be a bit more adventurous in your effects work, but are still cash-strapped, the Zoom 9001, also at £249, has a wealth of exciting treatments including the means to turn your vocalist into a demented robot.

Just like any aspect of music technology, prices rocket as you go for more effects and improved sound quality, but a good price and performance compromise can be found in the shape of Yamaha's £699 SPX900, which features an impressive array of high-quality effects that can be used in combination with each other.

Using the Zoom 9001signal processor you can add remarkable effects to your music.

Multi-trackers and mastering

On the ground floor of multi-track audio recording sits the portastudio, usually a four-track cassette-based affair – though some push it to eight tracks – with an integral mixer. The brand-spanking new Tascam Porta 07 is a good buy at £345 – it even features a dedicated output for your sync box.

For more tracks and better sound quality (oh, and more money) you'll be looking towards an open-reel multi-tracker such as the very capable Fostex R8 at £1,551, which offers eight tracks on half-inch-wide tape. Digital recording is fast becoming popular, but it's still rather pricey. Alesis' £3,499 ADAT and Tascam's £3,999 DA88 both record eight tracks of digital audio to video tape and give excellent sound quality – better than CD

Many people use a domestic cassette deck for mixing down and committing their efforts to tape, but digital audio tape (DAT) recorders produce much better results. Casio's portable DA-R100 (£399) is a big favourite with home recording buffs on a budget.

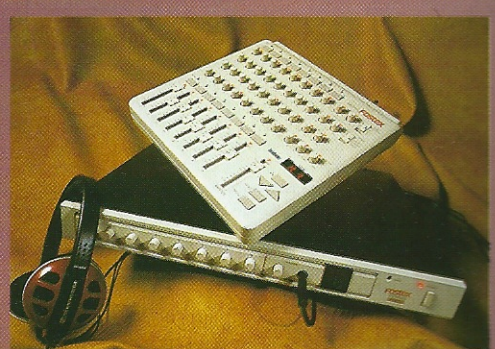
The new Tascam Porta 07 has a dedicated output for your sync box and is a good buy for £345.

Mixers

When you've got a number of sound sources kicking it out, you'll need a mixer to cope with those audio signals. Mixers come in all manner of configurations: eight inputs into two outs (8:2), 16 ins into four groups into two outs (16:4:2) – what you need depends on how many sounds you're dealing with.

If you've got a reasonably modest set-up, then it's worth taking a look at the Phonic BKX-8800 eight-channel mixer. Coming in at £199 it's aimed very much at the home studio market and even features a MIDI splitter.

A low-cost, but higher spec, solution is Soundcraft's Spirit Folio range of mixers. The 12:2 model (£410.08) offers many trick features, including phantom powering for condenser microphones. It's possible to get a mixer into the MIDI chain for a spot of automated mixing, with changes to fader settings and EQ triggered by the sequencer. Fostex's rack-mountable DCM100 line mixer (£449), plus the Mixtab controller (£299) for programming all the settings, offers eight stereo channels designed for use with electronic instruments.

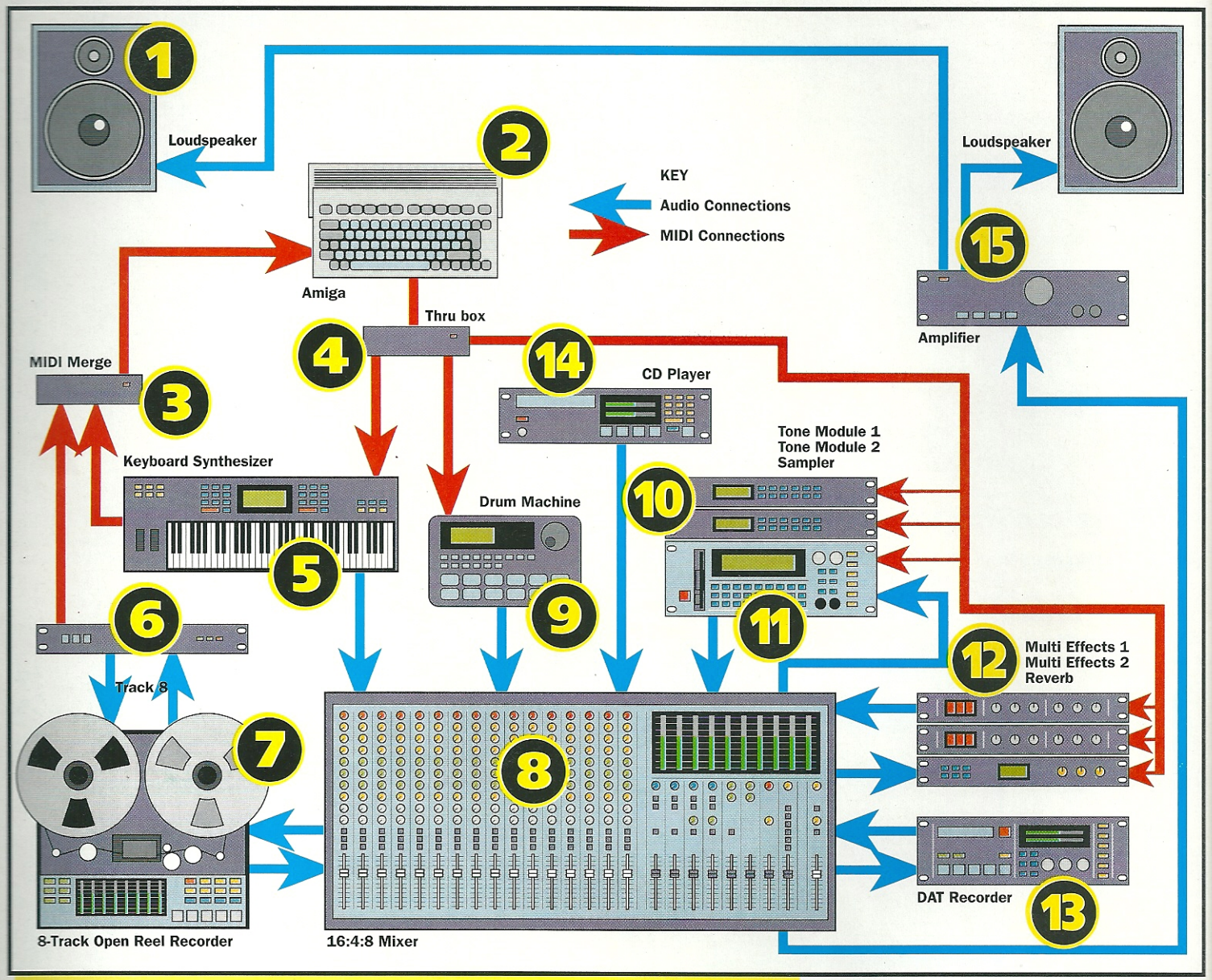


The Fostex rack-mountable DCM100 line mixer offers eight stereo channels.

Sync boxes

There are a number of options on the synchronisation front: Frequency Shift Keying (FSK), Smart-FSK, SMPTE and MIDI Time Code (MTC). They all do a similar job, but SMPTE, named after the Society of Motion Picture and Television Engineers, is probably the most popular in the UK. It was developed for syncing audio to video sources, but lends itself well to controlling MIDI sequencers.

And a highly recommended device that offers SMPTE, Smart-FSK and MTC is the all-singing, all-dancing PPS-2, £185 by JL Cooper.



1 Here's where all the sound comes out. Domestic hi-fi speakers will do for monitoring, but be careful about those powerful, uncompressed synthesizer sounds – keep the volume in check.

2 The heart of the MIDI set-up. Your Amiga can communicate with the rest of the rig via its MIDI interface, passing on sequence data and controlling sounds.

3 The MIDI signals coming from the input keyboard and sync unit must be merged together so they don't get garbled up. A MIDI merge unit does just that.

4 Rather than daisy-chaining everything together, use a Thru' box, which offers multiple MIDI Thrus. Powered models distribute and boost the MIDI signal.

5 A proper input keyboard makes entering note information much easier. Buy one with a synth built-in and you've got an extra sound source to play with.

6 The sync box reads time code from a track of the multi-track and converts it into MIDI information that tells the sequencer when to start and stop playing.

7 A multi-tracker is used for recording the parts that synths and samplers can't manage, such as vocals. It's synchronised to the sequencer for simultaneous playback.

8 The mixing console is audio heart of your set-up. All the audio outs are routed through it, where they can be adjusted for tone and balanced for volume.

9 A dedicated source of high-quality percussion sounds, such as a MIDI-controlled drum machine, can help you free up voices on your other tone generators.

10 Most studios will have a number of tone modules (synths in a box) for creating artificial sounds. One multi-timbral module can play many different tones at the same time.

11 The sampler is one of the most widely-used sound sources in studios today. Use it to record any sound you like, then play it back at different pitches.

12 The effects units can be assigned to any channel of the mixing desk, via auxiliary audio sends and returns, to add ambience or special effects to any audio source.

13 Digital audio tape (DAT) offers better-than CD quality digital stereo recording. So when it's time to mix down, commit your works to the highest fidelity medium.

14 A CD player can be routed through the console to the input of the sampler so samples can be taken. But be careful, you could infringe someone's copyright.

15 The monitor output of the mixing console goes to a stereo audio amplifier, which drives the monitor speakers so you can hear what you're doing.

MIDI MAGIC

Most MIDI-equipped devices have three sockets on them: MIDI In, Out and Thru'. In and Out are fairly straightforward. To transmit data to another device you connect MIDI Out on the transmitting device to MIDI In on the receiving device.

The Thru' socket is used when you want to chain devices together – a practice called daisy-chaining. Because MIDI can send messages on up to 16 different channels, it means you can link several instruments or effects units serially and set them to receive commands on only one channel, ignoring data transmitted on the other 15.

Rather than sending data to a chained device's In socket and having it mulched through the internal processor to be sent to the Out socket, data is 'mirrored' at the Thru' socket, effectively bypassing the device's innards to avoid any timing delays or processing errors. You then connect the Thru' socket to the next device's In socket.

It's reckoned, although many people dismiss this theory, that excessive daisy-chaining can cause delays to messages passing through the system – not too convenient if you've got lots of rhythmic things

going on and they go out of sync. One way around this potential problem is to invest in a MIDI Thru' box: a device that splits and boosts a MIDI signal and distributes it among multiple Thru' sockets.

MIDI connections

A MIDI cable is made up of a twisted pair of wires surrounded by a conductive screen with a 5-pin 180-degree male DIN plug at either end. The specification of the interface states that cables should be no longer than 15 metres because, as MIDI is a serial code – that is, transmitted one bit after another – a long cable run could mean you get some parts of the message lagging behind.

MIDI codes

MIDI messages are standard codes for transmitting data from your Amiga to electronic instruments or between instruments. The messages consist of a string of bytes, a group of eight bits, with the most significant bit first and the least significant last.

The first byte is called a status byte, which is a header that includes the message type. Its most significant bit is always one, which means Set On. Then come the data bytes that hold the values used by the MIDI command and have a most significant bit of 0, which means Set Off.

Channel messages

A channel message only applies to one MIDI channel. The first four bits of the status byte hold the command itself (a value between eight and 14, or eight and E in hexadecimal) and the last four hold the MIDI channel number. So for a note played on channel 12, the data would be 1001, which is the Note On command, then 1100, which defines the channel as 12.

Then comes the first data byte to define the note number (middle C is number 60 and is expressed as 0011 1100) and the second data byte for Velocity (the speed with which the key is hit), the maximum value of which is 127 and is expressed as 0111 1111. Other commands include Note Off, Polyphonic Aftertouch, Control Change, Program Change, Channel Aftertouch and Pitch Bend.

Pitch Bend messages differ slightly. Note On commands have a range from 0 to 127, but Pitch is set in a centred position for no change (the Pitch Bend wheel on a synth springs back to a centred detente when you let go of it). The centred position is set at 2000 in hexadecimal using a two-byte 14-bit number (the first bit of each byte is not part of the data) with the Pitch Bend range being adjusted at the instrument itself, or by using the General MIDI standard's Registered Parameter Numbers (RPNs)

System messages

System messages are sent to all channels and always have 1111 (F in hexadecimal) as the first four bits of the status byte. The number of following data bytes can vary between zero and a large string, depending on the command. Transferring data using System Exclusive messages – by which you can load and save banks of sounds or other data to and from MIDI devices – results in very large strings. Other system commands include Tuning Request for analogue synthesizers, Song Position Pointer, as used in synchronising devices to time code, Song Select and Start and End of System Exclusive data.

GENERAL MIDI

Although MIDI provides a standard to which all manufacturers can work, it was decided that more compatibility between synthesizers was needed. Hence the General MIDI standard, that specifies the following: a General Midi synth should have at least 24 dynamically allocated voices available for melodic or percussive sounds, or 16 voices for melodic and eight for percussive. Dynamically allocated means that if 24 notes are sounding, then you sound a 25th and exceed the maximum polyphony of the instrument, the first note sounded is turned off.

There should be a minimum of 16 distinct timbres, or sound set groupings, and 128 instrument presets, or the sound set, along with such other recommendations as MIDI In Out and Thru' sockets, a master volume control, left and right audio outs and a headphone connector.

The idea behind sound groupings was to ensure a MIDI sequence composed using one multi-timbral synth could be played back on another and still access the same, or similar, sounds – say, the piano part would play back as a piano and not as a Lithuanian nose flute.

So if you see GM stencilled on the case of a synth, you'll know what to expect.

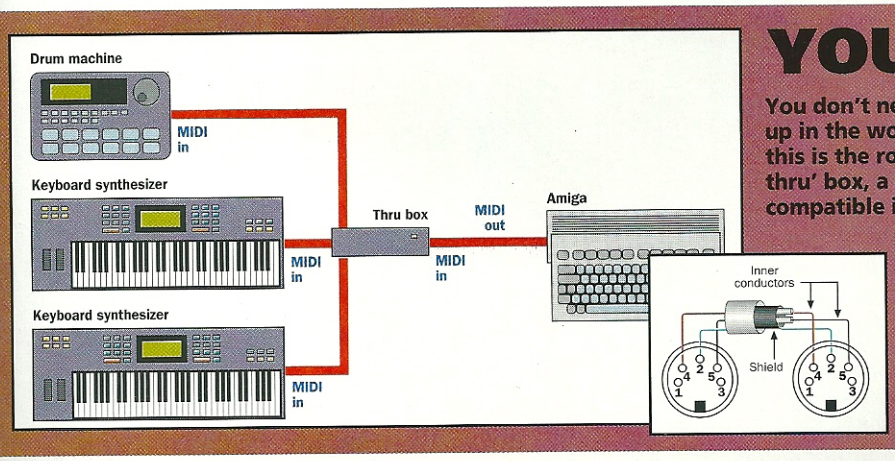
Hardware such as this Roland SC-155 sound module meets the General MIDI requirements.

MAKING CONTACT

For more information on the products mentioned, here's how to contact the appropriate manufacturers:

Akai 081-897 6388
Datel 0782 744324
Dr T's from Zone Distribution 071-738 5444
Fostex 081-893 5111
Future History, Freepost, NH4221, Rushden NN10 9BR
JL Cooper & Alesis from Sound Technology 0462 480000
Korg 081-427 5377
Microdeal 0726 68020
Philip Rees 0608 811215
Phonic from Audio Awareness 081 598 8081
Roland 0252 816181
Soundcraft 0707 665000
Tascam 0923 819630
Yamaha 0908 366700

YOUR MIDI SETUP



You don't need to get the most expensive and complex MIDI set-up in the world to make music with your Amiga (see page 58 if this is the route you do want). All you really need is an Amiga, a thru' box, a MIDI cable or two (see the inset picture) and a MIDI-compatible instrument or two.

All of these can be picked up, or in the case of the MIDI cables – can be made up – quite inexpensively. Try looking at the Casio machines in Tandy or Dixons. Software such as *Sequencer 1* (which was on the coverdisk of *Amiga Format* issue 30) can get you going with MIDI.

Frankly, it could be one of the less pricey Amiga activities yet invented.

BOX OF TRICKS

Although it's only a small box that sits alongside your Amiga, the genlock is your key to the wonderful world of computer-generated video effects

Do you fancy yourself as a potential Steven Spielberg or Francis Ford Coppola? Then buying yourself an Amiga was one of the soundest decisions you've ever made. All you need to realise the true nature of your Amiga's video capabilities is a rather unobtrusive little device called a genlock. Adding one of these boxes will open up a whole new avenue of Amiga useage that you may not have been aware of. Video titling, editing, graphics and even full video production are finally possible once you've got the right tools for the job.

For the uninitiated, a genlock is a device that enables you to combine the video output from your Amiga with output from a video recorder or camcorder. The genlock works by removing every occurrence of the Amiga image's background colour (this is called the key colour in video speak) with the video signal, therefore creating a combined video image.

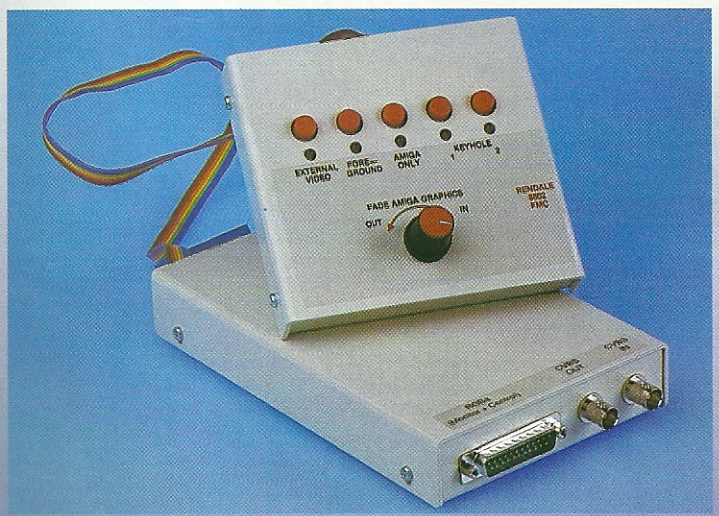
Buying video hardware such as a genlock isn't simply a case of picking out the one that looks the best and handing over a cheque.

Far from it.

For starters, not all video signals are the same so you must check that the genlock you buy is compatible with your particular video setup. American video equipment is totally incompatible with British Amigas, so don't buy equipment direct from the States unless it is compatible with both UK power supplies and the UK PAL television standard.

What follows is a round up of what we see as the top genlocks available for the Amiga today.

Some are quite old products and others are so new they haven't even been reviewed in ***Amiga Format*** yet (G2 GeneSys, for example). Although some are aimed at different markets than others (professionals wouldn't use a RocGen, for example), we've chosen them on a price versus performance basis, so read on and realise your Amiga's video talents...



Rendale A8802
£189
(Marcam Ltd 0602 790466)

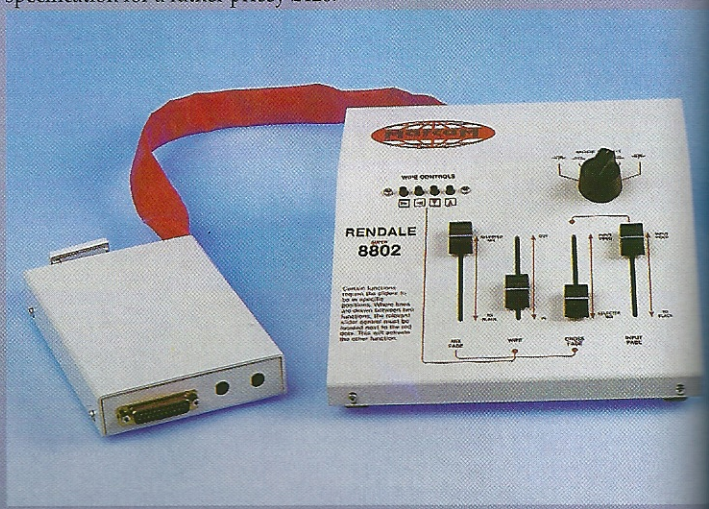
The Rendale A8802 was one of the first genlocks for the Amiga and surprisingly it has passed the test of time very well indeed. It offers the best output quality of any of the budget genlocks included here. Indeed, it's very nearly up to broadcast quality. What this means is that your video productions will come out clean and well defined.

Unlike more modern genlocks, the A8802 doesn't offer any form of fade and dissolve effects although an additional parallel port cable can be purchased to enable software control of the genlock's key colour (this is usually set to colour zero). In all though, the A8802 is still a capable enough genlock.

Rendale Super A8802
£599
(Marcam Ltd 0602 790466)

The next step up from the A8802 is Rendale's Super A8802, the SuperVHS-compatible version of the same genlock. Compatibility with the high quality, and now very common, SuperVHS video signals isn't the only benefit of the Super A8802 though.

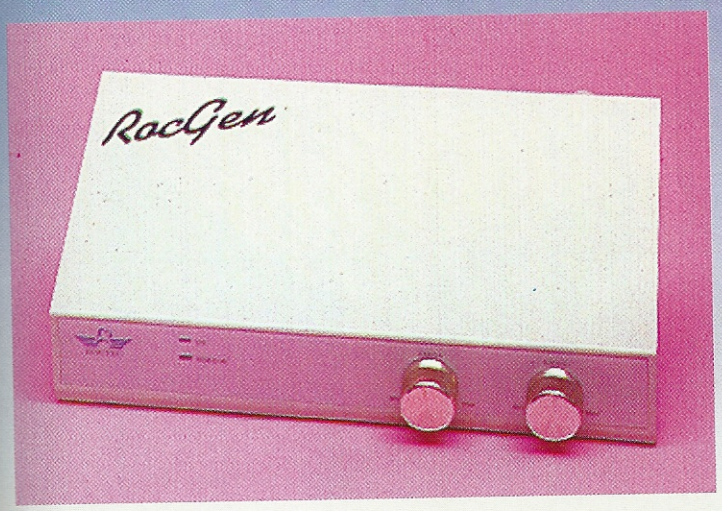
Far from it. As you can see from the picture, the Super A8802 comes with an additional control box that adds a whole range of extra genlocking facilities and effects such as full fade and dissolve controls and even a number of hand video wipes. The Super A8802 is perhaps one of the most capable genlocks available for the Amiga although it is rather expensive when compared to G2's rival genlock, the VideoCentre. A8802 owners can upgrade to Super A8802 specification for a rather pricey £420.

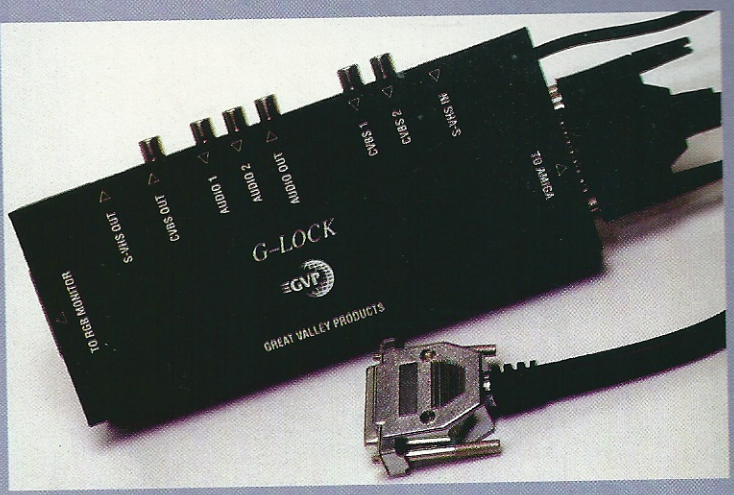


RocGen
£119
(Silica Systems 081-309 1111)

Hong Kong-based Roctec Electronics entered the Amiga market with a bang when it released its RocGen genlock back in 1991. Coming in at just £20 more than the ageing MiniGen genlock, RocGen offers far greater picture quality and more importantly, it has both fade and dissolve controls as standard, enabling you to smoothly fade Amiga graphics and the video signal in and out.

One surprising omission from the RocGen is that of an RGB pass-thru' connector, this omission makes it impossible to connect the genlock between an Amiga and an RGB monitor. Gripes aside though, the RocGen still represents the best buy for first time video enthusiasts on a tight budget.





GVP G-Loc
£349
(Silica Systems 081-309 1111)

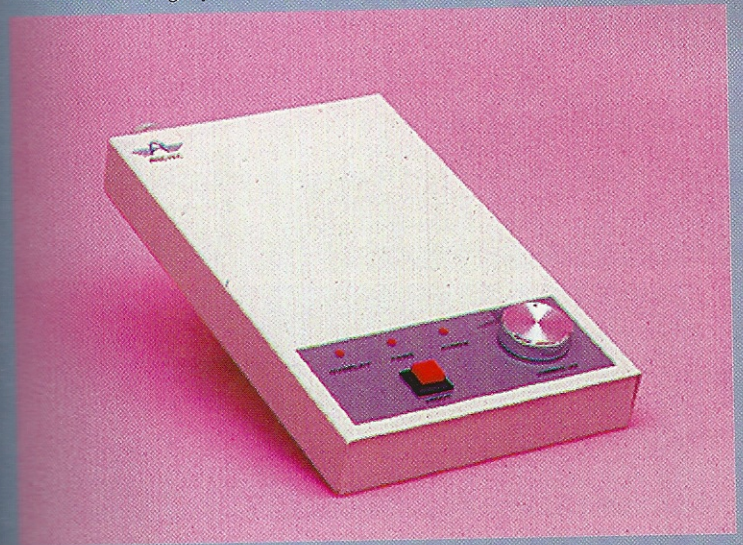
If there's an opening in the market for a leading edge product that will leave the competition for dead, then you can bet that GVP will be the company to fill that gap. This is exactly what it has done with the release of the G-Loc genlock. Although not as aesthetically pleasing as either the Rendale Super A8802 or G2's VideoCentre, the GVP G-Loc absolutely oozes build and design quality.

Like its main rivals, the G-Loc can handle both SuperVHS and composite video signals. The best thing about G-Loc, though, is the fact that instead of using clumsy hardware controls for its fade and dissolve facilities, it's controls can be adjusted on screen using either the bundled software or even the underused ARexx scripting language that comes free with your Amiga. All in all, if you have the money to pay out for it then G-Loc is the best genlock available for the Amiga.

RocGen Plus
£199
(Silica Systems 081-309 1111)

Roctec was quick to answer the criticism levelled at its original RocGen genlock and the RocGen Plus is the result. Packed into a box that is slightly larger and definitely a lot better looking than the original, the RocGen Plus comes with that all-important RGB pass-thru' connector that was missing from the original. You can control the key colour too, which is used to great effect if you buy yourself the RocKey chroma-key system (see the chroma-key panel).

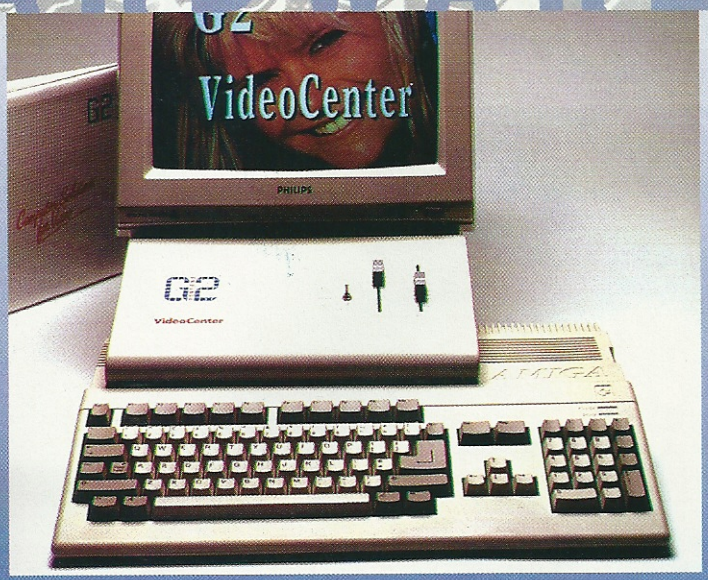
If you're an A1200 owner, it's important that you check with Silica that the RocGen you buy is compatible with your machine. Although Roctec has now fixed the problem, earlier RocGens don't work with the A1200. If you do buy a RocGen Plus though, you'll have a very capable genlock at a good price.



G2 GeneSys
£799
(G2 Video Systems 0252 737151)

The GeneSys has one hell of a pedigree, drawing on the kind of technology used in G2's rack-mounted VideoCentre3 (used in TV stations). Obviously, for £799 though, GeneSys doesn't come too close to its sibling's TV-quality. It does have full bandwidth keying circuits that enable it to produce excellent picture quality for your Amiga however.

GeneSys is capable of handling both SuperVHS and standard composite signals and an optional remote control unit is available that enables the user to perform fade to black, crossfading and key functions without having to reach across to press buttons on the genlock's fascia.



G2 VideoCentre
£495
(G2 Video Systems 0252 737151)

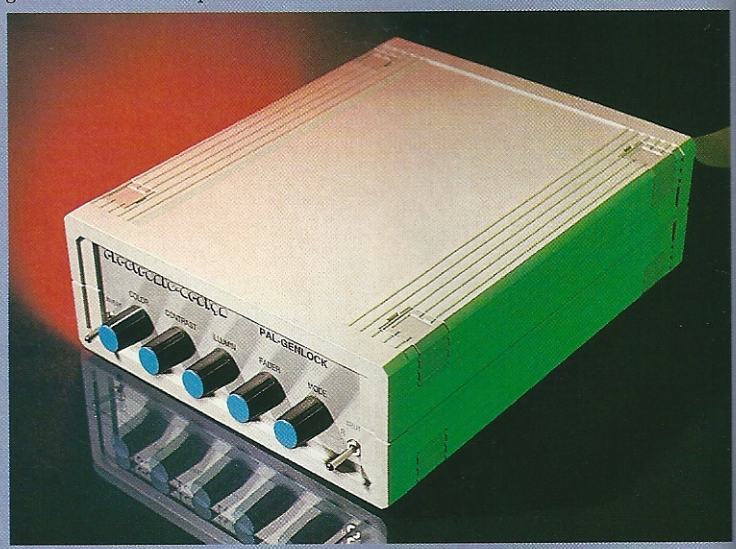
Although G2 would probably not admit it, its entire range of genlocks has been cut in price (or 'repositioned' as marketing types would call it) to make them more attractive in a market dominated by Rendales and G-Locs.

The VideoCentre offers virtually the same facilities as both the G-Loc and Rendale with both fade and dissolve controls fitted as standard and full compatibility with both SuperVHS and composite video signals. With its new low price tag, the VideoCentre is definitely worth investigating.

PAL Genlock
£350
(Electronic Design 0257 472887)

Electronic Design's PAL genlock differs from most of the competition because it not only overlays and fades video signals but is also capable of processing the video signal for greater clarity. You can, for example, use the genlock as an RGB splitter for video digitising.

The PAL genlock is a very sturdy affair that sits solidly by the side of any Amiga that it connects to through a built in ribbon cable. Although it only handles a composite video signal, a SuperVHS version is also available. The only thing that really lets it down is its cost – you can buy a far more capable G-Loc genlock for the same price.



G2 VideoCentre Plus
£975
(G2 Video Systems 0252 737151)

As its name suggests, the VideoCentre Plus is an enhanced version of G2's entry level VideoCentre genlock that includes everything that the VideoCentre has to offer plus a few extra tricks of its own.

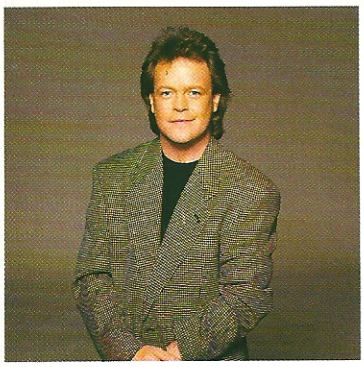
These include a built-in video effects and wipes generator that enables you to view the background video or the Amiga's video output through one of 20 variable shaped and sized patterns. These can easily be positioned using the VideoCentre's built-in joystick. There's no doubting that the VideoCentre Plus is a great genlock, but it still suffers from the same price problem that has always plagued it. After all, would you be prepared to pay over £400 extra for a fancy wipes generator?

CHROMAKEY CORNER

Although technically not genlocks, no round up of the state of the art in Amiga desktop video hardware would be complete without a look at Roctec's revolutionary RocKey (£399, Silica 081-309 1111) chroma-key system and the new G2 Illusion (pictured below) from G2 (£995, G2Video Systems 0252 737151).

A chroma-key system works in essentially the opposite way to a genlock – instead of overlaying the Amiga's graphics on to an incoming video signal, the chroma-key overlays live video on to Amiga graphics. The most obvious use of chroma-key is the weather reports that we see on our televisions every night. Although to us the weather forecaster appears to be pointing at a map of Great Britain that is positioned behind them, the map isn't there at all – it's actually being fed into a chroma-key by a computer. As far as the forecasters are concerned, they are pointing at a blue screen – it's not until the video output from the television camera is fed into the chroma-key device that the blue background is replaced by the weathermap.

As well as chroma-keying, RocKey and the G2 Illusion enable you to produce a whole range of video effects that will enhance any video production. If you've ever wanted to walk on the moon, mix with the rich and famous or even read the weather news, then a chroma-key should be at the top of your shopping list (on a blue background probably).



Bruno Brookes the popular Radio 1 and Sky TV presenter has joined Calculus

A keen Amiga 4000 owner and Panasonic fan, Bruno will be writing for Calculus, and is determined to take time out to visit as many stores as he can.

"I didn't realise just how many stores Calculus had, it's a real benefit to know that wherever I am there is likely to be a store near me, if I have any free time you can guess where I'll be".

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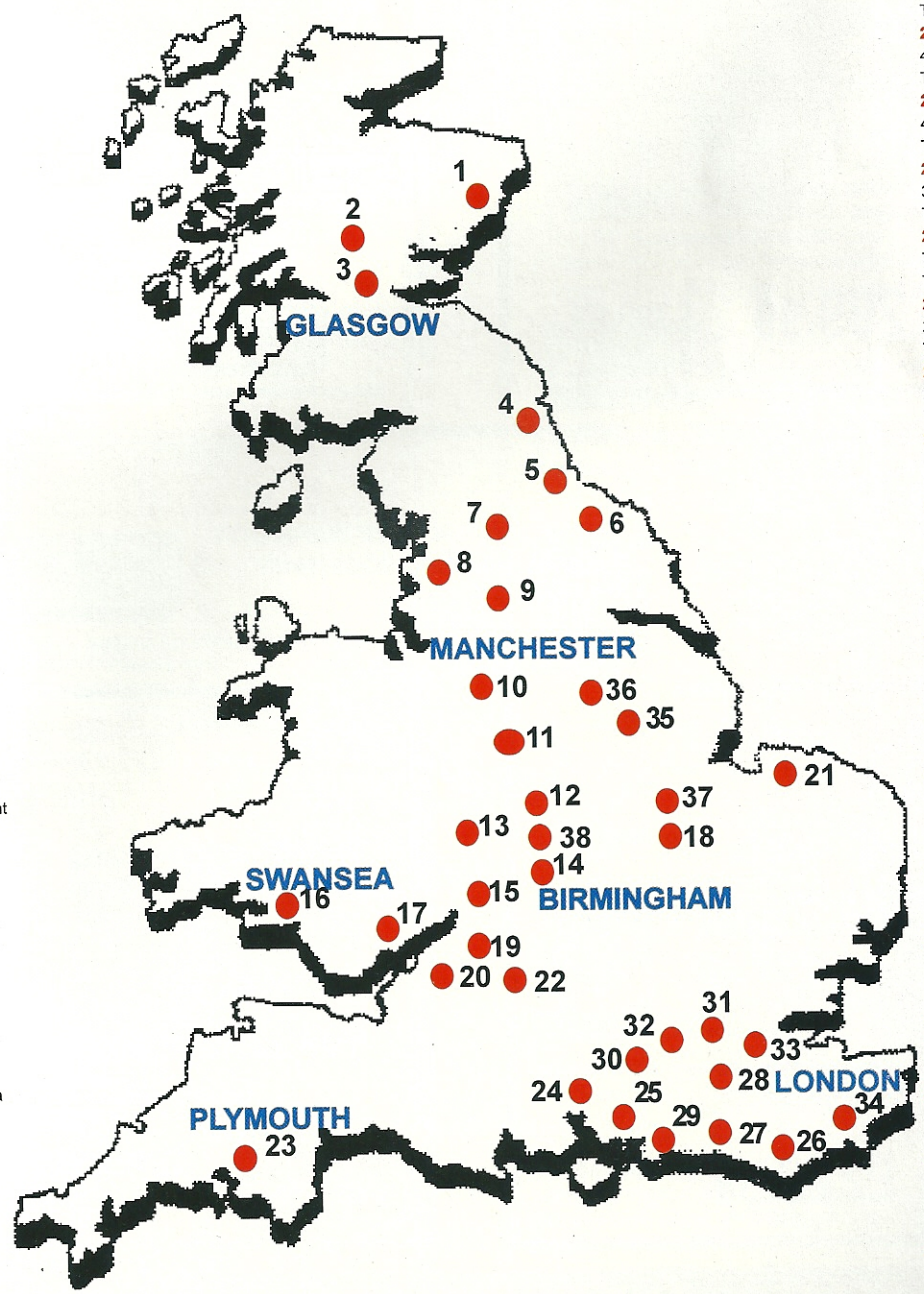

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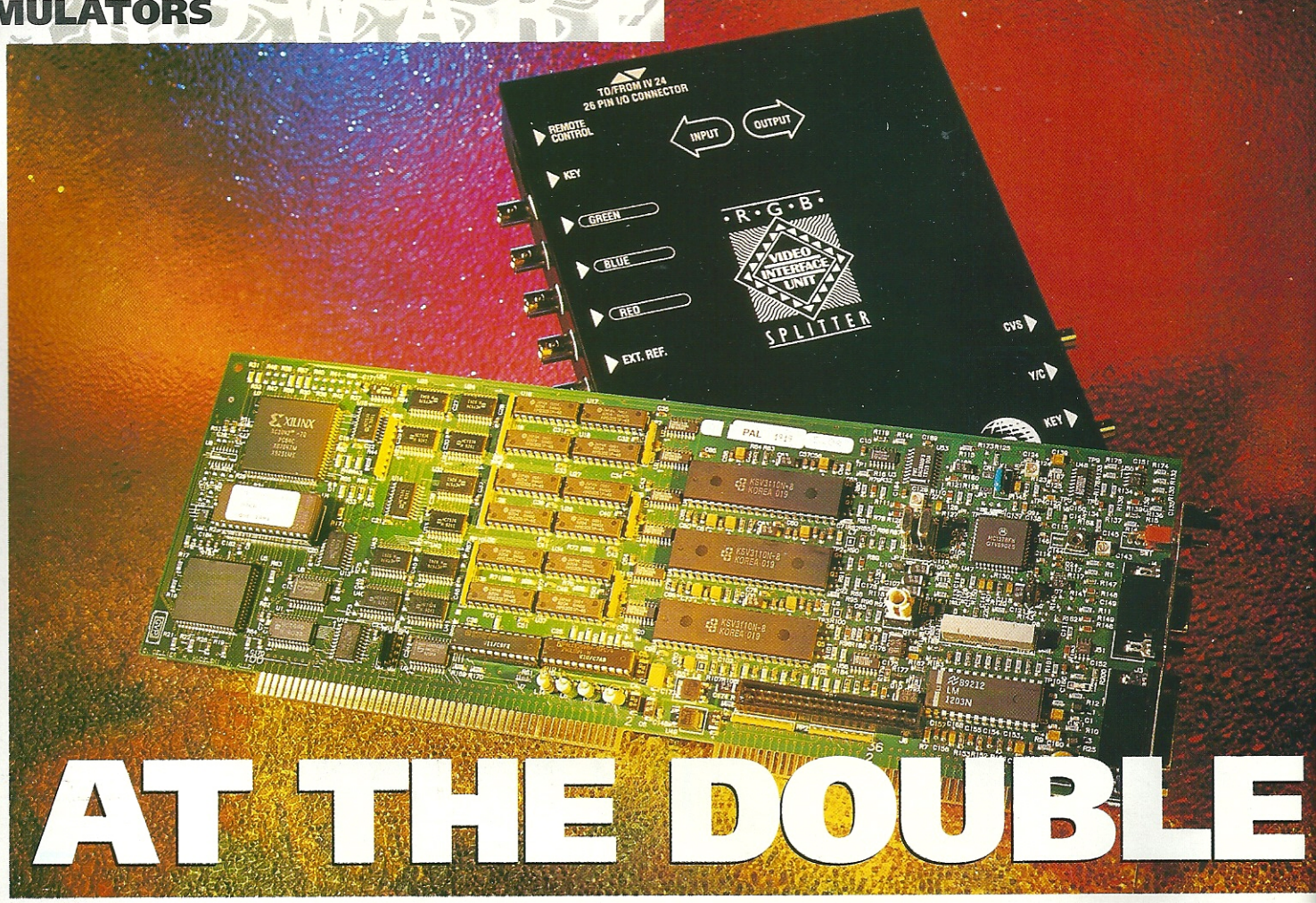


AT THE DOUBLE

Buy a PC and you're stuck with a PC. Buy a Mac and you're stuck with a Mac. But buy an Amiga and you can use the lot. Well you can if you've got an emulator that is. We look at the binds and benefits of emulation

Thanks to the glories of the American economy there are lots of different kinds of computers in existence. However, the more computers there are, the more data formats go with them, and the more hassle and confusion there is.

Fortunately, people tend to restrict their computer purchase to one of three main camps: Amiga, Mac or PC, so the main problems computer users encounter are with the transfer of data between these formats. In the Amiga world at least, you can use a piece of hardware called an emulator that enables an Amiga to pretend that it's a PC or Mac.

Because of technical difficulties encountered in emulating different formats, these add–ons tend to be quite expensive but maybe not so expensive when you consider the alternatives. A 68030-based Apple Macintosh with colour monitor will set you back about £1,450, a half-decent PC will cost you about £1,000. With this kind of expense, the few hundred quid that an emulator will cost you suddenly starts looking better value for money.

AMax (Macintosh)

£324.99

(Entertainment Int. 081-343 7337)

There are plenty of pitfalls awaiting the potential Mac emulator. For starters the floppy disk drives use an odd variable-speed mechanism that moves the disk surface faster at certain times. Apple peripherals are also peculiarly hard to talk to as they use unusual interfaces. More problems arise because the Mac's copyrighted operating system software is contained on 128K and 256K ROMs. So, to emulate a Mac you need to install the ROMs inside the unit. Initially emulators such as AMax relied on data transfer via a serial cable or an external Apple floppy disk drive. If you wanted to use your Amiga drives, all the data had to be transferred via 276K mini–disks, an incredibly drawn out process. With an external Apple floppy disk drive, however, AMax performs well.

Later versions of AMax offer a far better solution to the Mac emulation problem. AMax II Plus fits inside the A1500, A2000, A3000 or A4000, using one of the Zorro slots. The newer software makes use of all the Amiga's facilities, enabling you to use extra Chip and Fast memory and the Enhanced Chip Set.

The single best feature of AMax II Plus, however, is its ability to read Mac disks with the Amiga floppy disk drives. You can also connect Apple peripherals directly to the Amiga by means of two RS–422 comms ports. Perhaps most interestingly of all, it's also possible to connect to a Mac network.

In use it is quick and easy to configure AMax. The set-up screens enable you to decide on boot options, virtual screen modes, the memory map, hard drive/SCSI interface and whether to have a RAM disk. With these configured, you can drop straight into Apple Mac mode. Software compatibility is excellent, with AMax II Plus happily running such heavy duty programs as Quark *Xpress 3.1*, *Greatworks*, *Word* 4 and *Photoshop*. On an A3000, the speed is comparable to a Mac LC But with a 68020 or 68030 accelerator, the emulator can run as fast as the top end Macs. Our biggest cri icism is that it only runs in greyscale. There is a virtual scrolling screen of up to 2,048 by 2,048 pixel but the lack of colour is frustrating. The board cost £324.99 but this excludes the price of the Apple ROMs (another £150). At about £500 for the set-up might be worthwhile investing in a second-hand Mac rather than this card.

AMax means that your Amiga can pretend to be a high-falutin Apple Mac.

Emplant (Macintosh)
£300
(Blitsoft 0908 220196)

This is one of the newest Mac emulators and the only one that can claim colour support. In common with AMax, Emplant is American, it uses the Zorro slots on the A1500, A2000, A3000 and A4000, and performs a similar trick to AMax by hijacking the Amiga's floppy drive and modifying the way in which it reads data.

In order to use the card you need to get some Apple ROMs (try your local Apple Centre) that Emplant's imaging program needs to make an imprint on disk. Once this process has been carried out, the chips are removed from the board and the imprints loaded into the emulation program.

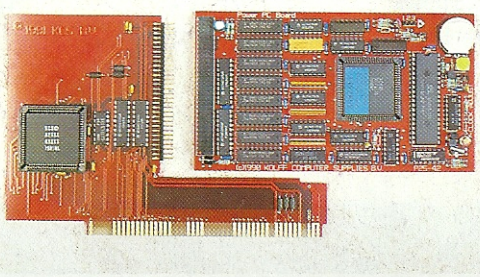
Practically every aspect of the emulation can be modified from the graphical frontend of the package. Initially this involves flagging how much memory you want the Mac System file to occupy (you'll need about 1.5Mb of memory), how much room the ROMs can take up and whether or not you use 32–bit or chip RAM. Similarly, 24–bit graphic cards can be flagged as on or off, SCSI peripherals flagged and all the different ports and sockets tweaked. Once everything has been set up correctly, the actual emulation can be booted.

The emulation software can be run from either floppy or hard drive. Similarly the Macintosh system file can be stored on hard drive (either a stand-alone unit or a partition of an Amiga drive) or on floppy. The best results are achieved by using a hard drive because the Mac system isn't designed to be run from floppy.

In Emulation mode the 'Mac' runs as fast as the equivalent Amiga. In other words if you have an A3000 running the card then you can expect SE/30 performance. There are, however, problems with actually getting data to and from your Amiga. In order to read Mac disks the emulator uses a piece of hardware called Sybil. This kicks in when you insert the disk, and in the process completely corrupts the screen. It's far easier to plonk a SCSI storage device on Emplant's SCSI interface and load the system file and all the relevant programs from that.

When you actually get Emplant working (this may take some time) it proves to be a reliable set-up. Unlike most other emulators it can also multi–task which means that it's possible to have your Amiga working on something in the background while you word process on your Macintosh. The other main point of interest about Emplant is that it isn't just a Mac emulator, but an emulation platform. The manufacturers, Utilities Unlimited, tell us that modules for 386/486 PCs, Mega STs, Falcons, Sega Megadrive and NES/SNES are planned. If these modules do see the light of day then it would make Emplant the emulator board you have to own.

Ahh, the PCXT, seen here in the form of the ATOnce board. Do the business with it.



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KCS Powerboard (PC)
£200
(Silica Systems 081-309 1111)

The Powerboard was the first hardware-based PC emulator to for the Amiga. It comes equipped with 1Mb of its own RAM, and an NEC V30 processor. It fits into the RAM expansion slot located on the underside of the A500 (the Trapdoor) and is therefore extremely easy to get up and running.

Powerboard effectively transforms your Amiga into a PC XT, one of the older PC types that only has very crude graphics capabilities. The principal use for the board lies in using all that thoroughly boring, but useful business software.

In common with all other hardware emulators, the Powerboard hijacks any information sent to the display, disk drives and serial and parallel ports. To operate the board, you run a boot routine, configure the emulator (specifying drives and video modes) and then insert an MSDOS disk. Once MSDOS is safely stowed in RAM you can run PC programs.

The board can operate in mono MDA or four colour CGA modes which are perfectly adequate for PC spreadsheets and/or word processors but don't expect games to look too hot. While running, the board operates as quickly and often quicker than the comparable PC, due mainly to some clever hardware design.

Vortex ATOnce (PC AT)
£199
(Silica Systems 081-309 1111)

This German PC emulator appeared on the market in mid 1991 and unlike the KCS board it actually fits inside the Amiga.

This means that you have to move the CPU from the motherboard to the Vortex board. The main quality ATOnce is that it is multi–tasking – the PC emulation will quite happily operate in the background while the Amiga does other things.

The board's emulation software enables you to configure the PC or partition a portion of your hard drive for PC use. Once this has been carried out AT emulation can be started by clicking on the ATOnce icon. The system will then ask for an MS–DOS disk from which to boot.

In operation the board had no problems with compatibility. It runs *Wordstar*, *Autoroute*, *Letter Perfect* and even the finicky *Norton Utilities* with no problems. Its speed largely depends on how much RAM and processor power your Amiga has but it is certainly one of the quicker PC emulators.

We tested it to a Norton rating of 6.1, which is quite nippy. However, we did experience some slow down when using more than four colours on screen.

The board is solidly constructed and well documented. Its configuration software is particularly well written, making PC hard drive partitioning quick and simple. The price (£199) makes it good value for money. Our only real complaint is that it doesn't come with an MSDOS boot disk.

Medusa (Atari ST)
£150
(Macro Systems/GTI International 49 6171 73048)

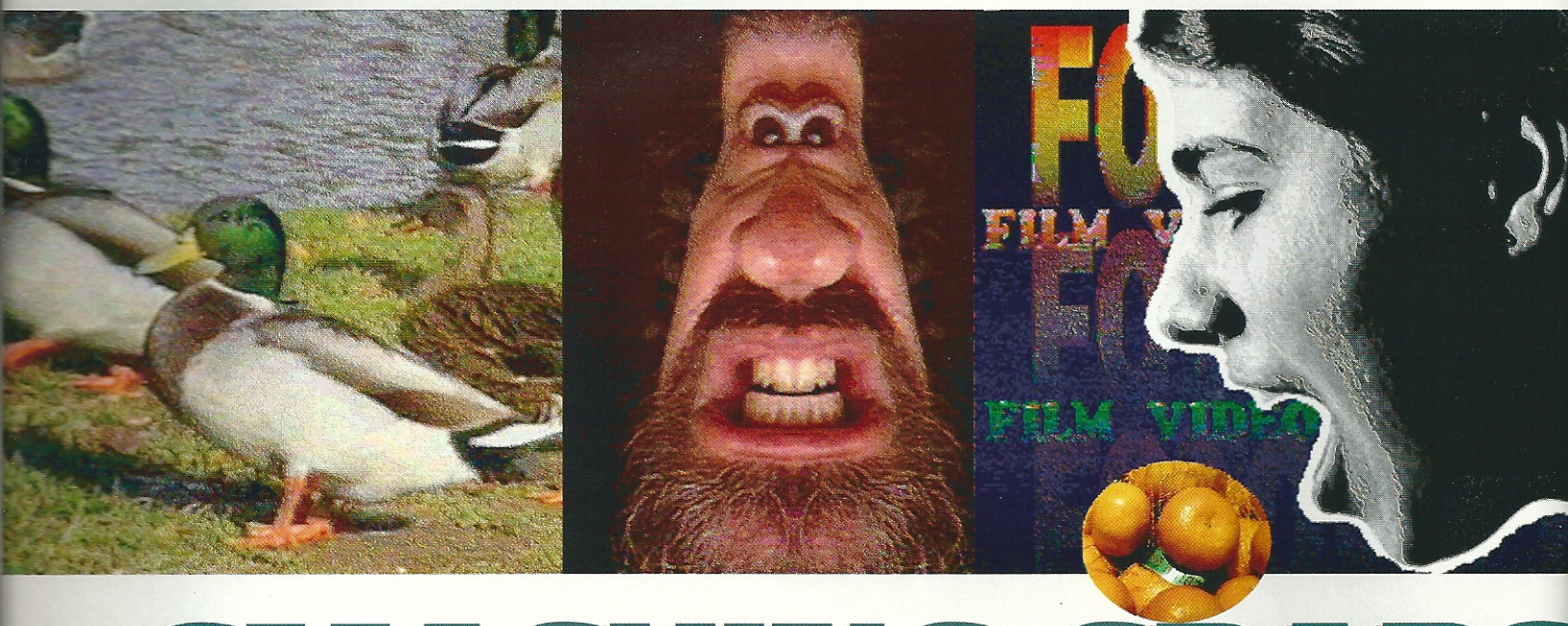
When this ST emulator first appeared in June 1991 it led a lot of people to ask the simple question: why on earth would I want to emulate an ST? The answer (back then) was: DTP and music. The ST had heavyweight sequencing software such as *Cubase* and *Notator* and top–end DTP software such as *Calamus*.

The board itself is tiny, comprising just two chips. With the board installed you need to use a program called *GETTOS* on an ST; this dumps the ROM images on to disk. With the ST's operating system on disk you can run the emulation software and load the ROM images into memory. In operation the emulator works just at about 95 per cent of the speed of an ST. However, you can use all three screen modes; you need a special monochrome monitor to see high resolution on an ST.

It's also possible to use far more than the ST's maximum 4Mb of RAM thanks to some clever work by the board's manufacturers, Macro Systems.

Medusa had no problems in running any serious ST software, but games won't (for the most part) run.

You won't need to go through a protracted conversion process either, the emulator can make the Amiga read and write ST disks. You can partition your hard drive to include an ST section and use any of the Atari machine's operating systems.



SMASHING GRABS

Can't paint? Can't draw? You can use a video digitiser to unleash your pent-up creative talent. Let's get straight to the art of the matter with look at recommended digitisers

Even if you can't paint you can still create wonderful images with your Amiga by using the good old video digitiser. By pointing a video camera at the subject that you'd like to 'paint' and then by feeding the output from the camera into a digitiser, you can grab the image that you see on the video camera into your Amiga's memory as a picture.

Although the more expensive Amiga video digitisers may seem attractive, you may well find that one of the cheaper and seemingly less capable units will suit your particular needs. At present there are four types of Amiga video digitiser: slow-scan, real-time mono, three-pass colour and real-time colour. Below is a quick run-down of the capabilities of each.

SLOW-SCAN MONO – Slow-scan digitisers are becoming less common these days, simply because they take so long to grab just a single image (this can be as long as 12 seconds to grab one monochrome frame). Although slow-scan digitisers consistently produce the best quality results, they need to be fed a very high quality monochrome video signal in order to be able to get the most from them.

REAL-TIME MONO – A real-time monochrome digitiser enables you to capture a single greyscale image from any video source without having to pause the video image or restrict your digitising attentions to static objects. The main advantage of a real-time mono digitiser is that it can be used to capture a moving subject. What's more, many digitising programs enable the frames captured by a real-time digitiser to be buffered into memory and then played back producing an animated sequence of digitised frames.

THREE-PASS COLOUR – Most colour digitisers cannot grab a full-colour video image in real-time, so they cheat by colour separating the signal into three exposures: red, green and blue, that are later combined to form a full-colour image.

If you intend to digitise from video tape, then go for a digitiser that either has its own RGB splitter or is capable of accepting a signal from a separate RGB splitter. For grabbing from camera, many colour three-pass digitisers use three coloured filters (little pieces of tinted red, green and blue plastic) that are placed in front of the camera.

REAL-TIME COLOUR – At the top of the digitiser pile are the real-time colour digitisers that are capable of grabbing a full-colour image from any video source in real-time. These really are the bee's knees but they tend to be expensive (expect to pay at least £3[illegible]). Be wary of cheaper real-time colour digitisers though as they sacrifice speed and quality.

Vidi-Amiga 12

£99.95

(Rombo Productions 0506 414631)

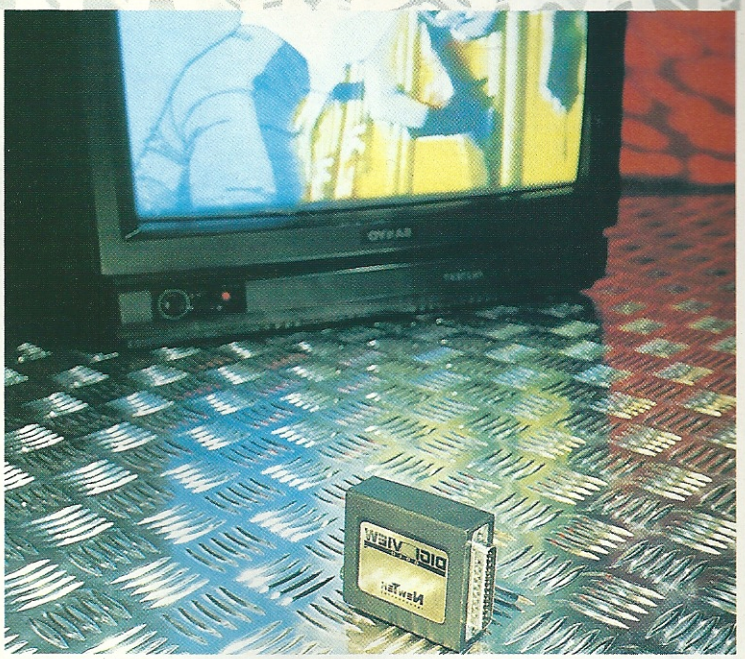
Rombo's Vidi-Amiga 12 caused quite a stir when it was released late last year because it combines a real-time monochrome video digitiser and high-quality colour splitter in one tidy box. Although Vidi-Amiga 12 cannot grab colour images in real-time, its built-in colour splitter will separate a static colour video signal into the three component signals that the digitiser needs. The resulting images are full of detail and contrast. Vidi-Amiga 12 fully supports the AGA chip set, so images can be grabbed with up to 262,000 colours.

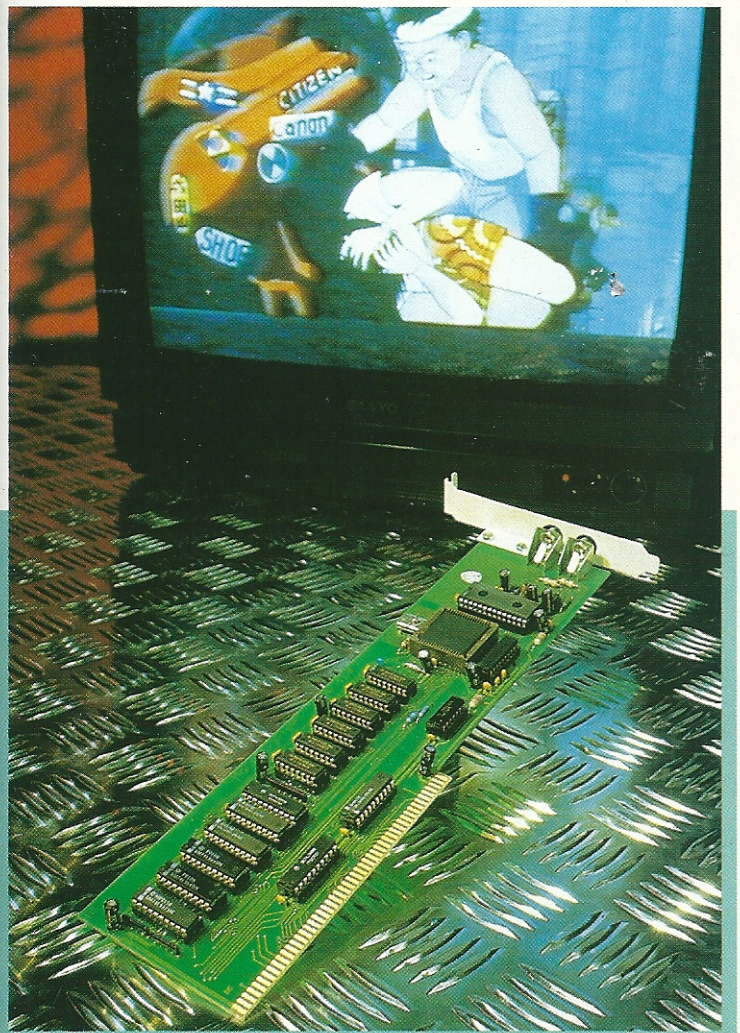
Vidi-Amiga 12 may not be the most technically-advanced digitiser, but if you want the best low-cost digitiser, then Vidi-Amiga 12 is definitely your best choice. Keep your eyes out also for the soon-to-be-released, realtime Vidi-Amiga system (£169.36).

DigiView 4.0
£150
(Silica 081-309 1111)

NewTek may have moved on to greater things, but its original DigiView 4.0 digitiser still proves to be highly popular with Amiga users thanks to its low cost yet high performance. Although DigiView is a slow-scan digitiser (a single monochrome image can take up to 12 seconds to digitise), this technique does have its benefits. Because DigiView uses a highly detailed video sampler, the quality of grabs obtainable are absolutely second to none. Even in these days of 24-bit grabbers, no other digitiser can match DigiView for quality.

The only bad news about DigiView 4.0 is that it really isn't that useable with anything other than a very high quality colour video camera, so home users may want to take a look at Rombo's Vidi-12 instead.





V-Lab
£299
(Amiga Centre Scotland 0896 87583)

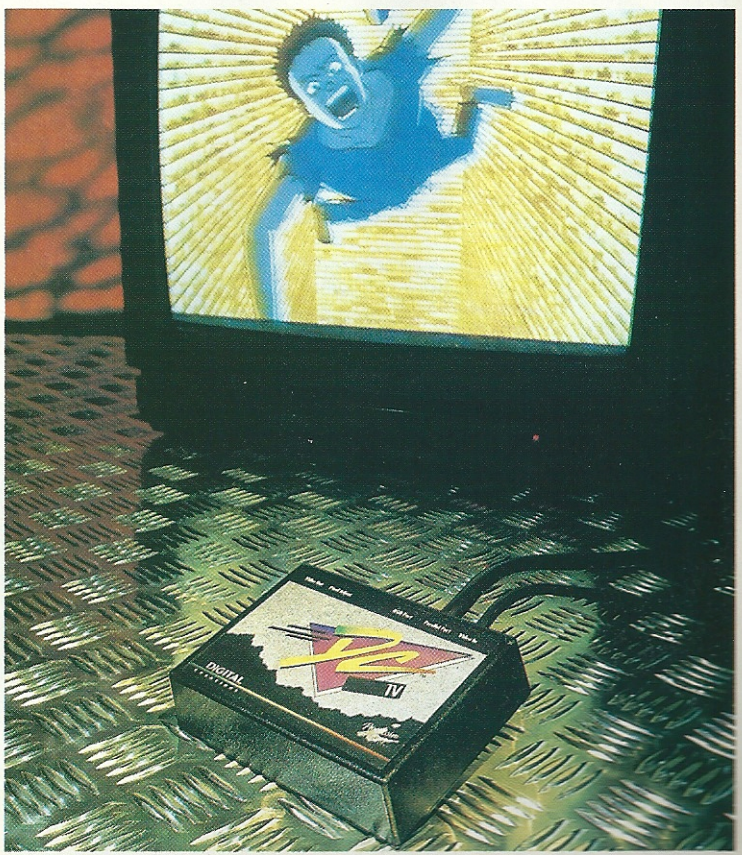
Macro Systems may not be a particularly well-known company in this country, but its V-Lab video digitiser has certainly earned itself a place in our top ten. V-Lab is a slim Zorro-compatible plug-in card for the Amiga 1500 that offers real-time 24-bit colour grabbing of any composite video signal.

Although the board doesn't directly support 24-bit file formats, the software enables you to convert your grabs to IFF-24, or any other standard Amiga screen resolution. V-Lab may lack sophistication but, for the money, it's the best real-time colour video digitiser available for the Amiga. If you want to grab in full colour from a moving video source, then V-Lab is for you.

DCTV
£499
(Silica Systems 081-309 1111)

Although not marketed as a digitiser, Digital Creations' DCTV is worth checking out if you're in the market for a full-colour video digitiser and psuedo 24-bit display device. Offering a special composite video mode that is capable of displaying full 24-bit quality images, DCTV also boasts a very capable colour digitiser than can grab 24-bit images from a composite video signal. However, DCTV is not a real-time digitiser, so the video source must be static. Although somewhat fuzzy, the overall quality of grabs obtainable with DCTV is very high.

Despite the fact that cheaper digitisers are now widely available, DCTV is an ideal choice for anyone who doesn't own an AGA machine and wishes to use their digitiser to grab high-quality images for video work. If you fit this description, then DCTV is definitely worth a look.

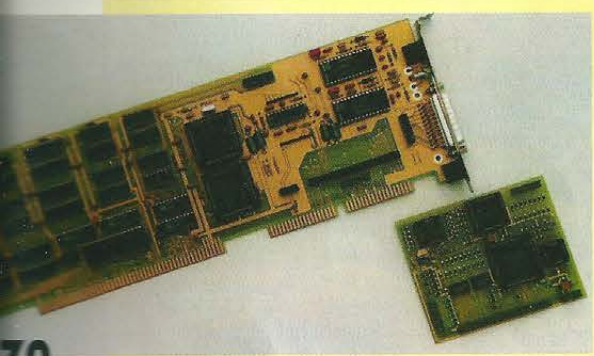


ColourPic Plus

£699
(JCL 0892 518181)

JCL's ColourPic Plus is an extremely impressive real-time digitiser that can grab full-colour video images from just about any video source in full 24-bit resolution. Although very similar to Macro Systems' V-Lab, ColourPic Plus provides far greater control over the incoming signal and, thanks to its built-in framestore, you can view the incoming video signal on your Amiga monitor simply by tapping the space bar (V-Lab, on the other hand, offers no such preview facility).

We have to admit that despite its many impressive features, the overall quality of images obtainable from ColourPic Plus is not quite as good as those produced by V-Lab. Considering the difference in price between the two, V-Lab still holds the crown.



FrameMachine

£379
(MicroPace UK Ltd 0753 551888)

If MicroPace is to be believed, its FrameMachine is the fastest digitiser available for the Amiga 1500 upwards. The digitiser, which is a Zorro-compatible card, can grab full 24-bit colour images with full overscan resolution in real-time from any Composite or SuperVHS video signal. When used with a SuperVHS camera or VCR, FrameMachine consistently produces some of the best quality grabs of any real-time colour digitiser on the market. An optional Prism card can be installed that enables the digitiser to display grabbed images in their full 24-bit glory. Prism can also animate quarter screen 24-bit images at a rate of 25 frames per second on an accelerated Amiga. FrameMachine is an impressive bit of kit.

VideoMaster

£69
(MicroDeal
0726 68020)

No, the price isn't a mistake – VideoMaster really is just £69. Designed by Tony Racine of AVR (the brains behind MicroDeal's Clarity-16 sampler), VideoMaster is a combined video digitiser and sound sampler that is only compatible with the Amiga 500 because it uses the 86-pin bus connector unique to the A500. As a result of this, only A500 owners can take advantage of this spectacular digitiser bargain, so the rest of us will have to look elsewhere.

The built-in video digitiser is very similar in many respects to Rombo's original Vidi-Amiga. It features real-time grabbing of monochrome images, the digitiser can also grab in full colour using an RGB splitter or the included colour filters.

Although VideoMaster is still very good value for money, at the end of the day you get what you pay for. The overall quality of grabs leave a lot to be desired. However, if you're looking for a budget digitiser to get started, VideoMaster is ideal.

SnapShot Pro

£499

(Silica 081-309 1111)

Following hot on the heels of both ColourPic Plus and V-Lab comes the excellent SnapShot Pro, a very nicely designed and robust digitiser that connects to the parallel port of any Amiga. Although it is not strictly a real-time colour digitiser, SnapShot Pro comes with a separate RGB splitter that automatically separates the incoming composite signal into the three exposures required to build up a full-colour image.

Although the image quality of SnapShot Pro is extremely good indeed, its price leaves an awful lot to be desired.

Ultimately SnapShot really is nothing more than a glorified Vidi-Amiga 12. However, if HB Marketing were to give SnapShot real-time colour grabbing facilities (and drop the price), it could be on to a winner.

Videon

£199

(Power Computing 0234 843388)

Although Power Computing's Videon is starting to show its age, especially when compared to cheaper and more capable devices such as Rombo's Vidi-Amiga 12, it's still worth considering if you want to grab full colour images from video tape. Like Vidi-Amiga 12, Videon doesn't feature its own framestore memory, so the image being grabbed must be static if you are to avoid any blurring effects.

Although the image quality is surprisingly good, Videon is no longer a viable alternative to the much cheaper Vidi-Amiga 12. If Videon were to be dropped in price, it could do well.

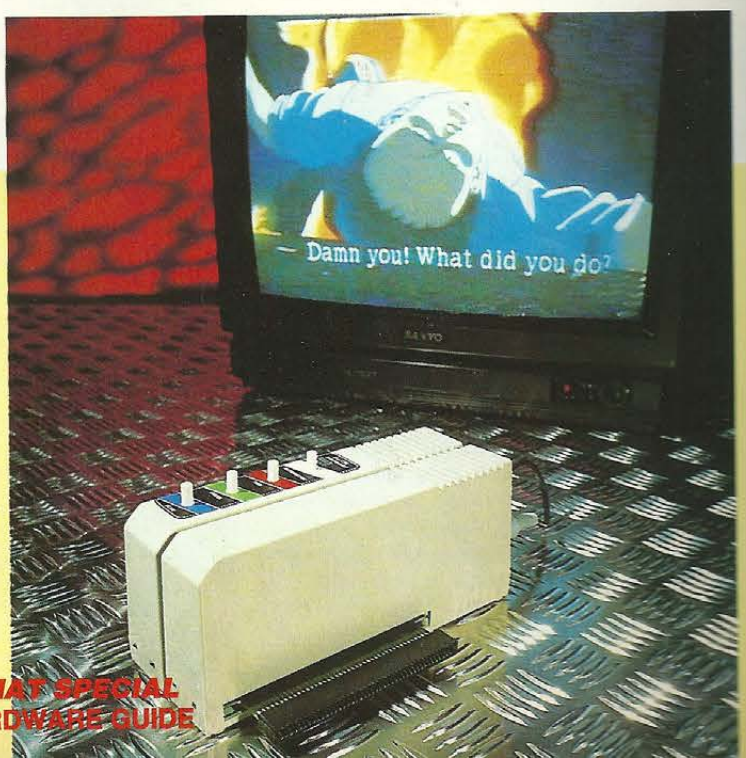
Real-time Colour Digitiser

£199

(Datel Electronics 0782 744707)

Like MicroDeal's VideoMaster, Datel's Real-time Colour Digitiser connects to the 86-pin bus connector on an A500, so it cannot be used on any other type of Amiga. Although very easy to set up and use, the digitiser simply doesn't cut it in the image quality department. To be perfectly honest, it's downright lousy.

The digitiser offers a number of image controls that can be used to alter the brightness and contrast of the incoming video signal, but even these don't improve image quality. For the price, Datel's digitiser just doesn't have anything to offer. Do yourself a favour and either buy Vidi-Amiga12 or, if you own an A1500, V-Lab. Maybe Datel should go back to the drawing board.



PERIPHERAL VISION

What does your mouse mat say about you? Do you need a mouse holster, and will a disk wallet change your life for the better? Let's take a handful of these and other bits and pieces from the lucky dip of Amiga peripherals

If you peruse adverts in a magazine such as *Amiga Shopper*, you'll realise that there's a whole industry built up around supplying 'peripheral peripherals'. Mouse mats, anti-glare screens, mouse holsters... you name it, someone is selling it (and making a pretty profit along the way). So, what can you buy the Amiga owner who's already got everything useful – and can you save yourself money by making it yourself instead?

Mouse matters

The one peripheral that absolutely every Amiga owner should have is a mouse mat. It saves scratching the table, it stops the mouse skidding about, and it gives you absolute control over your rodent. But beware: the type of mat that you own reveals to observers what kind of user you are.

The lowliest – but, paradoxically, also the coolest – type of mat to have is simply a sheet of cardboard, preferably cut off a cereal packet. This says one of two things about you: either you've decided that "this will do. After all, who needs to pay cash for something like this" (sad), or you're such a stylish Amiga guru that you've dispensed with the trappings of consumerism, and have reverted to minimalist computing. Warning: there aren't many of the second type of person about. If you think that you're one of these guys, you're almost certainly not – you're a dweeb.

Next up comes the freebie mouse mat advertising an Amiga product such as a hard drive or an expensive program. OK, so you're smart enough to blag the free gift – but really, this sort of kit is available by the bucketload. The next thing you know, you'll be wearing a CDTV T-shirt. You already do? Oh dear...

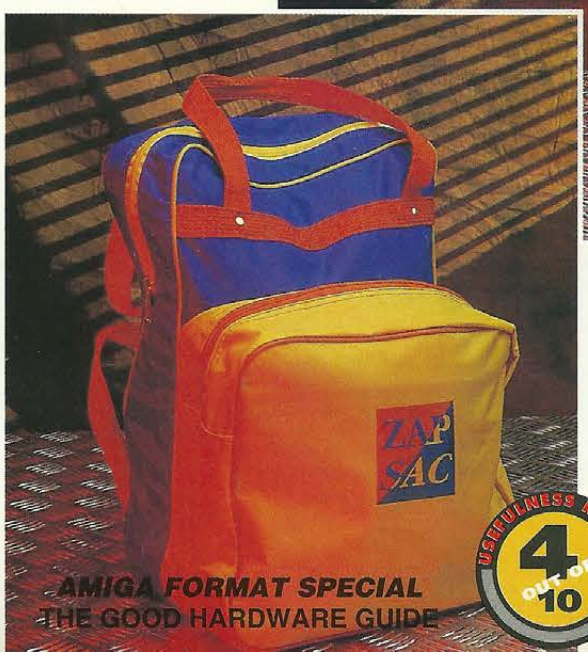
One up from this is the mouse mat advertising a product for a different computer. Atari mats are just plain sad; PC mats are almost as naff as Amiga ones (and easier to come by, too); Mac product ads on your mat are slightly better, although it can look as if you're just jealous; a workstation such as a Sun shows that you have contacts somewhere (although beware a NeXT mouse mat – that computer's as dead as a dodo, and so is your street cred); almost the best that you can do is an ***Amiga Format*** mat (we had to say that); but the ultimate, of course, is to have a mouse mat advertising a Cray (a supercomputer so cool that they design padded leather seats around the CPU for the programmers to relax on). What does a Cray mouse mat say about you? Well, that you've got several million pounds to spare, for starters. Also, that your Cray's mouse is probably being used on the remains of a Kellog's Cornflakes packet...

Storing stuff

Mats aren't the only thing that your mouse needs to live a comfortable life, though. At least, that's the thought process that several companies seem to have gone through, as they try to sell you mouse holsters – a small plastic attachment that sticks to the side of your monitor or computer, in which you lovingly place the mouse at the end of the day. What's wrong with just leaving it on top of the computer? Don't ask us.

And plumbing the absolute depths of tackiness, you can even get little clothes for your mouse. Yep, a little furry suit with a button nose and whiskers. It really is tragic.

But even if you believe (as most sane people do) that your mouse is fine without any of this pampering, you might do well to consider a dust cover for your Amiga itself – and any peripherals such as the monitor. It's all too easy to spill that half can of Jolt Cola all over everything as you're packing up for the night,



Top: some of the many bits and pieces of peripheral things you can buy for your Amiga.

Above: a monitor arm. Make sure it's sturdy enough to hold the monitor, or there'll be tears.

Left: pack your A600, power brick, cables, disks and sandwiches in this handy bag.

Waggle this around inside your mouse to remove fluff and other debris.

The mouse mat: make your own from an empty cereal packet.

A dust cover is one of the more useful of Amiga peripherals.

and at least a dust cover offers a first line of defence. (***Amiga Format*** does a natty line in dust covers, now you come to mention it...).

And what about when you want to move your Amiga from one place to another? It's all very well packing it in its original box, but that doesn't do much for your street cred when you arrive at the user group meeting. No, what you want is a customised holdall that will carry your Amiga, power supply, extra disk drive, cables and so on. One such is sold by Silica Systems. Make sure that your model of Amiga will fit before you buy, though – some are larger than others. Oh, and you'll still have to cart your monitor separately.

Screen play

Unless you use your Amiga in a windowless basement, you'll have come across the problem of glare on your screen. No matter how carefully you arrange things, you can guarantee that, at some time during the day, the sun will shine straight at your monitor – rendering those pesky lemmings absolutely impossible to see.

There are a couple of things that you can do to combat this. The first is to buy a tilt-and-swivel adaptor for your monitor. This will enable you to move the screen around so that you get the best viewing position possible, avoiding reflections. In fact, you should get such a unit anyway – 99 per cent of monitors aren't angled correctly, and it's something that can lead to back pain and even RSI.

If you're really flash, you could invest in a monitor arm, a device that clamps to the edge of your desk and holds the monitor in mid-air, so that you can free up some desk real-estate. You'll have to be loaded, though – most high-quality units cost hundreds of pounds. Don't be tempted by a really cheap monitor arm, unless you can be sure of its quality. Your monitor is a heavy, expensive piece of kit, and you don't want it crashing down on to your desk.

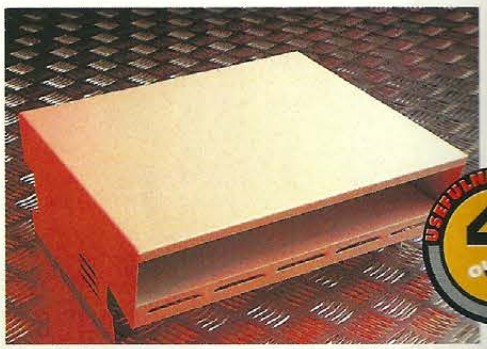
A less costly approach to avoiding screen glare is to buy an anti-glare filter for about £10. Most claim to cut out 90 per cent or so of glare. Be warned: if the sun is shining straight at your monitor, the best anti-glare screen in the world won't stop reflection. If the problem is less severe, such a device may well prove a worthwhile purchase.

The other type of monitor filter available is the anti-radiation device, that claims to reduce the amount of radiation emitted by your display. It still hasn't been proved that this radiation is at all harmful – for every survey that says it is, another says it has no effect whatsoever. If you're paranoid, you might consider buying on, but most people don't bother. And anyway, I like having three heads...

Incidentally, new EC regulations will require employers to make your life easier by supplying things such as tilt-and-swivel screens, and keyboards that aren't attached to the main computer.

Workstations

There's a growing market in workstations – from simple plinths to hold your monitor above your Amiga, to full desks with about a million little shelves to hold everything from the Amiga to your box of disks, your mouse, your pencils and paper clips. But do you really need to fork out money on such a thing?



The plinth: make sure your Amiga fits before you rush out to buy one of these little beauties.

Well, it's true that you can fashion a plinth out of three pieces of wood and half a dozen nails, but the custom-made solutions do have some advantages. Some tilt the keyboard to a better angle for typing, have specific spaces for external floppy disk drives and so on. If you're going to buy a plinth-style workstation, though, make sure that your Amiga will actually fit it.

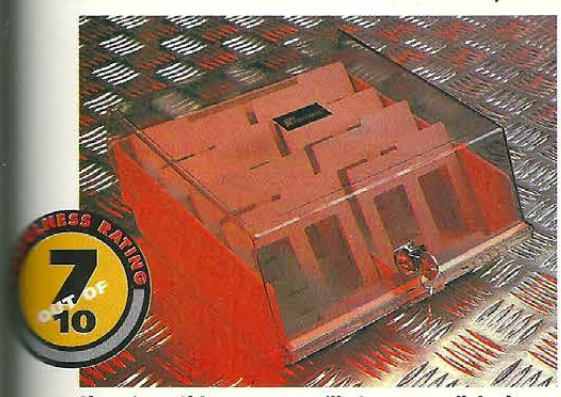
It's no use buying an A500 unit if you've got a huge hard drive hanging off the side of your machine that won't fit into the space provided. If in doubt, phone the supplier with the exact dimensions of your set-up and get an absolute guarantee that the unit you're buying will be OK – then at least you can get your money back if it isn't.

And the rest...

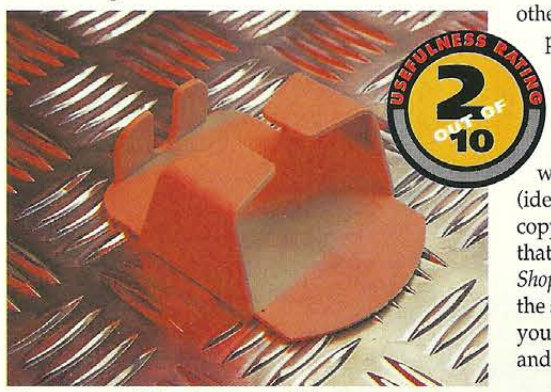
If you are going to get really serious about peripheral peripherals, then you should check out all the other extra little bits that complete your set-up and prove conclusively that you're an Amiga techno-freak par excellence.

These include things such as a disk wallet to take your favourite shareware to user group meetings; stackable disk boxes to keep your software safe at home; stickers for your Amiga (ideally advertising a totally different system); a copy-holder stuck on to the side of your monitor so that you can easily type in the listings from *Amiga Shopper* (a copy holder holds a sheet of paper next to the screen so that you don't have to keep switching your gaze from the monitor down to the desktop); and so on, and so on, and so on.

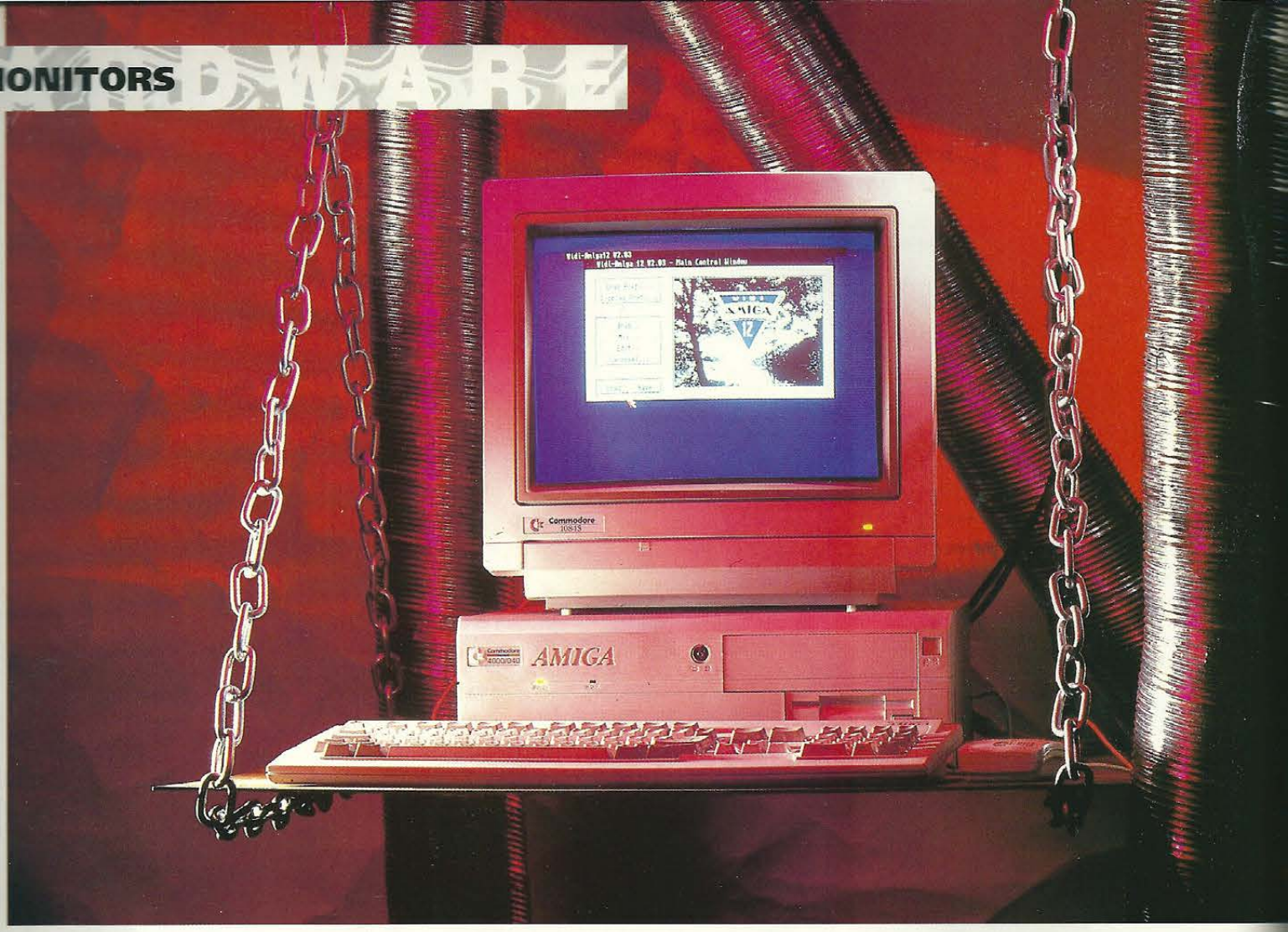
Only when you've got all of these things can you consider yourself a true Amiga aficionado.



If you're a tidy person you'll store your disks in a box, not where they happen to fall from your desk.



The mouse holster: how ever did we manage before these came on to the market?



MONITORS

You are going to get more out of your Amiga if you get yourself a monitor. That's a fact. But just which monitor do you get? Tune in to these pages...

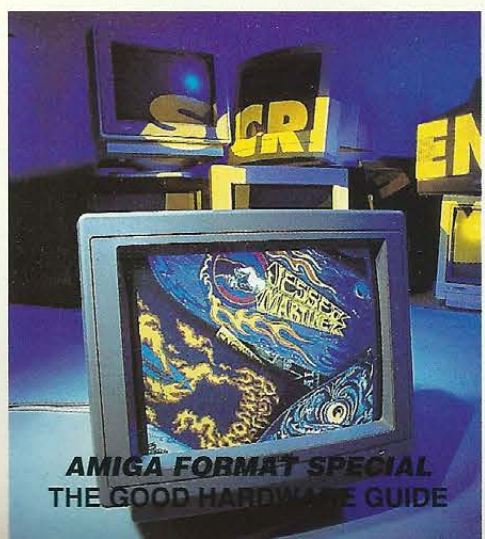
Here's a fact that might surprise and cheer you in equal proportions: most people who own an Amiga don't own a monitor. As far as we've been able to ascertain, the majority of new users make use their own televisions or of the portables that Uncle Derek took caravaning before his little problem became inflamed. But... the longer they own their Amiga, the more desperately these people are likely to want a decent monitor.

So, the chances are that you won't have a monitor – at least early returns of our Reader Survey suggest this. The next few pages are packed with information that will enable you to make a decent buying decision. In the event that you do have a monitor, it is also worth your while casting your eyes over the next few pages in order to find out more about your own equipment, because the more you know the more you will be able to understand about things like graphics, ray-tracing, DTP and the other Amiga pursuits that need a more than just adequate device for looking at the pixels.

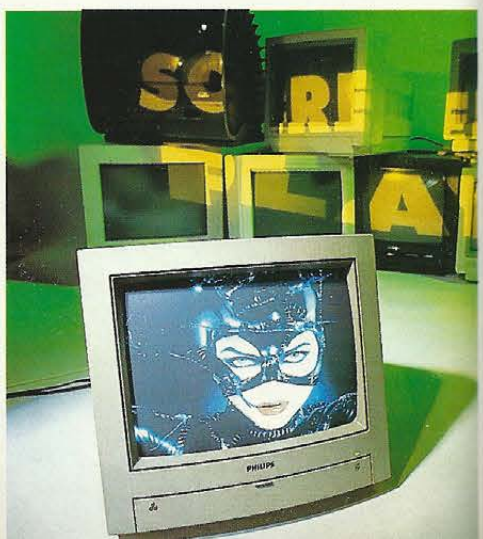
Let's start with some basic facts:
The first one will no doubt offend many monitor makers and sellers, but realistically most people don't need a monitor. Most Amiga users can adequately attend to their various tasks (games playing, word processing, databasing, even some *DeluxePaint* graphics work, music making and spreadsheeting to name but a few activities) with a decent television. Of course if you are a one-TV household, the question of useage arises – especially around *EastEnders*, *Baywatch* or *Match Of The Day* time. So although technically you don't need a monitor for the more bog-standard task, it becomes increasingly obvious as your knowledge increases, that other factors must be considered.

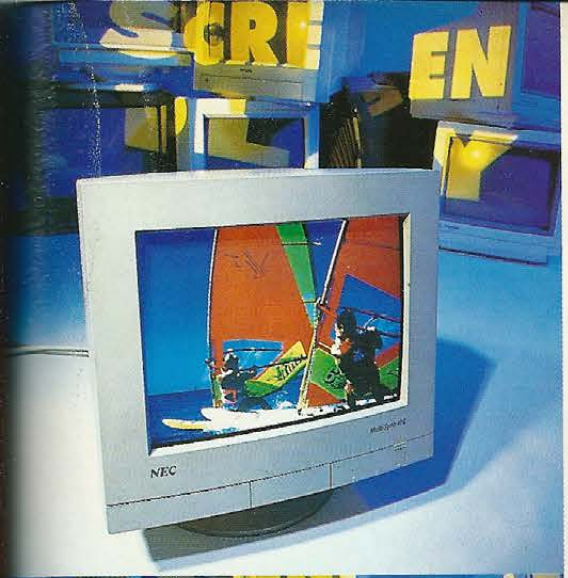
There are a huge number of monitors on the market and the vast majority can be connected to your Amiga. There are, however, several factors to bear in mind when purchasing a monitor. Firstly,

Philips 7CM3209: one of the most reasonable Amiga printers around at the moment.



And here's one of the classics, again from Philips, it's the all-time favourite... Philips CM8833!





Two quite excellent multisynch monitors are the NEC 4FG (top) and Commodore's very own CBM1960 (bottom). Watch for prices drops soon.

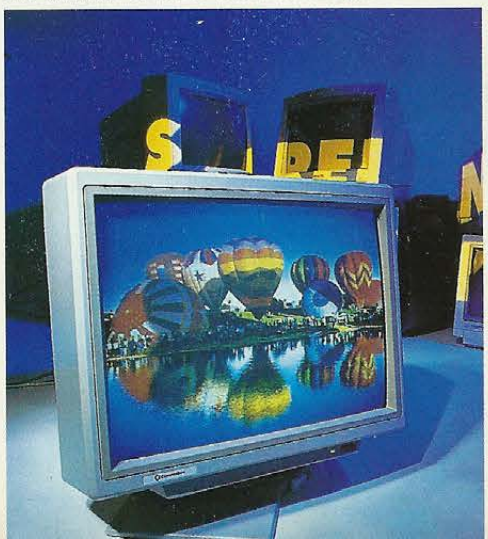
many companies (Commodore included) don't actually manufacture their own monitors, they simply stick someone else's tube in their case and slap a badge on the front. The other factor to bear in mind is that price is no indication of quality. Often the most expensive monitors offer little or nothing over models of half the price, some are even worse. If you're thinking of buying a monitor then ask to see one in action, with an Amiga signal running through it.

Monitor the situation

Don't be fooled by the case. All that counts with a monitor is the tube. Obviously it's nice to have an aesthetically pleasing lump of plastic sitting on top

Continued over

Yes, even Commodore bought into FST technology with the CBM 21FST. 21-inches you know.



MONITOR BABBLE BOMBED

As you would expect from an* Amiga Format Special*, we aren't about to leave you floundering around in all the jargon that weighs down monitor understanding. Nope, read this box-out and you you'll be able to flabbergast the shop assistant in your local High Street computer emporium:

Convergence: colour monitors work in a very similar way to standard televisions, they both use three small guns light at the cathode-ray-tube (CRT). These three streams of light comprise electrons and by using three basic colours Red, Green and Blue (hence RGB) make up the images on the screen.

The electron guns have to be lined up correctly if the colours are to hit the screen and form a clear image. If the guns are not lined up you will get unwanted hazes of colour appearing in between blocks of real colour – this is called convergence. Re-aligning the guns will sort this problem – although we wouldn't for one minute suggest that you try to do this complicated task yourself.

Composite: if you want to send audio, colour, and sync signals but don't want to send this information separately then you have to send it in composite form, hence the name.

RGB: Red, Green and Blue, three basic colours from which all other colours can be constructed. Unlike a composite signal, an RGB signal is so-called because it is split into these three colours. It makes no difference to clarity whether a monitor is RGB or composite.

RF (Radio Frequency): this term is used in relation to televisions used as monitors. RF is actually a composite signal used to transmit information via the airwaves.

Purity: this is the quality associated with the colour reproduction on screen. To test this you need a screen showing one colour only, this should be uniform throughout the entire screen. If you are getting dark patches anywhere on the screen these will lower the purity. This is usually caused by magnetic fields, sometimes generated by the monitor's built-in speakers. This can be solved by degaussing.

Degausser: if you are experiencing purity problems because of the proximity of magnetic fields to your monitor, you will need to degauss it. A degausser is basically a metal coil that neutralises the magnetic field. (It's very much the same process as is carried out to degauss a ship's hull to stop debris sticking to it).

Shadowmask: this is a heavy technical term that pertains to the area of the screen that the electron guns shoot the colours on to. This shadowmask is constructed from a thin mesh that directs the electron beams to form uniform patterns.

Resolution/Dot Pitch: probably one of the most important considerations for most users and for all of you thinking of buying a monitor. The shadowmask mesh comprises a huge number of very small holes. These can range from 0.5mm to 0.21mm in size, and this size is know as the dot pitch. The smaller the dot pitch, the more dots on a screen, the clearer the image shown, and the greater the resolution. Dot Pitch also relates to the shape of the dots as well.

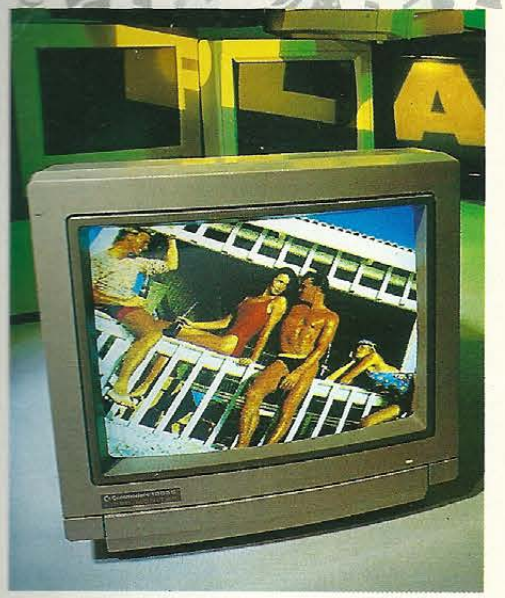
Pin cushion: ideally the bit of the screen that you can see should be a rectangle. However, in some cases the sides of the screen will appear to warp inwards, this is called Pin Cushioning (because it looks like the edge of your Aunty Maude's pin cushion that is made of a wodge of material in a dome shape).

Scan Line/Line Time Base: when the electron gun shoots its light at the screen it does so in a horizontal line from left to right. This brings the line time base into the equation. This is the time it takes for the scan line to move from the left of the screen to the right. The quicker the line time base, the clearer and less flickery the image. One way to tell if your line time base is out of kilter is if you have striations down the lefthand side of the screen. Striations are basically vertical lines that are caused by your monitor being out of sync with itself. Do make sure you don't have a rave demo running before checking though.

Frequency: this relates to the time a screen should take to redraw its horizontal and vertical line time bases. These two lines must also be synchronised in order to present a clear image. If you keep suffering from eye strain, your monitor's frequency may be at fault.

SCART: this stands for Standard Connector for Audio Radio and Television and is a standard protocol for relaying composite and audio signals to a TV or a monitor. Those of you with big impressive TVs might also know the SCART as the Euroconnector, in this form you are able to line your video and TV out to your stereo system (a fine example of relaying audio and video signals).

Multisync: multisync monitors such as Commodore's 1960 (see the review in the main section of this feature) are exactly what you need if you are going to want to make use of the AA chip set's new productivity modes. The name multisync derives from the monitors ability to synchronise with any signal fed into it.



For most people this (CBM 1084s) is the monitor to choose, but a new screen is expected soon.

of your Amiga, but even the prettiest monitor is naff all use if the image is blurry and the colour is indistinct. Again, price is no indication of quality. Just because a monitor comes with a price as large as its code number, it doesn't mean that it will give a better picture than your TV. Don't believe the hype and always ask to see an Amiga's video output running through the monitor before you buy.

There are two main types of monitor for your Amiga, single–scan monitors and multisyncs. Of these, the most popular are the single–scans because they offer good all round performance and are relatively cheap. If you're more interested in using the Amiga's high resolutions and especially if you've got an AGA chip set Amiga then you should be looking at multisync monitors.

If you're going to purchase a single–scan monitor then the best piece of advice we can offer is that you steer clear of Commodore's badged monitors, with the possible exception of the 1084S. This monitor costs £299 and is available through Calculus (0543 416626).

The best single–scan monitor you can get is the Philips CM8833 Mk2 (contact Philips, 081-689 4444). This costs a miserly £229 new and has been a favourite of computer users for some time now.

The 8833's picture quality is miles better than the competition's, offering good focus and crisp, highly-detailed colours. The built-in speakers are of high quality, even if they do seem to lack some bass frequencies for the musical purists.

It's a similar story with the high resolution multisync monitors. The two Commodore models: 21FST and 1960 are sturdy if nothing flash. The Philips 7CM3209 is also quite lacking, but if you can pick it up at the discounted price of £329 then it's a worthwhile purchase. If you'd like the Rolls Royce of monitors then the model you should go for is the NEC 4FG multisync (£599, contact NEC, 081-993 9831). This has a brilliant display, great colour clarity, excellent contrast and superb purity. It will, however, only display the AGA chip set's Productivity mode. Remember to keep an eye on the heavily discounted mail order stock lists. Often the mail order companies get hold of good-quality high-resolution monitors in large numbers. The monitors may not have brand names but are sometimes better than the well-known makes.

MONITOR FACTS

PLACING speakers next to a monitor will cause rainbow coloured blobs to appear on the screen because the magnet in the speaker is pulling the tube's beam off course. If the speakers are left there for any length of time, the tube will be permanently misaligned.

AVOID leaving disks on top of the monitor. The magnet in the monitor can destroy the magnetic information held on a disk.

IT takes about 15 minutes for a monitor to warm up. So if you're buying one, ask the sales person to leave it on for this period of time to get a realistic impression of its abilities. This also gives you time to peruse the other fine products on display in the shop.

VERY few multisync monitors have built–in speakers. This is because they are designed primarily for the PC market (PCs having built–in speakers), so you'll need to plug your Amiga in to the hi–fi to hear any sound.

IF your monitor has composite video input and you have a video with composite video output then you can watch videos or television pictures on your monitor. Take the output to the back of the monitor and plug in either a TV aerial to the video or play a video. To do this you'll probably have to flick the switch on the back of the monitor from RGB to CVBS (Composite Video Broadcast Signal).

HOW YOUR TV WORKS

Many, many Amiga users are quite happy to use their trusty TVs instead of monitors. But just how do they work? In simple terms, your Amiga produces an RGB signal that has to be converted into a format that a television can understand – the signal has to be changed into RF (Radio Frequency). This is carried out by the modulator. A500 and A500 Plus users will be familiar with this rectangular box that sticks out of the video port on the back of their machines, and into which an aerial lead is plugged. People with A600s and A1200s however, will wonder what the hell this is all about because all you have to do is to plug your aerial lead straight into the Amiga. This is because Commodore finally got around to incorporating the TV RGB-to-RF modulator in the Amiga itself – it also produces an audio output.

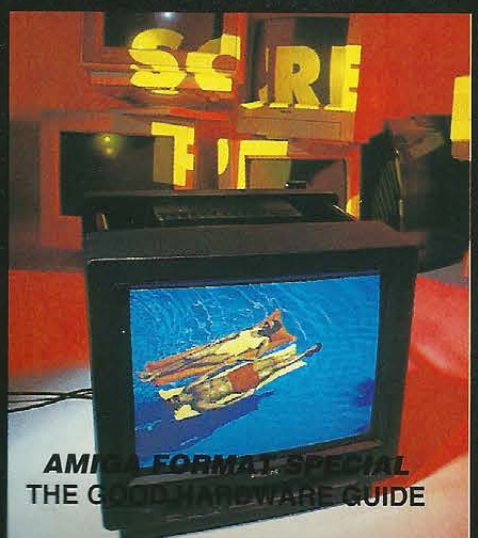
A modulator is the most basic of methods by which to connect your Amiga to a form of output. Although it is cheap and effective it does mean that the signal that gets displayed on screen will be blurry (the modulator is sometimes referred to as the 'mud-ulator') and text will be difficult to read. The reason for this blurriness is because, in modulating the RGB signal, some of the information is sacrificed on its way over.

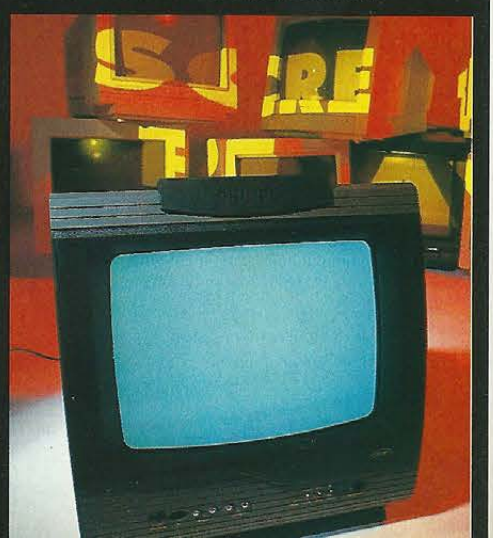
Fortunately for those of you who don't have to muck around with old-fashioned TVs but have the newer ones that come armed with SCART (also called Euroconnector) sockets, there is another way. Your Amiga is quite happy to take SCART output but you will have to get a specialist cable made up by your local computer shop or by a particularly technically minded friend. Once you've got the cable, all you have to do is to plug the SCART into the TV and into your Amiga's RGB output, and you're away.

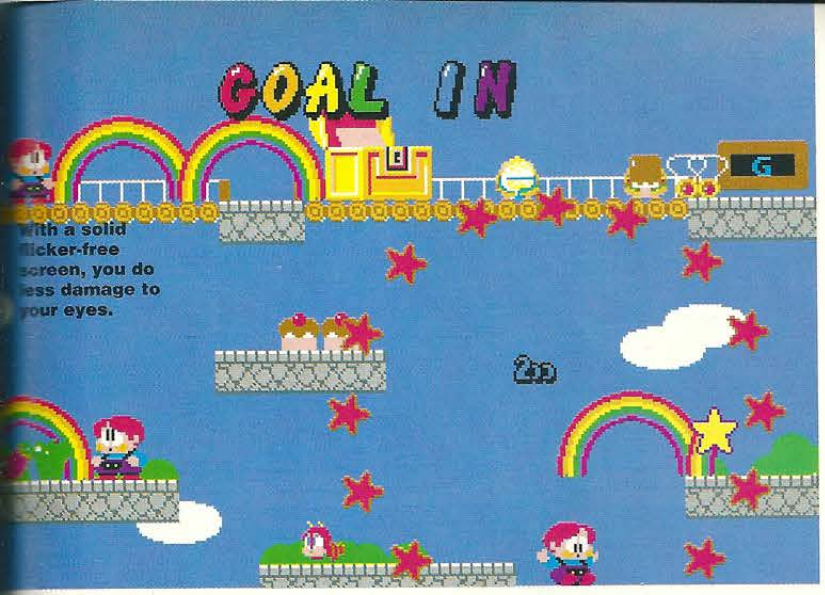
***Amiga Format* recommends any of the Sony Trinitron range of televisions. These have superb picture quality thanks to flatter, squarer tube (FST) screens and every possible variety of socket. The 14-inch model has inputs for composite video signals, RF signals and SCART signals. The best of these is the composite input. This enables you to take the digital composite signal from the back of your Amiga direct to the TV.**

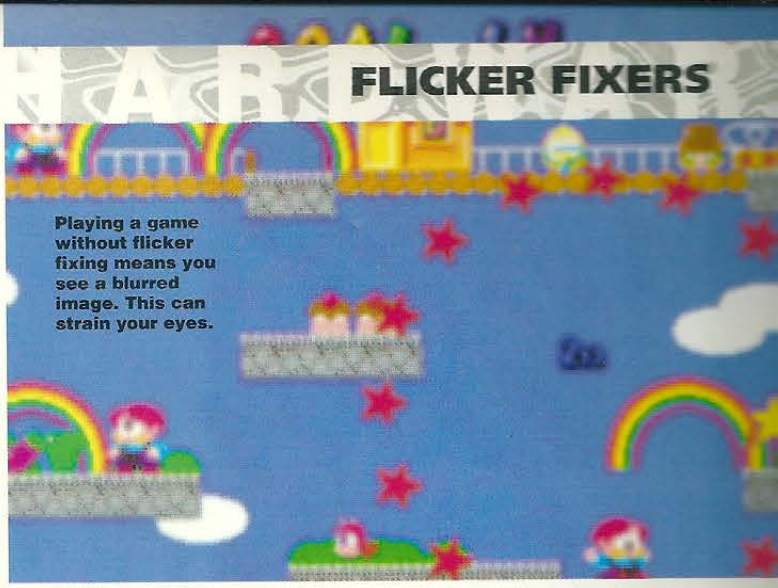
We also recommend the Philips TVs, Book and Cube. Both have FST screens and look extremely stylish. On the back are SCART and RGB connectors which effectively turn the TV into a monitor. Colours are crisp and clear (thanks to a built–in filter) and the quality of sound from the stereo speakers on the Book, the Cube's single speaker is excellent.

TVs are not as totally poor as some Amiga 'authorities' would have you believe, it's simply a matter of choosing the right TV. After all, you could have Ceefax while you *Lemming*!









FIX YOUR FLICKERS

If you do a lot of work in DTP and paint programs, you'll probably run your monitor display in high-resolution, in which case you'll be familiar with the dreaded screen flicker. What you need is the hardware to fix it...

Good as the Amiga's display is, there have always been problems running it in high-resolution. When the original engineers designed the video display, they decided that it would be a good idea to have a high-resolution (640x400) screen display.

To do this they used a hold and modify (HAM) effect to display pictures at a much higher resolution than should have been possible with the Amiga's Denise video chip. This technique uses an interlaced screen, a screen that shows all the even scan lines first and then all the odd scan lines.

Commodore had its reasons for designing the interlaced screen modes. Interlacing is very important within the video industry and the Amiga's ability to deal with this has led to it capturing the home video market. However, this kind of video display causes big problems in practical use. The most obvious of which is screen flicker.

When using HAM mode on a standard monitor or TV the display flickers very quickly. All of which means that looking at the display for too long is uncomfortable and annoying in equal measure. It also makes any serious kind of art work in high-resolution on a standard Amiga monitor something of an impossibility.

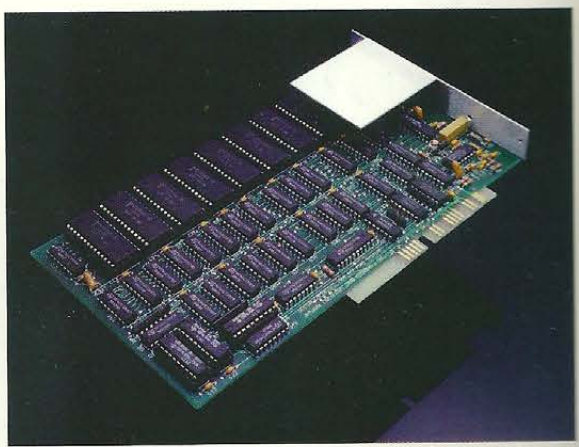
Fortunately there are several ways of eliminating the dreaded screen flicker. If you've got an A500, A1000, A1500 or A2000 then the you can upgrade to Workbench 2.0. With this installed it's possible to use multisync monitors that can synchronise a wide range of signals. The ECS upgrade within the new enhanced chipset includes a non-interlaced screen mode called Productivity. This mode can display a screen 640 by 480 pixels without the slightest hint of a flicker. You do need the multisync monitor though and unfortunately these aren't cheap.

There is a cheaper option available though, in the form a flicker fixer. These boards are manufactured by third party companies. They work by re-synchronising the video signal. Unfortunately, you will still need a multisync monitor to see your wonderful new rock solid images.

Owners of the A3000, A4000 and A1200 don't have to worry about the flicker problem because their machines have a CBM Display Enhancer built in. The most popular flicker fixer is the Microway model which costs £125 plus VAT (contact MicroWay Europe 081-541 5466). It comes in the form of a plug-in card for the A1500 or A2000 and connects to the Amiga via the video slot. On the back of the card is a nine-pin D socket that channels the output from the card to a multisync monitor. Unfortunately the connector that the flicker fixer attatches to is non standard, so a new cable will have to be made up.

The fixer converts all standard screen modes to a higher sync RGB signal, removing visible scan lines as it goes. It has no problem coping with all of the Amiga's 4,096 colours meaning that colour screens have never looked better.

ICD also produces a flicker fixing card. This has recently been updated to version two and reduced in price to £199 .95 (contact Silica 081-309 111 for further details). The board fits into the Denise socket of the main board, a job which isn't as technical as it sounds. If you can open a carton of milk without getting sprayed then you can probably fit the board. You will still need a multisync monitor and cable to see everything though.



The Microway Flicker Fixer, a plug-in board, is one of the most popular flicker fixers for the Amiga.

FILTER TIPS

Not everyone can afford £100 or more for a flicker fixer and another £300 or £400 for a multisync monitor. But there are a couple of other ways of reducing the dreaded flicker and they aren't all from the Blue Peter school of self help.

The first method is to use a screen filter. These come in two forms: mesh and polarised. They both fit on the front of TV or monitor and reduce glare. Mesh filters reduce the amount of light hitting the monitor but can also impair clarity. Polarised filters are far better as they reduce glare without affecting contrast.

Interlace flicker can be reduced by controlling the colours an application is using. Avoid using colours that have a high contrast. Try reducing the intensity of the white to a medium grey (RGB 888). By having a general play around with the palette it's possible to get a considerable reduction of the screen flicker.

MOUSE SURVEY

If you spend a lot of time using your mouse then it's important that you choose one that is comfortable and easy to work with. But do you need an optical mouse, a trackball or just the plain old-fashioned sort? Your decision will be made easy if you follow our advice

The Amiga was one of the first home computers to use that now commonplace interface between the user and the machine, that we refer to as a mouse. Previously cursor movement was carried out by using either a joystick or the cursor keys, a system that made the Etcha–Sketch seem technologically stunning.

The idea behind the mouse is to get an interface that is closer to the movement of the human hand and capable of drawing something other than a straight line. The mouse uses a ball moving over three rollers, two of which control direction and a third that determines speed. Over the last ten years, various changes have taken place with the mouse but these are largely cosmetic. What really counts with mice is the length of the lead, the feel of the unit in your hand and the quality of the mouse's movement over the mouse mat. What doesn't matter when you're shopping for a mouse is the cute appeal of the unit, the space age interface or the number of air miles you get free with it. It's easy to be awestruck with the science behind some of the most recent mouse designs, but your best bet is to stick to the proven ball and roller technology. Here is our pick of the top mice:

Golden Image Mouse
£14.99
(Ladbroke Computing 0772 203166)

Sticking to the maxim that simple is best, the Golden Image Mouse is a good solid unit that received an ***Amiga Format*** Gold rating of 90 per cent for itself in issue 38 (September 1992). The mouse's resolution (that is how much horizontal and vertical data the Amiga can pick up per inch of space) is 290 dots per inch (dpi).

In operation the mouse moves smoothly across the mat and is easy on the hand. The curved shape and micro-switched buttons mean that it feels like a quality product. This makes it perfect for art packages and DTP as well as for the more mundane Workbench-related activities.

Contriver Mouse
£15
(Power Computing 0234 843388)

The 290 dpi resolution of this mouse makes it ideal for games playing. It also makes it useful for art packages that require a good deal of precision.

It is quite a heavy unit, although this doesn't impede movement, but makes it feel like a quality product. The buttons are solid (microswitches are good like that) and it sits nicely under the hand.

As an added extra, if you're into ruining the well-crafted curves of your monitor then you can fix the Contriver's mouse holder on the side and plonk it in there when it's not in use. At £15 a go, this is a good budget choice.

Solid gold easy action. The Golden Image Mouse scored an *Amiga Format* Gold rating in issue 38.

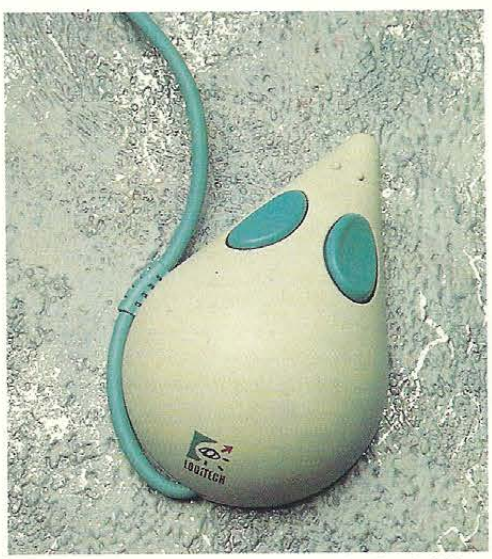
The Contriver Mouse is ideal for using to play games and is a good buy at £15.

The Pandaal Mouse is comfortable to use and moves well over the mouse mat.

For £29.24 you get a Naksha Mouse, a copy of the adventure game *Operation Stealth*, a mouse mat and a mouse holder.

The Golden Image Optical Mouse: if you have problems with your mouse getting clogged up, this could be the answer.

When you chose your mouse, make sure that it feels comfortable under your hand and that the buttons are easy to reach. Micro-switched buttons are particularly solid and responsive.



Although it's a novelty product the Logitech Kidz Mouze performs surprisingly well.

Pandaal Mouse
£15
(Pandaal 0234 841224)

This is what we in the Amiga mouse reviewing industry refer to as a low-rider. It has a well-sculpted feel and sits nicely under the hand, although if you've got long fingers you may be in trouble. It moves well over the mouse mat and seems sturdy enough with two micro-switched buttons and a longer lead than usual. It has an average dpi resolution making it suitable for most activities. A solid mid-range buy.

Naksha Mouse
£29.24
(Silica 081-309 1111)

In the 280 dpi category, this is another of the Botham mice: a good all rounder. Its solid weight means that it feels good sliding over the mat. The unit feels good under the hand and proves responsive. The mouse buttons are micro-switched that won't get brushed accidentally. At £30 and with a copy of *Operation Stealth* thrown in for good measure this represents good value for money. You also get some extras: a decent mouse mat and a mouse holder.

GeniTrac Trackball
£49.95
(Silica 081-309 1111)

Another option for pointer movement is to invert the mouse and move the little ball directly with your hand. This is how trackballs work – you spin the ball with your hand. This process isn't adequate for serious usage, but can prove fun when playing games.

The GeniTrac is the best trackball around. It looks sleek, the buttons are well positioned for thumb operation and the ball is well placed. At £50 it isn't cheap, but if you're anti-mouse, check it out.

Golden Image Optical Mouse
£39.99
(Ladbroke Computing 0772 203166)

One of the biggest problems Amiga users have with their mice is when the plastic rollers inside get clogged up with bits of fluff and dust and the mouse pointer starts moving erratically.

You can avoid having to do this by taking the little rollers out of the equation by using an optical mouse. This optical mouse reads dot information from a special mouse mat instead of with roller movements.

Although you won't have many problems with dirt, the movement feels less than convincing and if you move the mouse too quickly the computer looses track. However, an optical mouse may be worth considering if you work in a dirty environment.

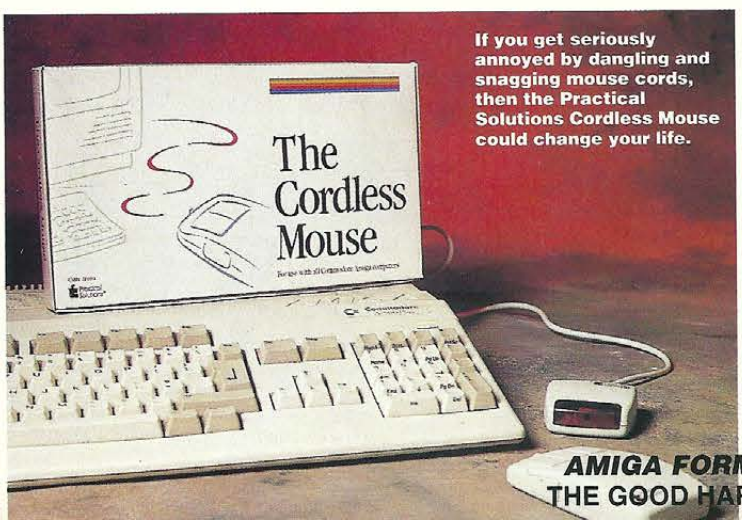
Logitech Kidz Mouze
£32
(Logitech Ltd 0344 891313)

Here's a mouse aimed squarely at the younger Amiga user. It comes in a delightful mousey shape, complete with plinky little eyes and a rodenty tail. Because of its novelty factor it can't really be recommended for the more serious Amiga useage such as intricate graphics , but if you want to encourage children to start using the Amiga then this might be a good idea. Because this mouse is designed for small hands it feels distinctly uncomfortable if you're an adult.

However, it proved to be surprisingly responsive and accurate, although its dpi isn't up to any kind of precision work. The buttons feel a bit odd because they are situated on the sides of the mouse's snout, but they have a solid feel to them.

Practical Solutions Cordless Mouse
£25
(Silica 081-309 1111)

One of the most common and annoying problems you'll encounter when using a mouse is cord snagging. What's needed to rectify this problem of cord snagging, of course, is a no-lead mouse. And here we have one. This sort of mouse uses infra-red technology to read mouse movement data. In use the mouse proves to be great for Workbench and serious functions but fairly useless for when it comes to playing games. You'll also encounter problems if the infra-red signal gets disrupted. However, this cordless mouse is worth checking out if you're a serious freedom fanatic.



If you get seriously annoyed by dangling and snagging mouse cords, then the Practical Solutions Cordless Mouse could change your life.

The GeniTrac is the best trackball we've seen. But at £49.95 it's certainly not cheap.

This strange-looking chap comes courtesy of top coders Kefrens, from their PD demo Desert Dreams. The pic was lifted from the demo using an Action Replay, and saved out as an IFF. Inset: an example of the Randomize colours option.

CUE THE ACTION

Since the heyday of the Commodore C64, Datel Electronics has been churning out thousands of small electronic devices known as the Action Replay, but what is it and what would you do with one?

The original ActionReplay cartridge was reviewed way back in issue 12 of ***Amiga Format*** in July 1990. Now in its third incarnation, it is widely regarded as one of the most powerful utilities forthe Amiga owner. The standard Action Replay cartridge fits into the lefthand expansion port of the Amiga 500. Mounted on the cartridge are a Freeze button, two LEDs, a switch and a potentiometer (knob) to activate the Slomo mode, that slows down the Amiga's processor.

A version of the Action Replay is also available for the A1500 and A2000. This plugs into a spare slot inside the Amiga and the controls are mounted on a pad connected to the card by a short wire.

A1200 owners needn't feel left out, because Datel is shortly to release an A1200 version of the cartridge that plugs in to the Trapdoor expansion slot. Expect to see this in August or September this year. A Mark IV version of the A500 Action Replay will be released by the end of the year.

Bear in mind that it is illegal to copy commercial software unless it's for your own personal use. The Replay cartridge can be used for copying most Public Domain disks and normal AmigaDOS disks, but Datel and ***Amiga Format*** in no way condone the use of Action Replay for the reproduction of copyright material. OK, let's find out just what you can use Action Replay for...

Action shots

For the artist, the most useful of the Replay's options is the Mempeeker command. This enables you to freeze a program and save the graphic display to disk in the form of an IFF file. This file can then be loaded into programs such as *Deluxe Paint* and *Image FX*,and be manipulated. At ***Amiga Format*** we use this feature to save screenshots of games to disk, so that the images can be inserted electronically into the DTP system. This way we reduce the need for photography, and so speed up production of the magazine.

To grab a screenshot, go to the position in the program that you wish to freeze, press the Freeze button, and type :

```
P [Return]
```

The 'frozen' screen will be displayed – this is the Mempeeker mode. There are a number of other screens, that can be accessed separately by inserting a number after the P command – for example P2, P3.

Now you can use the keyboard keys to manipulate the image. Let's look at some of the more useful Mempeeker commands. To save the picture file to disk, use the following command:

```
SP(path)(name)(nr)(height)
```

where SP stands for Save Picture; (path) and (name) are the path name and name of the file; (nr) is the picture number; and (height) is the image height.

If you use the command

```
SPM (name)
```

where SPM stand for Save Picture Mempeeker; and (name) is the name of the file, you can save any modifications to the image, such as brightness, and changes of colour or height. The Replay does have some limitations here. Mempeeker does not recog-

A500 Action Replay (£59.99) is available from Datel Electronics, Tel: 0782 744324.

REPLAY COMMANDS

[b]	Increase brightness of image.
(Shift b)	Decrease brightness of image.
(F1)	Set to default colours.
(F2)	Randomize colours.
(Help)	Display help screen.
(Delete)	Hide help screen.
(Left mouse button)	Increase picture height.
(Right mouse button)	Decrease picture height.
(Escape)	leave the Mempeeker.

Some programs use the 'copper' to create striking coloured backgrounds...

...but a limitation of the Action Replay is that it doesn't grab these colours correctly.

nise copper backgrounds (multi-coloured backdrops used mainly in arcade games – most recently *Trolls*, *Zool* and *Sleepwalker*), and will display the copper as a single colour only.

The mode also doesn't recognise hardware sprites, so when you freeze an image you may find that the result has some sprites missing. These can easily be taken out separately, though, and inserted using a paint package. Display the sprites by using the command:

```
SPR(nr/addr)
```

,where you can use (nr) as the sprite number, or (addr) as the address of the required sprite.

Taking samples

If you're musically-minded, two of the more useful features of the Replay are Tracker and Scan.

Tracker scans through the memory of your Amiga, and tries to locate a music sequence that has been created by tracker programs such as *Protracker* and *Noisetracker* that available from most PD libraries. This means that you can load up your favourite game or PD demo, use the Tracker command to search for the music contained in it, save it to disk, then load it into your tracker program. To activate the music search, press the Freeze button, then type:

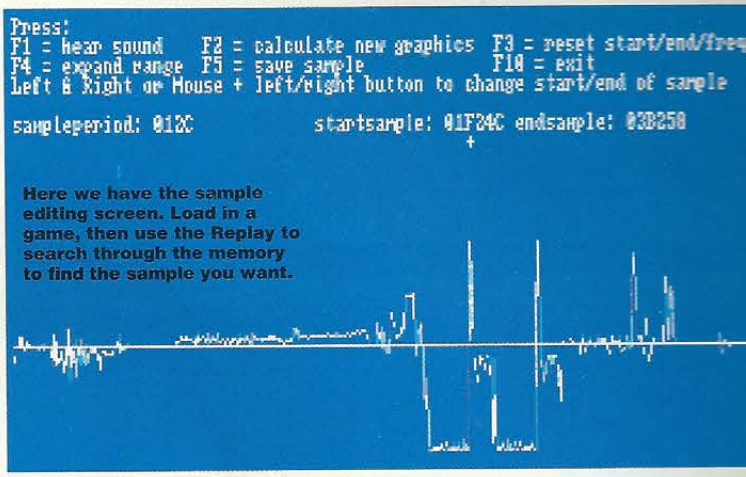
```
TRACKER [Return].
```

If any music files are located, Replay will display a message, then offer you a series of options so that you can manipulate the song data, and save it to disk. The Scan option does a similar job to Tracker, but it displays the contents of the available chip memory as a sound wave, so that you can play it and listen for samples. If you have a demo or game with a sound effect you would like to use, select this option to locate the effect, then use the editing options to cut the sample from memory and save it to disk.

To activate the sample search, press the Freeze button, then type:

```
SCAN [Return]
```

The screen will then display a sample waveform, with selector bars at either end. Press (F1) to hear the entire sound, and you will see a cursor trace across the waveform as it plays. If you hear a esting sample, then note its cursor position. N move the start selector to just before the curs tion, and the end selector to just after. Zoom the sample by pressing (F2), and play the sam again. Repeat until you have cut out all but t required sample, then save it to disk using (F

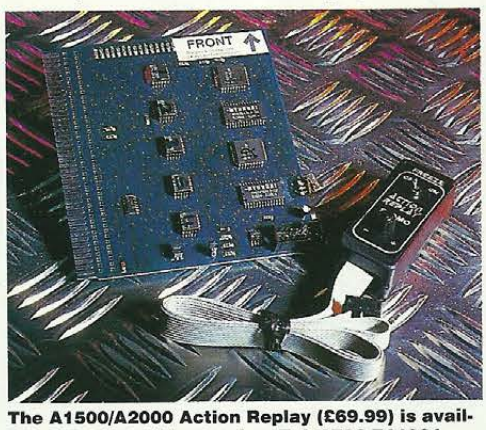


Here we have the sample editing screen. Load in a game, then use the Replay to search through the memory to find the sample you want.

Is it safe?

Although the cart is pretty robust, if you foll these simple points it will last you for years:

- Never plug it in or remove it from your A while the power is on.
- Never use Slomo while a disk is being acc
- Always make sure that your program disk write-protected (it's very easy to forget to sw blank disk)



The A1500/A2000 Action Replay (£69.99) is available from Datel Electronics, Tel: 0782 744324.

GAME CHEATS

If you're an arcade game fan, you can use your Action Replay cart to cheat at games Below you'll find cheats for some popular games. To use the cheat type:

```
TFD (Addr)
```

Where (Addr) is the address value given in the table below:

Game	Address	Effect
Alien Breed '92	C059C7	Player 1 lives
	C06167	Player 2 lives
Assassin	C05B0E	Infinite lives
Bubble Bobble	C091EE	Infinite lives
Dynablaster	0517F3	Infinite lives
First Samurai	C849	Infinite lives
Populous II	C592D5	Experience
Rainbow Islands	E337	Infinite lives
Trolls	000759	Infinite lives
Wizkid	C09CCF	Infinite stars
Zool	01A003	Infinite lives

Making your own cheats

You may be wondering how on Earth anybody ever discovers cheats such as those above. Fortunately the Action Replay cartridge makes finding the cheats incredibly ple. What you do is to freeze the game at the start, then type in:

```
TS (Lives)
```

Where (Lives) is the number of lives you begin with. Now go back to the game, lose life, freeze again, then type:

```
T (Lives-1)
```

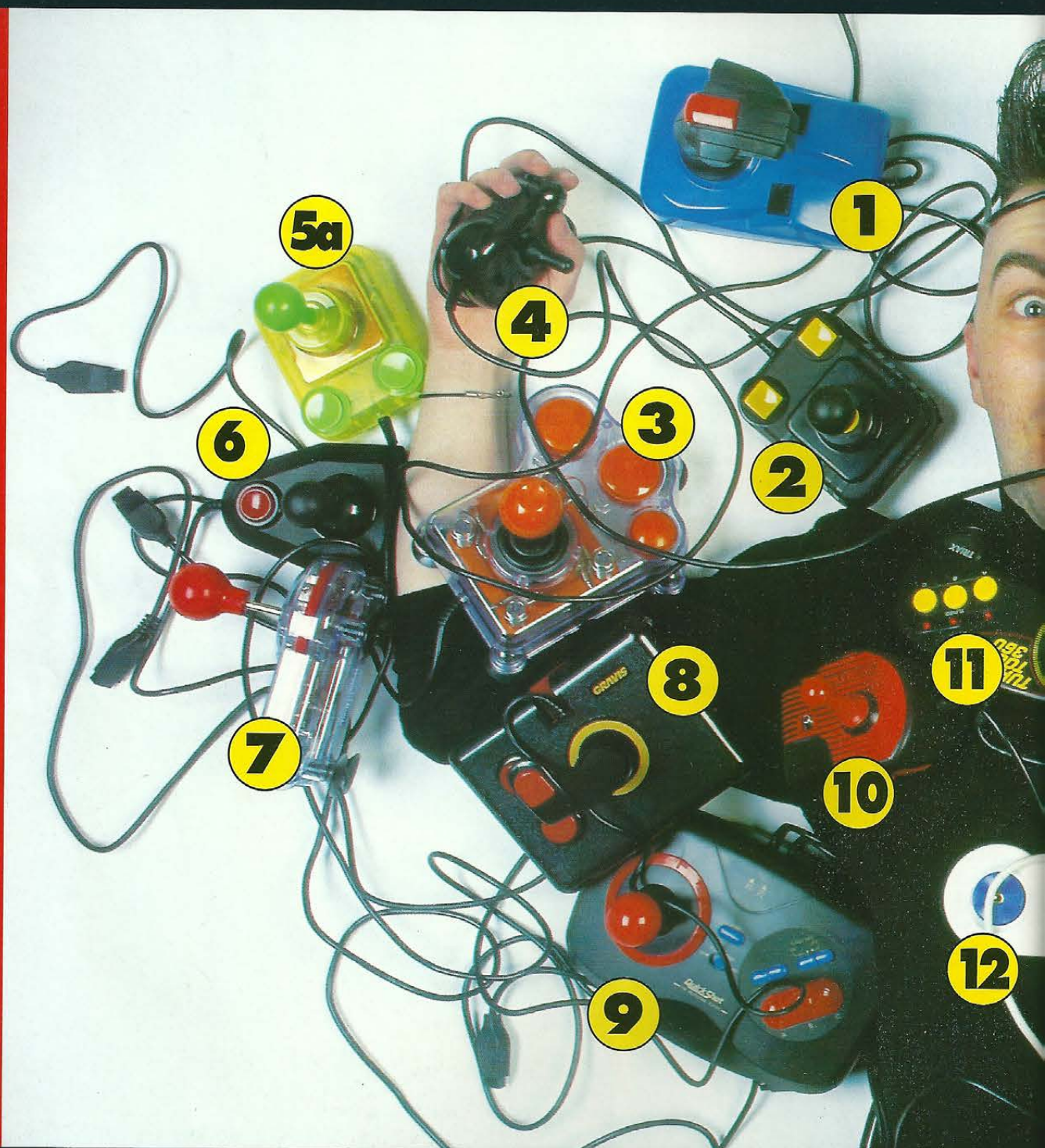
Where (Lives-1) is your new number of lives. Repeat this process until you are given address number (Addr), then type in:

```
TFD (Addr)
```

This will remove the decrement function from the code, so that the Amiga will not t any of your lives away when you die. Voila! Immortality is yours.

There's more to Amiga life than seriously useful applications, you can have fun as well.

THE JOY OF STICKS



1 Logic3 Sigma Ray: £13.99
Spectravideo (081-900 0024)

2 ZipStick: £14.99
Power Play (0457 876 705)

3 QJ MegaStar: £24.99
Spectravideo (081-900 0024)

4 The Bug: £14.99
Cheetah (061-707 7080)

5 Competition Pro: £13.99
Power Play (0457 876 705)

6 The Arcade: £23.99
Euromax (0262 602541)

7 QJ SuperStar: £13.99
Spectravideo (081-900 0024)

8 Switchstick: £29.99
Advanced Gravis (via Logi UK on 0344 891 313)

9 Maverick: £15.99
QuickShot (081-365 1993)

10 Speed King: £10.99-£14.99)
Konix (0495 350 101)

11 Turbo Touch 360: £20
Hornby Hobbies (0843 225555)

12 GamePad: £14.99
Advanced Gravis (via LogiUK on 0344 891 313)

Over the next four pages Stuart Campbell looks at the fun side of Amiga hardware

Working for *Amiga Format*'s sister mag, *Amiga Power*, means that I have to play games day-in and day-out. Straight up the line, joystick murdering, multi-levelled Amiga games. This means that I've got to have the right stick or I become so annoyed, so pained, so... think of a footy player having to kick around the park for 90 minutes with a pair of boots two sizes too small. Think of the pain. Seriously, a bad joystick – one that you've chosen and that has either been badly made or that just doesn't match the type of game you play most often – can really do damage to your wrists, hands and level of patience. Be picky when you buy your joystick, you're going to spend a lot of time with it.

13 Crystal Turbo: £14.99
Power Play (0457 876 705)
(Please note that this classic stick is being removed from Power Play's lists as we go to press. Boo! Hisss! Booo!)

14 QJ Footpedal: £24.99
Spectravideo (081-900 0024)

15 Python 1: £10.99
QuickShot (081-365 1993)

16 Exterminator: £6.99
Cheetah (061-707 7080)
(This joystick has now been discontinued, with the new range of sticks to be announced over the forthcoming months)

17 Navigator: £15.99
Konix (0495 350 101)

18 125+: £9.99
Cheetah (061-707 7080)

19 Freewheel: £29.99
Spectravideo (081-900 0024)

20 Pacman: £TBA
Stuart's own find from Greece is this stick. A UK retailer is still be arranged.

THE GAMES-PLAYER'S GUIDE TO JOYSTICKS

Seven-day-a-week gamer, Stuart Campbell (of our cousin magazine, *Amiga Power*) spills the beans on what makes a good joystick, and what doesn't.

Pretty obvious, this, surely? I mean, what could you possibly ask for from a joystick? Eight directions, a fire button or (preferably) two, surely nobody could mess up such simple requirements? Hmph. Spend 10 minutes with some of the colossal dayglo plastic monstrosities that I had to soil my fingers with for this feature, and you'd soon lose that foggy notion. So what's to do? What we need here, I think, are Stuart's Five Fab Rules For Joystick Makers.

We're Playing Games, Not Training For The Olympics...

Far too many of the sticks featured here, especially the flight-grip trigger-fire jobs, have a ridiculous amount of travel (the distance you have to yank the stick before it actually registers the movement) which means that five minutes into a game of anything more strenuous than *A320 Airbus* your biceps ache like Fatima Whitbread's, because you're having to move your entire arm to achieve any results.

And We're Not Masons, Either...

It's one thing (and a bad thing at that) to have fire buttons on only one side of your joystick, but it's quite another when those fire buttons are on the left-hand side, flying in the face of the preference of practically all right-handed gamers, who like to move with the left hand and fire with the right. Catering for minorities is all very well and admirable, but why not save time and trouble and just cater for everyone?

I Like The Jesus And Mary Chain, I Do...

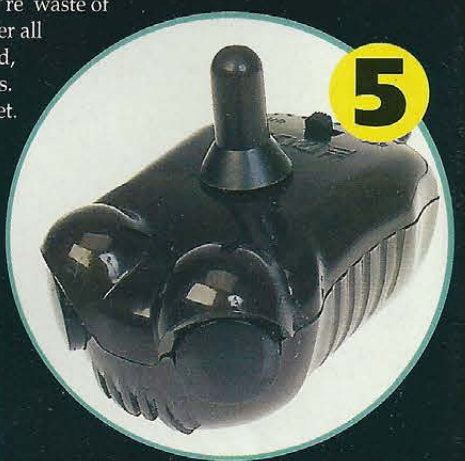
Why? Not just for their fab summer pop tunes, but for their inspired and genius-like use of (stand by for key word) Feedback. Yep, any decent joystick worth it's salt has to give you a bit of feedback, usually in the form of a nice solid microswitch click to let you know it's listening to what you want it to do. Of course, you can take this a bit too far, Mr Speed King, but it's still a good thing, oh yes.

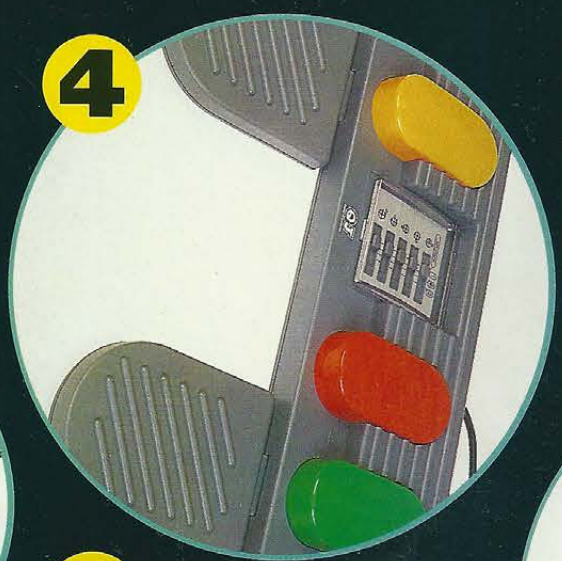
If You're Going To Do It, Do It Right...

What's the point in having autofire buttons if they don't work? An obvious, perhaps even stupid, question, you might think, but it's not as stupid as the number of these joysticks which steadfastly refuse to eject an irresistible stream of hot laser death from the front of your ship when you flick the switch. Why? Hey, don't ask me, I'm not a mechanic.

Suckers Are For Suckers

Suckers don't work. It's as simple as that. Most joysticks are constructed of such cheap, light, flyaway plastic that one good by-line cut-back in *Sensible Soccer* will have them lifting off from your desk and causing you to smash the back of your hand on a nearby sharp edge or hard wall. They get in the way of your holding hand the rest of the time, too. They're waste of rubber all round, mates. Forget.





ELEVEN GAMER'S OPTIONS

Gravis Switchstick

1 Oooooh, quality that's what this stick says. Aside from the fact that the Switchstick likes to think that it can double as a mouse (erm... why? what's the point? Bloody silliness just adds to the price), this solid, two fire-button jobbie is easy on the hand. Sadly though it offers neither the requisite clickiness required for precision vollies, nor the each side of the shaft fire buttons. It is equipped with a fair autofire though.

Mega Star

2 Urgggggggh! That's about it really. Could pass for 'art' or even a spaceship from *Blake's Seven*, but as a joystick it is too big, too stiff, too ugly, too unprecise, too heavy, too expensive and too tacky. There is nothing I can think of to recommend this horrific excuse for a joystick, It is stocky and sturdy and built like a clear plastic outside lav with orange bits, so it'll last...: dammit. No, I'm sorry, there is just no game I can think of that this stick would be any use with.

Freewheel

3 It's an interesting idea, you've got to give it that. A hand-held steering wheel which works by mercury (probably), you use it by, er, holding it out in front of yourself and waving it around. As well as making you look a proper nellie, this is very hard to use precisely due to the lack of a level surface to judge movements by. It's quite fun for playing *Sensible Soccer* with, though.

Footpedal

4 Well, it's a pedal, isn't it? Strictly for the serious flight-sim and driving game fan with frankly too much money, this is an effective and perfectly-working substitute for accelerating and decelerating by joystick. Mind you, for something aimed at flight-sim fans it's a bit of a stupid colour, isn't it?

Cheetah Bug

5 My undisputed personal Number One stick until the Gravis Game Pad and the Pac-Man showed up, this little hand-held number is a real beauty, with a little stick and ergonomically-superb body that you hardly feel like you're holding at all. Autofire's great, movement is super-precise, but they're a bit awkward for big hands and seem more prone to breaking down than most of the other sticks featured here. Winners use Bugs!

Competition Pro Extra

6 The old faithful of the joystick world, the Competition Pro has been with us for years, and it didn't last that long without being pretty damn good. There's nothing fancy about it, it's just a well-balanced, well-sized, well-shaped and easy-to-use stick, and while it's a bit short on innovative features, it'll never let you down.

Gravis Game Pad

7 Bad points: Useless, stupid, screw-in joystick attachment which is awful in use and necessitates a screwhole in the pad which hurts your thumb when you're not using the stick attachment. Good points: Moves beautifully, can be switched for left or right-handed use, and the two extra fire buttons serve as auxiliary up and down controls, which can be excellent for driving and platform games.

Power Play Zipstick

8 The only major difference between this and the Comp Pro is a stiffer, clickier feel and the addition of some suckers, which serve no other purpose than to get in the way. A very good, reliable stick all the same, though, and the three-option autofire works well.

Navigator

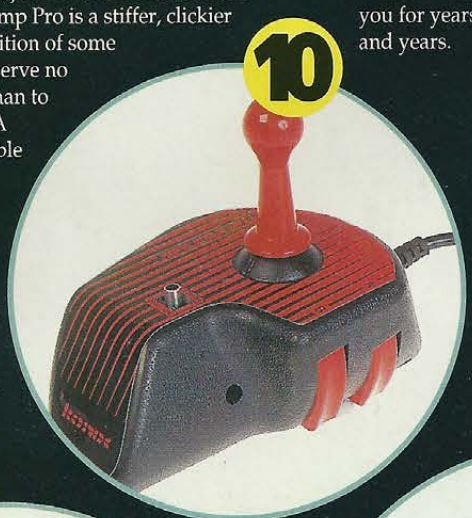
9 Held like a *Star Trek* phaser with the stick stuck bizarrely on top and the trigger as a fire button, this is an incredibly difficult joystick to get any precise movements out of, and the hands-on-top-of-one-another position you have to adopt to use it is very badly balanced. It's all looks and no feel, this is the kind if thing that joystick makers like to think that the 'yoof' think is modern. It's not. And you look like a prat, too. Ugh, basically.

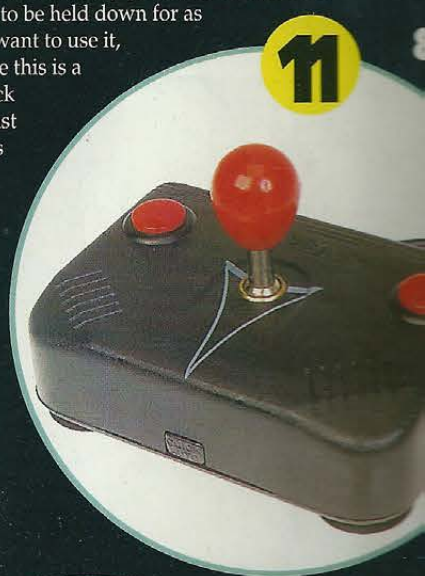
Konix Speed King

10 A lastingly popular stick, this handheld, red'n'black stripey, controller has a long, solid stick (easy to grip even for big hands) which clicks loudly and reassuringly whenever you move it. However, the positioning of the fire buttons means that in any busy shoot-'em-up it doesn't take long before the bit of your hand between the thumb and forefinger is in complete agony.

Pacman

11 A brand-new joystick from Greece (of all places), this is a superbly-constructed stick with a beautiful action, and which is built heavily enough to actually stay on your desk when you use it, even during a heavy Sensible Soccer session. The autofire's a bit awkwardly placed on the front surface and has to be held down for as long as you want to use it, but otherwise this is a gorgeous stick which will last you for years and years.





GETTING A GR

If you're going to take your art and DTP work seriously, then you'll want the best hardware at the right price. Here's our guide to the world of scanners, mice, graphics tablets and much, much more

There's no doubt about the Amiga's position as the top home computer for graphics work. A look at the results of the recent Bit.Movie Computer Art festival will confirm this. The Amiga took first place in four out of the five categories for which it was eligible. But there's only so much you can do with your Amiga alone, sure you can paint some pretty impressive pictures with *DPaint IV*, and you can do some wild and weird things to them using *Art Department Professional* and *Morph*. But when you get serious, be it with computer animation, graphic design or desktop publishing, you're going to need some extra hardware.

Whether it be display cards to help you get better images on your screen, or even just an upgrade mouse to move your pointer around the screen in sharper style, there's a whole host of hardware just for Amiga graphics. But how do you know the great graphics gizmos from the awful artifacts? That's simple just read on...

P ON GRAPHICS

AMIGA FORMAT SPECI
THE GOOD HARDWARE G

PRETTIER PICTURES

The A4000 has a 24-bit palette and it can display up to 262,144 colours at once. Lesser Amigas need an add on card to achieve this 'true colour' graphics capability.

The Amiga's ability to display up to 4,096 colours was revolutionary when it was launched back in the mid-80s, but nowadays it's beginning to look a little passe. When it comes to displaying great graphics the more colours you have at your disposal the better (up to a point but we'll cover that a little later). If you have one of the new AGA chip set machines it's not such a concern for you. Your machines have the ability to display 262,144 colours from a palette of 16,77,216. Because a standard 320 by 256 screen is comprised of only 81,920 pixels, it is possible to make every one of them a different colour, so having any more colours at your disposal isn't absolutely necessary.

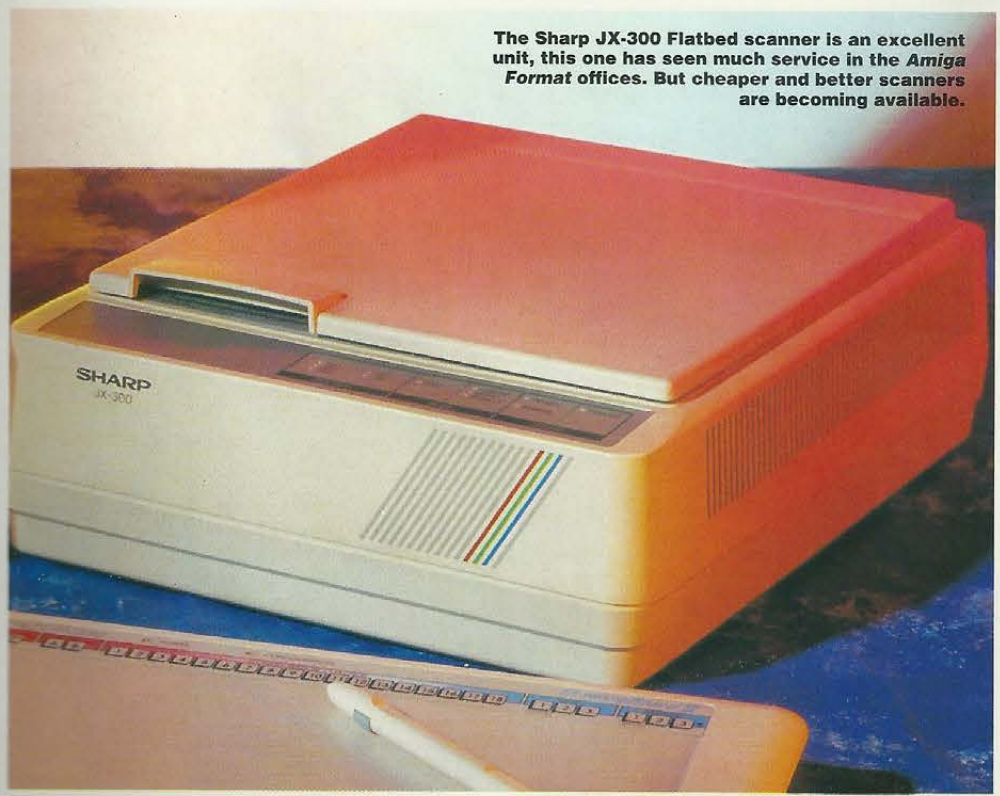
Owners of older model Amigas need not despair though, there are many add-on cards available that give you access to true colour images. These cards are known as 24-bit frame buffer cards, and there is an extremely good reason why they are called that, let's explain.

A binary digit, or bit, can have two positions, on or off. So one bit of information can represent a two-colour image. On means that a pixel is for instance, red, and off means it is, for example, green. Add another bit of information, and your options are doubled, so you can display an image with four colours.

Each additional bit doubles the amount of colours you can use. You could keep going for ever, but that would be excessive. There has to be a point when you have enough colours, and there is, but how do we know what that point is?

How many colours are enough is determined by how many different shades it is possible for a human eye to distinguish. Scientists have discovered that human beings can, on average, recognise about 150 to 180 shades between black and white.

Because colours on a monitor screen are made up of three components, red, green and blue light, this means 180x180x180 colours are needed to give a realistic effect. This makes a total of 5,832,000 colours and that's what you need for "True Colour" graphics. So isn't a 17,000,000 colour palette a bit excessive? Using our binary



The Sharp JX-300 Flatbed scanner is an excellent unit, this one has seen much service in the *Amiga Format* offices. But cheaper and better scanners are becoming available.

Superior Scans

Once you get into the realm of high-end graphics, it's often not a simply a case of creating a picture right from scratch. More often than not it is about using, combining and manipulating images from other sources. Obvious sources are Amiga programs such as VistaPro and Real3D, but by far the widest selection of visual input is available from the real world. Why ray-trace a car if you can take a photograph of one? (There are a whole set of good answers to that question, but they really don't concern us right now.) But once you have your photograph, how do you get it into your Amiga? A scanner is what you require.

There are a wealth of scanners available for the Amiga and virtually any machine will work, as long as you have the right software. ASDG releases scanner driver extensions to its *Art Department Professional* software, initially it supported Epson scanners, and recently the company has announced support for the Hewlett Packard Scanjet IIc.

The choice of scanners ranges from small hand-held mono units right up to expensive flatbed colour devices. The correct scanner for you is not necessarily the biggest and most expensive. Colour scanners are not cheap, and you really have to consider if you need this extra power. The images they can provide, though, are excellent, especially when viewed in conjunction with a 24-bit card.

system, this means we would need eight bits of memory to create the required number of colours, and this number of bits would be required on each of the three colour channels, Red, Blue and Green. This gives us a grand total of 24 (eight time three) bits. And that is the reason why we use 24-bit graphics cards to display true colour images.

What really separates the good 24-bit cards from the bad is the software that you need to support them. On some platforms, such as the Apple Macintosh, any 24-bit software can work with any 24-bit display card.

Unfortunately on the Amiga this is not the case. Each card stores, or buffers, the information in a different way. So although any card can load and manipulate an IFF24, they can't all be used as a display card for every application that is 24-bit compatible.

What this means is that if you were working in *ImageFX* for example, you can work with 24-bit images, but you can't see them in 24-bit from within the program. To do this you have to save the image out of the program you are working in, and then load it into the display or paint package that is packaged with your 24-bit graphics card.

The large variety of 24-bit cards makes it virtually impossible for any software producer to support them all. An increasing number of software houses are adding support for one or more boards to their products though.

One of the better supported boards is Opal Vision. Make sure you check, before you buy a board, that the software you want to use with it can drive it.

Tantalising Tablets

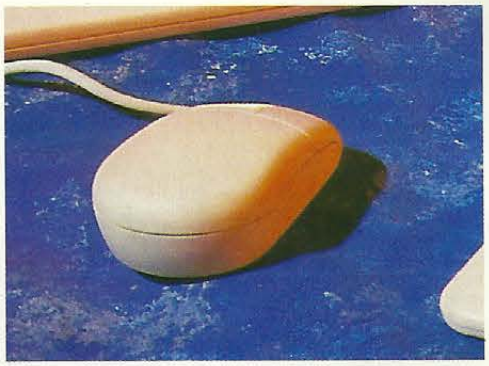
One of the big problems with computer art is that of the human interface. There, that sounded techie didn't it? But it's really very simple. Most people were taught to draw and paint with an object that was stylo shaped, be it a pencil, a pen or paint brush. The first time you get your Amiga and load up *DPaint* you are presented with... a mouse. Now there are some good mice around, but there's no getting around the fact, they just don't feel like a stylo.

There are two ways out of this predicament for aspiring Amiga artists who feel the need to get back to more traditional working techniques.

The first is a pen mouse, basically a very small mouse with a pen like protrusion at the back of it. These take some getting used to, but using one is more like working with a pen, pencil or brush.

Secondly, a much more complex solution to the problem is available in the form of a graphics tablet. These devices use a rectangular drawing board, that map the surface of the board to the equivalent position on the screen.

A fine mesh of wires runs through the board and are used to detect the position of the stylo tip on the surface. These boards are not common on the Amiga, again it is merely a problem of the software not being available rather than the hardware. But a few do exist, and packages are beginning to take advantage of them



A good mouse is a major aid to productive computer time. The standard A500/600 one should be binned as soon as possible.

Mighty Mice

While we're skirting the subject of pointer controllers, it has to be made clear that there are areas where the traditional computer rodent is unsurpassed. Although a tablet might cut the mustard for drawing, when it comes to DTP the mouse is still king. But if you're at all serious about your desktop publishing you'll have specific requirements for your mouse.

Smooth rolling action, positive feel from the buttons, and reliability are what a mouse needs to deliver. If yours doesn't, then consign it to the bin and get yourself a good one. DTP is a mouse-intensive pastime and your productivity will be hit just as heavily by a sub-standard mouse as it will by having *Tetris* installed on your hard drive.

No one will ever try to tell you that the mouse that came with your Amiga 500/500plus or 600 is anything other than trash. It should be binned as soon as you get it out of the box. The Amiga scene is awash with good quality mice, it's just a matter of choosing one that is right for you. Like joysticks, mice preference is a personal thing. Sure, read the reviews, we've used a lot of mice. But try the rodent for yourself before parting with your cash.

Denser Drives

Graphics files are always pretty large – a standard size interlaced 24-bit image is around 1.3Mb in size, which is far too big to fit on a standard double density floppy disk. Desktop publishing files can be quite sizeable too, especially if you have used a few graphics in your document, so if you are planning to save or move graphics and DTP files between machines, you're going to need more than the standard 880K of a floppy disk. There is currently only one way to do this, and that is the Power Computing HD Drive.

These innocuous looking external floppy drives, they appear just the same as the standard Power Computing PC-880B on first inspection, can format a disk to accept up to 1.76Mb of data. This is no mean feat, no other drive manufacturer has been capable of producing the technology to do this. But revolutionary technology like this does not come cheap. As well as accepting twice the data of conventional drives the Power unit costs twice as much too. If you feel you need one of these fine pieces of kit, get hold of a copy of ***Amiga Format*** issue 48, which contained a special offer voucher enabling readers to buy the unit for a bargain £99.

Internal versions of the unit will be available shortly. Contact Power Computing on 0234 843388.

A graphics tablet can be used as a standard mouse pointer mover to control Workbench tasks. But they really come into their own when used with a paint package.

SCANNERS

What to look out for

When you choose a scanner there are four basic points that you should take into consideration:

● **Resolution:** Resolution is the number of dots the scanner can use to make up your image. There are two types of resolution, input resolution and output resolution, and they are connected via a fairly simple equation.

The outcome of all this is that if you wish to scan something three inches wide, and achieve an output file 320 pixels across, a standard Amiga screen resolution, you will need to scan at 106 dpi. These are reasonable figures, if you start getting into the bizarre regions of high-end colour DTP you may wish to scan something a mere two inches wide, and end up with a scan 6 inches wide at 200 dpi.

A quick mess with the maths reveals that this would require a scanner capable of a resolution of 600 dpi. Basically, if you're planning on scanning, make sure the machine you buy has the resolution you require.

● **Scan area:** Scanners come in a variety of shapes and sizes. Most hand-held units have a head width of around 12cm, which means if you're hoping to scan A4 you'll need to make two passes and then join up the resultant files in a paint package or image processing program.

This sounds easier than it actually is, believe us. Although it may be worth the effort of doing this occasionally, if you intend to scan a lot of A4 an A4-sized flatbed would be worth the extra outlay. Consider the size of what you are scanning before you part with that hard-earned dosh.

● **Price:** There is no getting away from it, cash counts! if you want a professional quality scanner you'll need a professional size wallet. but there are bargains to be had!

There are a lot of mono hand-held scanners on the market, and very often you'll find they have the same scanning head in a different case. What usually separates one scanner from another is the quality of the software that drives the unit, or the other programs that are bundled with the scanner. But remember they all save in IFF so if you have any good Amiga paint program you will be able to import the image file and touch it up in that. It pays to shop around, we recommend the Power Scanner, because it represents the best value available at its recommended price (£115). But there are many other scanners available for a similar price, so it pays to shop around. If you are offered another scanner at a very good price, try it out it might be worth your money.

BEST FLATBED SCANNER

The Epson GT-6500 is a fully featured flatbed scanner. It's pictured here with the optional sheet feeder, but the transparency adaptor is the accessory that really lights our fire.

● **Colour resolution:** Colour scanners are hugely expensive when compared to their monochrome cousins. Just because you want to scan a page of text that has a blue headline and red underlines doesn't mean you need a colour scanner.

You could scan in mono and colour it in a paint program afterwards. On the other hand, don't believe that you can achieve realistic results by scanning photographs in mono and then re-colouring them in *DPaint*. It can be done, but it takes a lot of time, and expertise. If you need to scan in colour, you're going to have to be prepared to pay the price

LOOKING AFTER YOUR SCANNER

Scanners are at once robust and delicate devices. If you take a reasonable amount of care over your unit you should get many a year of reliable service from it. Don't bang scanners around because they have delicate and carefully aligned elements in the head unit. Keep the scanning surface clean, hand scanners particularly are prone to becoming dirty because the scanning head has to move directly over the surface that is being scanned.

The tubes used by flatbed scanners don't last forever, in fact their life expectancy doesn't extend much past six months of fairly heavy use. The contrast and brightness of your scanned image will start to deteriorate, at first imperceptibly, and later quite dramatically if you do not replace the tubes frequently.

Keep the glass clean. A flatbed scanner is effectively an empty box with a glass top, with electrical circuits moving back and forward in there. It's a positive dust trap, so don't be afraid to whip off the glass and clean the underneath thoroughly every once in a while. Don't get over enthusiastic though, you should only need to do this at most three or four times a year.

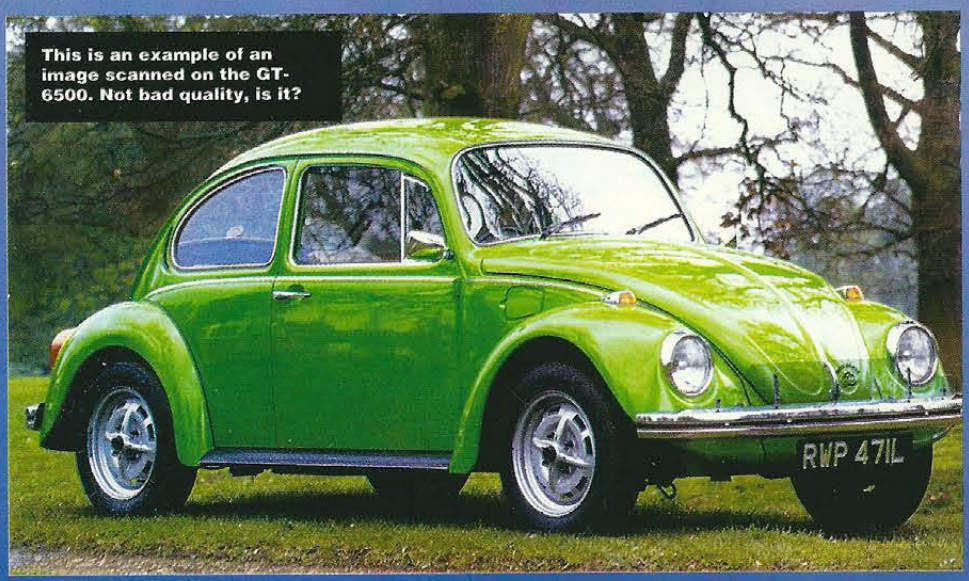
Epson GT-6500
£799, Transparency Adaptor £499 (Power 0234 843388)

This is the premier Amiga scanner, anything any other scanner can do, this can do better, plus a whole lot more. This beauty is a full 24-bit colour A4 flatbed, but it doesn't stop there. With the addition of the optional transparency adaptor, the GT-6500 can make full use of its 600 dpi scanning resolution to scan transparencies.

Even without the trannie adaptor the GT-6500 is a formidable scanner. That enviable 600 dpi resolution is the key to its impressive performance. Other flatbed scanners offer less resolution for more bucks, but the GT-6500 can be bought with either the ASDG *Art Department* loader or with Power Computing's PowerScan 3 software for far less than the cost of any of its competitors. Fitting the scanner couldn't be easier, it simply plugs into the parallel port of your Amiga.

Desktop transparency scanners are rare beasts on any computer platform, on the Amiga this one is unique. Transparencies are usually far smaller than reflective material, often a mere 36mmx24mm in size, rarely more than 5inch by 4inch. This means that to create a file that is printable at a reasonable size, and you really need to be looking at an output resolution of around 200 dpi, a very high scanning resolution is required.

Although 600 dpi wins no prizes as far as professional scanners are concerned, for a desktop unit it is up there with the very best. Just take a look at the printed scan on this page and you will see that this unit is capable of professional quality results.



This is an example of an image scanned on the GT-6500. Not bad quality, is it?

PowerScan GreyScale Handscanner V3
£115 (Power 0234 843388)

Power Computing's mono handscanner is a top performer, just like its technicolour brother. The unit is quite different in appearance to the colour version and attaches to your Amiga via the parallel port, which means it can be used with any Amiga model. The connector even boasts a printer pass through port which is useful if you don't want to be disconnecting and re-connecting all the time.

It can scan at up to 400 dpi and has a brightness control on the scanning head itself. The unit is shipped with the same powerful, if slightly unattractive software that accompanies the other scanners detailed here. PowerScan V3.0 is notably faster when dealing with mono images than when it has to cope with colour.

The software included with the scanner also has an option to convert your scans into greyscale, which removes the dithered dot pattern and replaces it with one of 16 appropriate shades of grey. The results that this scanner produces far surpass those delivered by any other hand-held scanner. If you want a scanner to produce a photocopied or dot-matrix printed fanzine, this is definitely the unit for you.

Not quite as attractive as the Colour version, Power Computing's mono hand-held scanner delivers the best results we've seen.

Power Colour Hand Scanner
£239 (Power Computing 0234 843388)

If you still need colour, but you aren't in the market for a high resolution flatbed scanner, your options are a little limited. There is the Sharp JX-100 unit, a strange beast that looks something like a carpet salesman's sample but delivers excellent quality results in up to 256 colours. The problem with the JX-100 is that it costs almost as much as the Epson flatbed scanner. A much more reasonably priced option is the Power Colour Hand Scanner. This unit bears more of a resemblance to conventional hand-held scanners, but is unique, at present, in that it can scan in colour.

This little beastie connects to the Amiga via the Zorro slot, so it attaches via an interface box to the left side edge connector of an A500, and uses an internal Zorro card for the big box machines. It can deliver a variety of resolutions up to a maximum of 200 dpi and has a scan head of 104mm wide. The machine comes with its own scanning package in the form of the PowerScan 3 software, this also offers limited image processing facilities.

The scanned results tend to be a little flat, colours lack some saturation and blacks need to be a little deeper. But for the money there is nothing else to touch this baby. When it comes to getting "real" images into *DPaint* to use as the basis of your drawings, this scanner is just the ticket.

Currently unique in the Amiga market, Power's Colour hand-held scanner is the cheapest and easiest way to get colour images off the page and into your machine.

24-BIT CARDS

A 24-bit card is not an absolute necessity to the owners of the new AGA Amigas. The A1200 and 4000 are capable of displaying up to 262,144 colours using the HAM8 mode, and more and more programs are starting to take advantage of this. But if you have an earlier Amiga and don't want to upgrade to an AGA machine at present, there is a dazzling array of 24 bit adaptors to enable you display all the colours of the rainbow (and then some). But how do you go about choosing the right card for you requirements? It's not as difficult as it may, at first, seem.

All the 24-bit (and pseudo 24-bit) systems that are around at present have different strengths and weaknesses, so if you know what you are going to want to do with your set-up, choosing the best 24-bit system for the job should be a piece of cake.

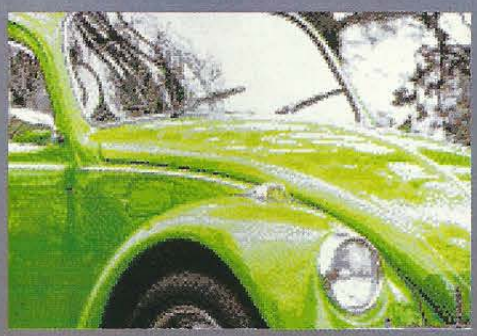
But there's also the question of which machine you have. Almost all true colour cards are made with the A2000/3000 type 'big box' Amigas in mind, so if you have an A500 you are limited to a choice of just one 24-bit system (DCTV) at present. Although there is talk that Australia's Opal Technologies have plans to produce their excellent OpalVision card for the A500, the company is concentrating on other things at present, and we don't expect to see OpalVision for the A500 before the end of 1993. Lastly and not leastly there is the question of price. 24-bit systems are not cheap. Their high prices reflect the high development costs and sometimes innovative technological approaches to the problems involved in getting 16,777,216 colours on the screen of a computer which was never intended to do so.

Add to this the fact that no 24-bit card, no matter how good or successful it is, will ever sell in sufficient numbers to enable prices to tumble to bargain levels. But what they do is spectacular, and they often have hidden, abilities that make them well worth the money. If you want true colour ability, read on and see which system is right for you.

24-bit true colour enables every pixel of this image to be displayed in a separate colour

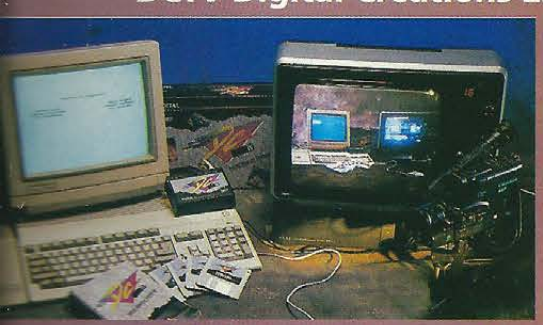
Smooth colour transitions like this show up the limitations of the AGA 256 colour mode.

HAM enables 4,096 colours to be displayed at once, but it's still not enough



It was stunning nine years ago, but the Amiga's 32-colour palette fails to impress today.

DCTV Digital Creations £399 Silica 081-309 1111



DCTV, looks and works like no other 24-bit card in existence. It goes on the outside!

This is the only true colour system for the A500, after Black Belt's HAM-E disappeared, allegedly to become the HAM-8 mode on the AGA machines. Digital Creations little, and attractive, black box sits behind (or on top of, it's really up to you) your A500 and plugs in to both the RGB and Parallel ports. It uses a standard Amiga screen to encode video information, and displays it on an analog monitor.

This system is certainly innovative, but it gives DCTV a few quirks that make it unlike any other 24-bit system. One side effect is that you can't display DCTV images on an Amiga monitor at the same time as other Amiga graphics. To do this you would have to send the composite output of the DCTV to a genlock, add the graphics from another Amiga and save the results to video tape. This seems like a major disadvantage until you consider that most people use a true colour system to display things like 3D-renders, and *VistaPro* landscapes, and for this it is ideal. In fact for creating animations and saving them off to video tape, DCTV has a definite advantage over some other systems. When you add the bundled digitising and paint software, that are both extremely good, you have a package that is an absolute bargain. DCTV is a must for A500 owners with an interest in graphics.

GVP Impact Vision 24.
£999
Silica Systems 081 309 1111

When it was first launched, Great Valley Products' IV-24 system was greeted with the kind of hype that might have led the user to expect another Video Toaster. The truth of the matter was that it was far inferior to NewTek's desktop video studio. After some prevaricating. GVP has addressed many of the criticisms of the system and released IV-24 version 2. The new release has several software upgrades, but fails to address the main problem with the board, its speed, or lack of it.

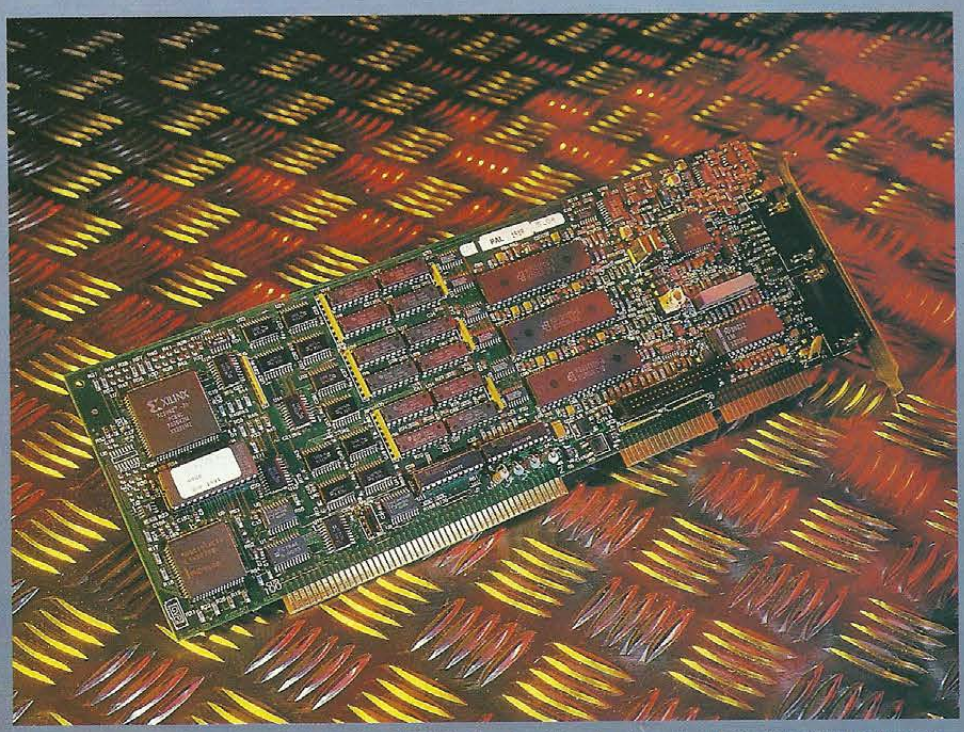
But we're sounding really negative, and that's not the way it should be. IV-24 has a few tricks up it's sleeve, and they are very impressive ones. As well as being a 24-bit display buffer card, the unit is also a true colour digitiser. Although the quality isn't quite as good as V-Lab, it's certainly better than most other things. You don't want to be digitising in 24-bit unless you can display, retouch and image process in 24-bit too, and that's what IV-24 offers.

When you add the Caligari for IV-24 V2 software that is included, the system starts to look very impressive indeed. Caligari has always been somewhat of an enigma, a very powerful ray-tracing program that has been available in several versions, but only the mega-expensive Broadcast version manages to draw all the strings together and produce the package it has always promised. The version with IV-24 is a triumph. Powerful and accessible, it is worth several hundred pounds in itself.

For the 24-bit user who wants to ray-trace, display, paint and digitise, IV-24 is the solution.

OpalVision
£549
Indi/Calculus 0543 419999

From the same Australian genius who produced the Colourburst card a few years ago, OpalVision is at present nothing more than a 24-bit display card. Well, that's not exactly fair, it's nothing more than a



24-bit cards all look pretty similar, they fall into the functional rather than the attractive category. This is the IV-24 card from Great Valley Products.

fast 24-bit display card with one of the best paint packages we've ever seen bundled with it, and the world's first 24-bit game to boot!

At present OpalVision is just very good. If you were to try to choose between it and Harlequin now, it would be a very tough decision. But give this board a couple of months and its own particular area of speciality will begin to show. Opal Technologies has been spending the last year developing a series of add ons to OpalVision that will turn it into a highly-impressive full real-time video effects studio.

NewTek never managed to produce a PAL version of the Video Toaster, so Opal Technologies has taken up the gauntlet. It is vapour-ware at present, but the release dates are within the next couple of months, and we understand they are on target for making them. Once the add-ons arrive the system should be capable of performing video mixing, real time video effects (like the ones you used to see on Top of the Pops) and fades and wipes. If desk top video is your main area of usage, you really would be well advised to wait and see what OpalVision brings to the table.

Harlequin
£999
Amiga Centre Scotland 089 687583

Created by the Amiga Centre Scotland, Harlequin was the first 24-bit card we saw for the Amiga. Given its age you might expect it to be a low or middle order card in today's rankings, but no! Harlequin is possibly still the best straight, no frills, 24-bit device available. What sets it apart from the rest? Well basically its speed. Harlequin is so fast at handling and re-drawing 24-bit data that it is simply a pleasure to use. 24-bit files are large, and processing them can sometimes cause a delay in a 24-bit boards ability to redraw the screen quickly. Not so for Harlequin.

Is there a down side? Isn't there always? Harlequin is not cheap. In fact it's bloody expensive, and it comes without any software, so to get it up and running you really have to splash out another £600 on a copy of *TVPaint*. So not only is the board expensive, but the software is too!

Surely at these kind of prices it can't be worth buying. But it is! The speed of the board itself and the power and flexibility of the TVPaint software make it a truly professionals tool. If you are after a 24-bit card for illustration and computer art usage, Harlequin is the tops.

There are many other 24-bit cards available, including A Video and Retina. AVideo (£399, Checkmate Digital, 0707 664684) is a fairly straightforward 24-bit card, but Retina (£345-£499 depending on the amount of video RAM, Amiga Centre Scotland, 0896 87583) is an unusual card in that it enables you to set up very high-resolution Workbench screens (1280X1024 for instance) with lots of colours (256). Whatever your choice, you can be sure of one thing, a 24-bit card will completely change the way you use your Amiga, and it will completely change what you see on your monitor too.

PUTTING ON THE PRESSURE

A graphics tablet offers natural control of the mouse pointer, so working in paint packages becomes much easier.

Graphics tablets enable the user to draw and paint in a much more conventional manner than using a mouse. They usually come with a 'puck' which is a mouse-like unit with a cross hair attachment. Pucks are usually used for entering data into CAD (computer aided design) and 3D ray-tracing packages. Tablets also come with a stylo, and it's this we are really interested in.

The stylo is effectively a pen. It is pretty much the same shape as a normal ball point, but instead of ink it has a wire running from to the base-board, or tablet itself. This tablet has hundreds of fine wires running under its surface, and by a process of electromagnetic induction it is possible for this array of wires to detect where the point of the stylo is whenever it is in contact with, or just slightly above the surface of the tablet. Because the stylo doesn't have to be quite in contact with the surface of the tablet this makes them ideal for tracing pictures. Most tablets actually have a transparent plastic sheet on the surface to help you do this. Simply slip your paper original under the plastic and draw over the top of it.

The most interesting thing about graphics tablets is that the point of the Stylo can be pressure sensitive. With the right software this means that airbrush and other drawing material effects can be greatly augmented. This goes hand in hand with true colour capabilities, because to display a realistic looking airbrush stroke you need to have a lot of shades of each colour available to you.

At present *TVPaint* with the Harlequin board, *OpalPaint* with the OpalVision board and the ever innovative *Deluxe Paint 4* are the only Amiga programs with pressure sensitivity capabilities, but we hope to see more soon.

The industry standard graphics tablet is the Wacom board, which is supported by *OpalPaint* and *TVPaint*. The cheaper, but not noticeably inferior CalComp board offers much the same features, and can be used with the far more common *Deluxe Paint 4* (but only effectively with version 4.6 and above). The boards can also be used as simple Workbench pointer controllers. Stylos tend to have one button on the upper side of the barrel which operates as the right mouse button, and the the tip equates to the left mouse button. This makes for a very expensive mouse replacement but many people who use tablets would never pick up a mouse again.

MICE

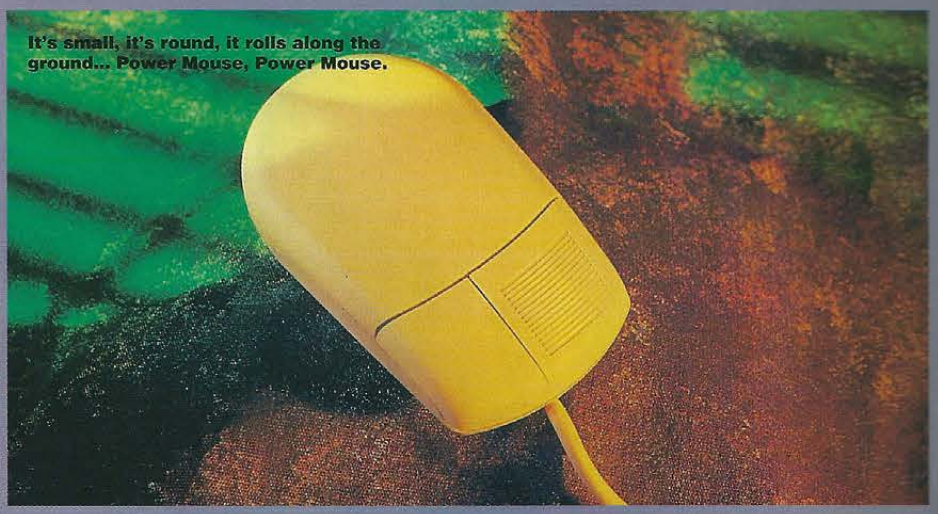
Have you ever been working in your favourite paint package, or struggling over a particularly complex DTP layout, and made that all important mouse stroke, just to see the pointer wiggle apoplectically on the screen? If so, you'll know the fury a mouse can provoke in a human being. My mum always used to hate mice, although I thought they were fluffy and harmless. That was before I met the one bundled with the Commodore A500. Many's the time I considered casting that foul rodent out of my bedroom window and watching it smash to smithereens on the street three floors below. Then I came to work here at the hallowed offices of ***Amiga Format,*** and it took me no time at all to notice that no-one in the office was actually using That Mouse.

A host of third party rodents roamed the desks, clicking cleanly and tracking tightly. I saw the light and got myself a Naksha, I've never looked back...

Naksha Mouse
£29.24
(Silica 081-309 1111)

This is the Rolls Royce of rolling rodents. Mine has lasted me for over two years of heavy use, and it still has a mile or two left in it yet. The buttons are microswitch, and they click every time, exactly where and when you want them to. The ball is weighty and it grips the surface like a Lancia Delta Integrale. The shape is a joy to cradle in your palm, and the unit is just the right weight to make it feel sturdy, but not make it a drag to push. Solid and sturdy, this mouse will last and last. But this kind of quality doesn't come cheap, if you can find a Naksha, and they aren't commonly stocked in the face of much cheaper opposition, you'll have to part with up to £30 to secure it a place on your desktop.

POWER MOUSE



It's small, it's round, it rolls along the ground... Power Mouse, Power Mouse.

£15 (Power Computing 0234 843388)

The Power Computing Mouse is a sleek little unit that, to use a car analogy, has to be the Ferrari of mice. Even when it is just quietly sitting on the mouse mat it looks as though it's doing about 150mph. It wasn't styled by Colani, but it sure looks as though it was (little aside here, Colani actually has designed a mouse, and it's weird, comes in left and right-handed models and looks nowhere near as good as the Power Computing mouse). The surface of the Power Mouse has a dull, matt sheen to it, but to touch it is a simply gorgeous sensation. The surface feels as if it is velvet. A late entry into the race, but our favourite mouse for DTP work, to be sure.

These are just four of the many mice available for the Amiga. For a full rundown of our recommended buys turn to page 78.

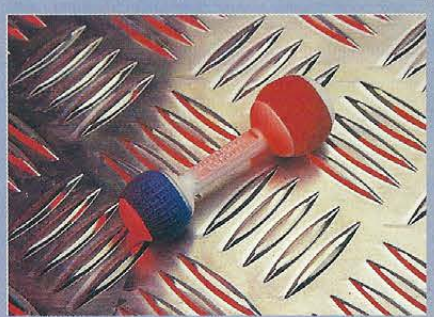
Trundling gracefully across the mouse mat, the Naksha mouse is king of the rodents.

The Golden Image mouse's role in life seems to be to imitate the Naksha as closely as possible.

Golden Image Mouse
£14.99
(Ladbroke 0772 203166)

If the Japanese have ever been guilty of the accusations that they copy the design of a classic, then sell it for much less, this is the proof. The Golden Image mouse is virtually identical to that great classic the Naksha mouse, but it costs a mere half the price. It has the same responsive feel, the same reliable micro-switched buttons, the same rugged construction. What it also has is the very tasty price tag of only £14.99 and that will get you a mouse mat too.

RODENT HYGIENE



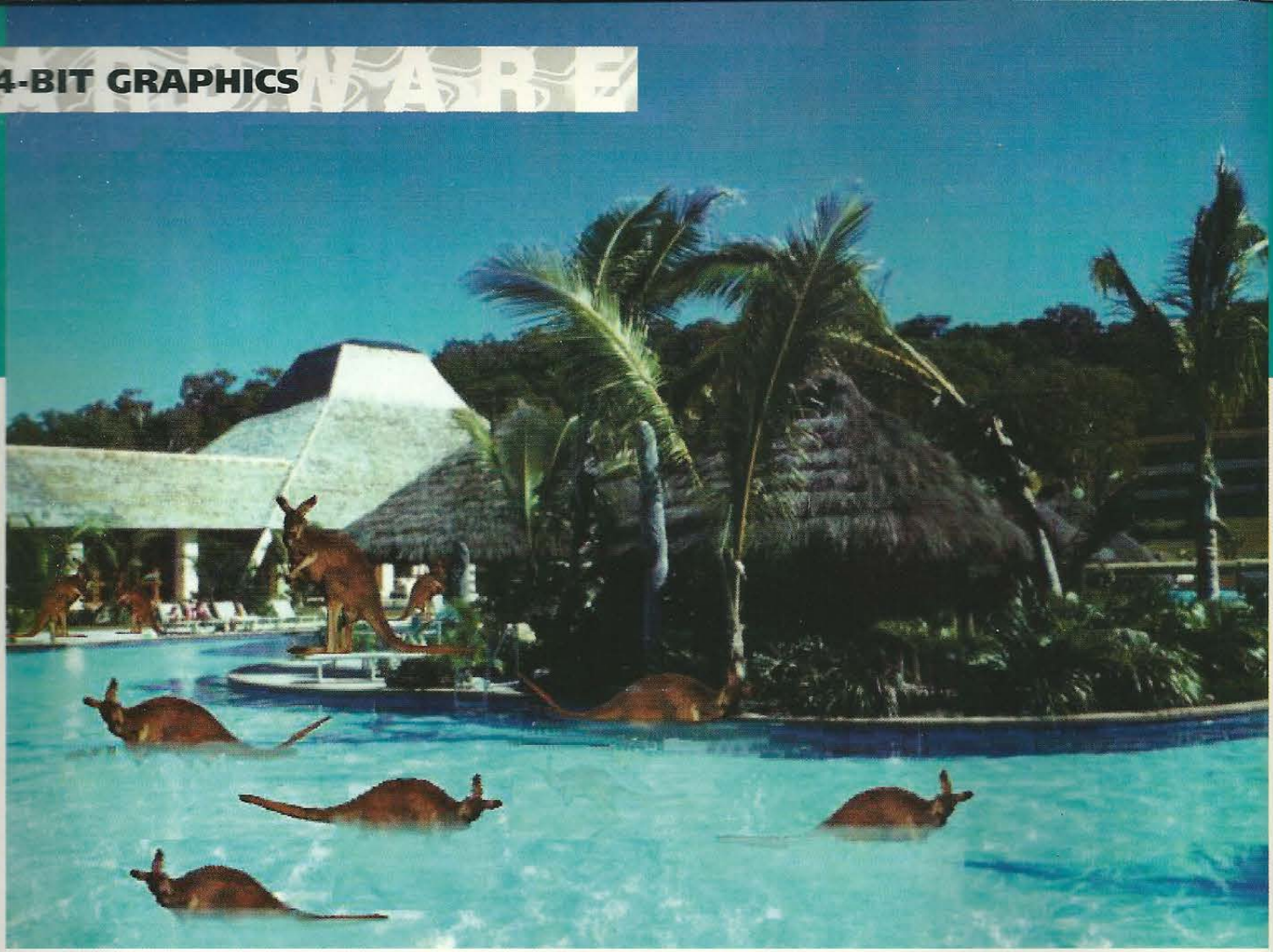
The Mouse Mechanic, it looks like a dog's bone, but it sure doesn't taste like one

It would be unfair to blame all the sticking and glitching your mouse gets up to on the poor rodent itself. How well do you look after it? Look at that surface you're forcing the poor thing to roll around on, would you eat off it? What's on the surface gets on the ball, what's on the ball gets on the rollers, when the rollers get dirty, the mouse performs badly. The answer is to clean your mouse .There's an interesting new product called the Mouse Mechanic that looks like a dog's bone, or a dumbbell for hamsters, but is an ingenious object for getting where your fingers can't to clean the mouse. We laughed at first, but it works.

Alfa Data Mega Mouse
£12.95
(Golden Image 081-365 1102)

Whoever said that quality doesn't come cheap? The person who had never seen the Alfa Data Mega mouse, that's who!

This mouse may not be quite as robust as some of the opposition, but that's the only criticism that can be levelled at it. The buttons, the ball and the general build quality of the unit are excellent. You don't get a mouse mat, but then they aren't the sort of things that wear out now are they? So if you've got a mouse mat left over from an earlier mouse, and you're on a budget, this could well be the mouse for you.



24-BIT GRAPH

Our graphics feature glanced at 24-bit graphics, now let's take a little more time to look in detail at the systems that make the Amiga the leading edge 24-bit machine. Here we look at the the three best systems: DCTV, OpalVision and IV24...

DCTV, the hardware and software set-up that showed the way into 24-bit graphic manipulation.

Does anyone remember the days of four-colour graphics on home computers, when a paint packages that would enable you to explore the wonders of non-anti-aliased box drawing was considered to be leading edge? It wasn't that long ago you know. But now we have machines that sit on your desktop and can produce broadcast-quality images for less than £2,500. These computers will also enable you to play *Sensible Soccer* and do the accounts when you're not producing awe-inspiring graphic artworks.

These machines are Amigas. Now read on...

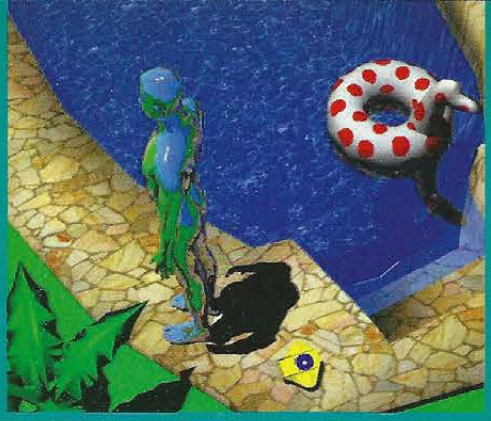
DCTV

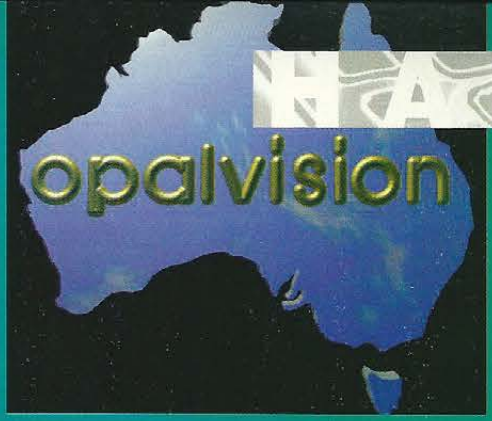
As the Amiga has grown and improved, so people's expectations have developed with it. When the computer was released back in 1985, everyone was shocked at the amazing 4,096 colours it boasted. Unfortunately, as the years went by, that 4,096 colour palette started looking increasingly unrefined and it soon came to pass that the buzzword on every Amiga owner's lips was true colour.

In 1992 the £500 (it was reduced to £399 later that year) DCTV system was launched in this country. It gave A500 owners the opportunity to indulge in a spot of 24–bit graphic processing, utilising just under 17 million colours. It included an incredible painting program called DCTVPaint and built-in digitising hardware. Needless to say, it became the add–on for the A500 owner.

The actual system consists of a small black box containing the composite video hardware. This reinterprets the information held in a high resolution screen Amiga display as composite video waveforms. The system enables you to manipulate and display true colour images using the same amount of memory and with the same speed as standard high resolution animations.

DCTV's ability to display these true colour pictures makes it an extremely useful video or art tool. With those 17 million colours it's possible to be faithful to the source picture. Instead of reinterpreting the colours, a far better match can be made. This





means that the Amiga can be used to a much greater extent in a post–production video setup.

In order to see the resulting true colour images you need a composite monitor and five megabytes of memory. You can cheat the system by plugging the composite lead into your video recorder and taking the output to a normal colour television so it isn't absolutely necessary to splash out on a new monitor. The DCTV box talks to your Amiga through the RGB socket with a pass–through for the normal Amiga monitor.

The package is of most use to anyone who'd like to retouch images, by digitising an image with DCTV it's possible to make photographic quality changes. All of which means that you can completely transform the blandest of photos. The colour, the tint, the shade and the physical layout of the image can be modified, tweaked and generally rearranged until it looks the way you want.

Although the development of the AGA chip set machines has made this kind of hardware outdated, DCTV is still a worthy package, especially as the *DCTV Paint* program bundled with it is of such high quality. If you can pick it up cheaply enough and you're desperate to hang on to your A500 then it may be worth purchasing, otherwise spend the money on an A1200 and the forthcoming art package *Brilliance*.

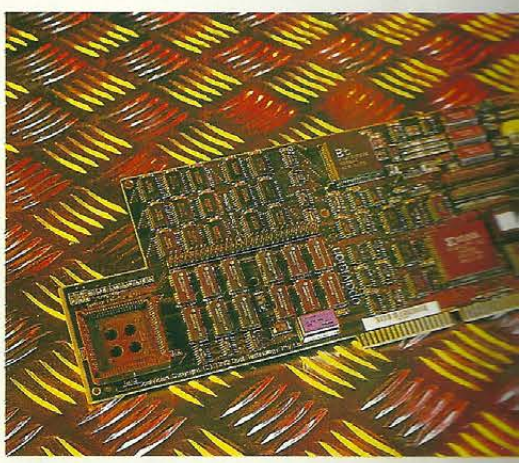
OPALVISION

The development of 24–bit graphics cards on the Amiga was always inevitable. Once everyone had got used to those 4,096 colours, the next big step was to get true colour. By opening up the palette to just under 17 million different colours it is possible to modify images of photographic quality.

The foremost 24–bit graphics package for the Amiga is OpalVision. This is a hardware/software combination that plugs into an A1500, A2000, A3000 or A4000.

The board comprises a 24–bit frame buffer and display card, supplying 16,777,216 colours. It has 1.5 Mb of its own RAM on–board and so it's easy to switch between OpalVision and Amiga graphics.

OpalVision's hardware card plugs into the video slot inside the case. Due to the way the card has been designed it is possible to plug in extras bits. These will transform the OpalVision board into a cheap but highly effective digital effects and video editing suite. With a chroma–key, genlock, a video effects roaster chip and various other video related



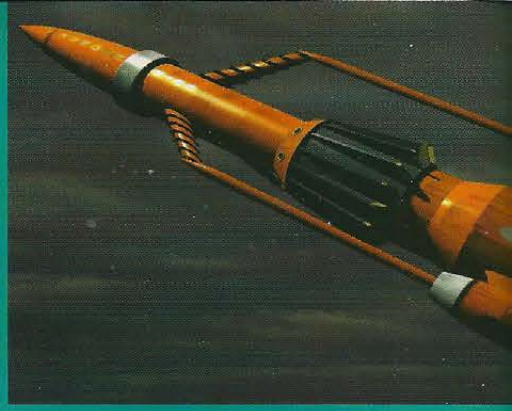
24-bit cards such as OpalVision and IV24 are really the preserve of the professional. Or are they?

IC WONDERS

SEA OF COLOUR

You would have thought that with the arrival of the AGA chip set A1200 and A4000 Amigas, graphics cards such as OpalVision had become redundant. But you would of course be completely wrong. The confusion arises because the AGA machines have 16 million colour palettes, the same as these graphics cards.

To a certain extent it's true that you do get a palette of 16 million colours with the AGA chip set Amigas, but this shouldn't be confused with the 24–bit graphics of boards such as OpalVision. The Amigas cheat a bit to display that number of colours, so that you can't change every individual pixel, you have to change three. With a 24–bit graphics card you can use any of the 16.8 million colours on every pixel.



add–ons in the pipeline, its future looks assured.

The OpalVision card operates at a maximum resolution of 768x576 in PAL mode and it can animate in the 24–bit medium resolution and 15–bit low resolution modes. Although it's entirely possible to create original artwork from scratch, the board's main strength lies in the manipulation of frame–grabbed video images.

The board's VLSI graphics co-processor enables resolution changes, stencil modes, transition effects and smooth scrolling between screens, and the microcode graphics processor takes care of the control system, priority switching, hardware scrolling and panning. These heavy duty processors mean that for the first time you can expect a reasonable amount of speed from a true colour system.

As with all of video hardware add–ons, the hardware's only as good as the software that runs on it. And OpalVision comes with *OpalPaint*, an incredibly slick painting program that enables you to work with graphic images on your Amiga in pretty much the same way as an artist does with paint and canvas.

The traditional complaint levelled at computer paint packages has been that they bear no relation to the way artists traditionally create an image. The creators of *OpalPaint* have tried hard to emulate both the textures and the techniques of traditional artwork. To this end you can use realistic airbrush tools, chalk, pencil or even watercolour.

One of OpalVision's most powerful capabilities is its ability to create true colour stencils. By defining a portion of one picture as the stencil, you can either place it on another picture or rub through from one to the other, revealing only the parts you need. In addition, you can use sophisticated enhancing tools such as greyscale, oil, hessian, texture and smear to modify the image. Similarly, you can alter the colour of the image on a minute or grand scale by using the add, subtract, negative, shade, posterise, gamma, sharpen, smooth ad colourise tools.

Images such as all those shown on these pages can, and have been, produced using the Amiga!

IV24

One of the newest 24–bit graphics cards to appear on the rapidly burgeoning market is the IV24 which is produced by the respected American hardware manufacturer GVP. This is a heavy duty set–up that will set you back £1,300. The card is designed for use on the quicker Amigas, with plenty of RAM and lots of acceleration.

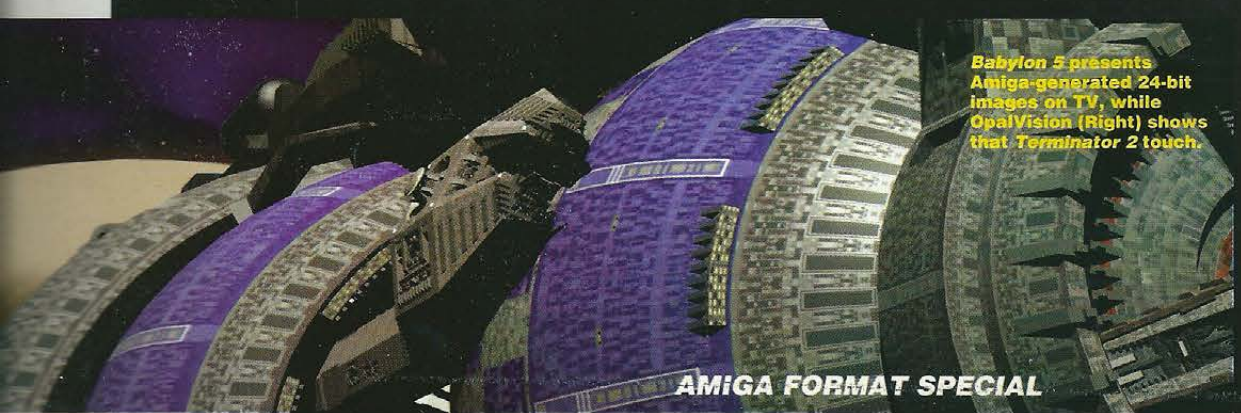
The unit comes with professional-quality software which includes *Desktop Darkroom* (a video grabbing program used in conjunction with an RGB splitter), *MyLAB* (a desktop real-time image viewer), *Caligari 24* (a 24–bit rendering package), *Macropaint 2* (a 24–bit painting package). Of these, the most interesting is *Caligari* which produces excellent results with very little rendering time.

There are, however, severe speed problems when using *MacroPaint*. When running the program on an unaccelerated A3000 there was considerable cursor lag. In fact this was so slow that the pointer split into its red, green and blue components. All of which makes that the program all but unusable. We didn't encounter the same problems on an A4000, so our recommendation is that while IV24 is undoubtedly a powerful card with plenty of features, only get it if you have a seriously quick Amiga and a seriously large wallet.

SEE YOUR TRUE COLOURS

So just what is True Colour and why is it being hyped so much? Put simply, true colour means photographic quality. At this level of graphic sophistication, computer images look just as good as photos. True colour literally equates to 16 million colours. The odd bit is that while your computer is capable of creating that many colours, the human eye can only see about 4 million. All of which begs the question: why go for 16 million colours?

The answer is that computers generally manipulate data in blocks of eight. This means that you have standard configurations like 8–bit, 16–bit, 24–bit or 32–bit. It would be possible to have 22–bit graphics (with 4 million shades) but the practicalities of getting information flowing into 8–bit chips make this a senseless effort. It's far easier to simply use 24–bit graphics chips which offer 16,777,216 colours. The other reason for stopping at 24–bit is that the human eye is made up of a grid of 4000x4000 receptors. That equates to 16 million pixels and as there aren't any monitors that can handle that kind of resolution yet let alone go beyond it, there seems little point in extending the palette further.



***Babylon 5* presents Amiga-generated 24-bit images on TV, while OpalVision (Right) shows that *Terminator 2* touch.**

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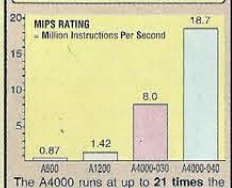

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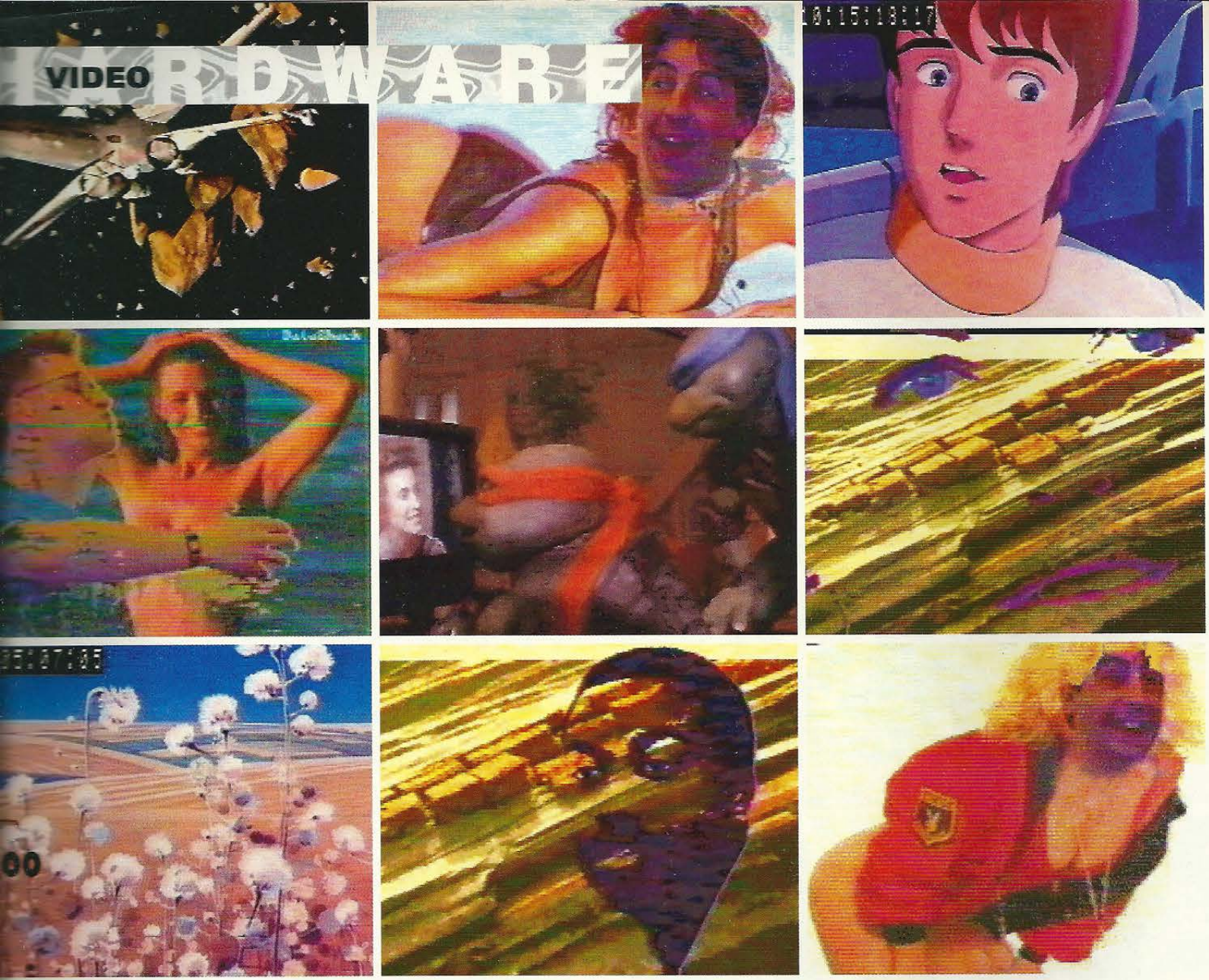


VIDEO STAR

When it comes to video the Amiga is an award winner. Here we profile some of the sophisticated hardware you'll need if you want to improve your moving pictures

Unlike other computers the Amiga is designed specifically to cope with the demands of video. Within the space of eight years it has become the choice of those concerned with post-production work, and home video enthusiasts working to a tight budget. As in many other areas of technology, the Amiga has gone a long way to democratising what was the enclave of television and film companies.

By using a range of hardware add-ons, the Amiga is capable of sophisticated effects that belie their inexpensiveness. These add-ons are capable of improving the look of videos be they of holiday snaps, a sporting event, an air rally or wedding footage.

Sophisticated scanning techniques can be used to overlay, modify and otherwise enhance video signal information. Thankfully, over the last five years the cost of items such as digitisers has fallen to very acceptable prices, but you should still expect to part with about £400 for a good chroma-key.

Digitisers

Computers are little more than interpreters. They read simple information from the outside world and do their best to convert it into a series of binary figures. This information might come from the keyboard or mouse or through one of the ports on the back of the Amiga. Video information has to be sampled and con-

verted in exactly the same way, so for the Amiga to be able to do anything useful it first has to simplify the data.

Digitisers are clever sampling devices that convert a video image into a pixelated picture using standard analog to digital circuitry. Once the appropriate image has been frozen, the signal is scanned from top to bottom, left to right with the analog to digital convertor making a guess at the video information being passed into it. It then reads pixel information about brightness, luminance, colour and position and displays its approximation of the original on screen. This data can be saved in a standard Amiga graphic file format such as IFF.

Initially, all the digitisers for the Amiga were monochrome affairs. However, over the last five years, as the technology has got cheaper and new hardware has appeared, digitisers that can digitise using RGB signals have appeared. You can now get full-colour digitisers that work at impressive resolutions. The one that we recommend is the Complete Colour Solution from Rombo that costs £150. This can digitise single frozen screens or animations using an RGB signal.

These days digitised images crop up all over the place. Indeed many of the pictures included on CD-ROM disks are digitised. Increasingly, these pictures are also animated by linking a sequence of them together and running them back at between 10 and 12 frames a second. These animated sequences are created by digitisers that utilise real-time grabbing facilities. These record chunks of video data, saving the results as a series of numbered files. Unfortunately, due to space constraints, these animations are usually at a low resolution and often in either 16-shade or 16-colour modes.

The ability to transform a live video signal into a digital representation is extremely useful for improving the look of a film. You could digitise a pop group, retouch the picture in a paint package and then, using a genlock, use this image behind the band as they play.The process could also be used to create realistic-looking maps. By digitising a shot of countryside, the image could be transferred to a paint package, have points of interest annotated on it and then transferred back to video.

Let's say that you want to scroll the opening titles for a wedding video over an enhanced computer image. The first step would be to choose a good bright shot and then freeze frame it. The signal from your VCR is inserted into the back of the digitiser and another lead connects this to your Amiga.

Run the digitising program and ask the Amiga to grab a screen and the image of the church will appear on-screen. If the image is too dull or too bright then the appropriate controls can be tweaked on the digitiser. Once you've got a good clear image you can save it as an IFF.

This can then be imported into your paint package and modified. You could, for instance, change the colour palette to some primary colours for a posterised effect. If you now use this picture as a background for your animated titles (*DPaint* includes easy-to-use animation facilities that will do the job for you), you have a simple but effective introductory sequence.

Continued over

VIDEO EFFECTS TO TRY TO CREATE

The IV-24 card enables you to frame grab any footage

1. The weather. Create a series of weather maps on your Amiga. Film yourself talking about them in front of a blue background. Chroma-key the maps on to the background.
2. Advert. Get hold of some digitised pictures of exotic locations around the world. Film yourself selling holidays abroad in front of a blue background. Chroma-key the digitised pictures onto the blue.
3. Video Intro. Digitise someone from video tape. Modify the picture in a paint package. Record the image on to the front of the original video as an introductory sequence.
4. Titles. Try adding opening and closing credits to your videos with a genlock.
5. Subtitles. Add your own comments and/or subtitles at the bottom of the screen on a video with a genlock.
6. Rave. Create some psychedelic animations and record them on to tape. Play back with a suitable progressive dub disco track.
7. Spitting Image. Construct a blue hood and film your friends with this over their heads. Get hold of some head shots of celebrities and chroma-key these on to your friends heads.
8. Pop video. Record a band in front of a blue background and display a series of suitably wacky colourful images chroma-keyed on to it. Try not to loose the band in the background detail.

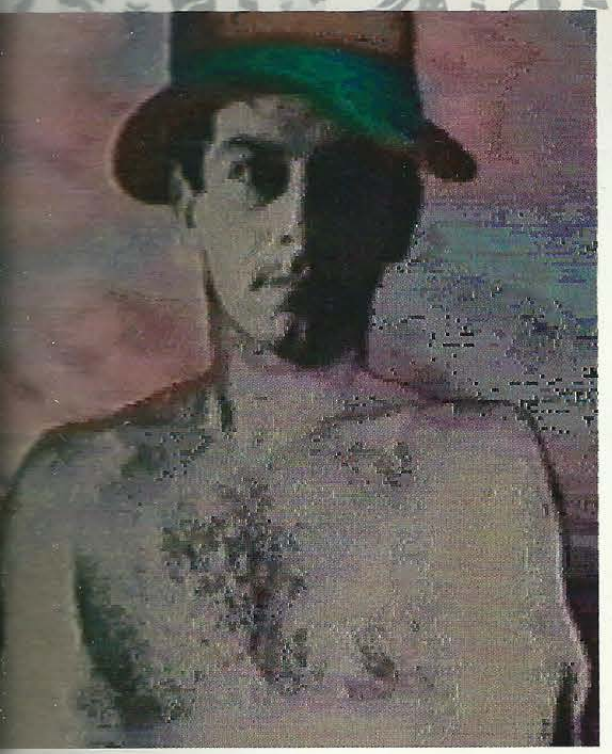
CLOSE TO THE EDIT

We all know that the Amiga is the premier video effects computer, its amazing assortment of genlocks, chroma-keys and digitisers means that it's one of the leading performers when it comes to post-production effects. Up till now, however, the only way to actually orchestrate the whole video editing process on your Amiga was by using something like the Video Director 3 software and hardware vide editing package. That's all set to change with the release of VideoPilot.

VideoPilot (pictured here) is a professional video editing suite designed to be used in conjunction with an Amiga. It is capable of all the effects that professional set-ups can create. The actual package consists of a video control device and some software. Up to three video input sources can be connected to one output recorder. Information on segments of video are stored in the Amiga and referred to when the suite is searching for a particular piece of footage.

In practice the whole set-up proves easy to use. The main problem encountered in editing video footage is getting precise edit points and combining these with effective wipes and fades. VideoPilot enables you to jog and shuttle the tape to precisely the right point and to then use a still frame at the start or end of the shot, an external caption insert, a genlock title or graphic, a fast replay, a slow motion replay, assembly points or a three machine A/B roll (dissolve).

We found VideoPilot to be quick and easy to use. Obviously it isn't the cheapest peripheral you can get for your Amiga (it costs about £1,500) but when you consider that other set-ups cost tens of thousands of pounds, it becomes very good value. By using the infra-red memorisation facility (which means you don't need an LANC recorder) you can create a complete video post-production set-up for under £2,000.



VIDEO STANDARDS

There are a bewildering variety of video formats. Here are the different varieties.
1. VHS: Video Home System, a full sized cassette that is the home video standard. VHS uses half-inch tape and is one of the bulkiest formats.
2. Super VHS: greatly improved VHS format that uses better recording heads and a finer band width. Unfortunately, Super VHS recordings cannot be played back on a standard VHS recorder.
3. VHS–C: or compact VHS. This uses the standard half-inch tape but in much smaller cassettes. The VHS–C tapes can be placed in a convertor that is the same size as VHS tape and they can then be played on standard VHS equipment.
4. Super VHS–C: improved quality compact VHS tapes. Although these are of very high quality, they fall into the same problem area as VHS–C, offering a relatively short recording time.
5. Video 8: this is an increasingly popular format developed by Sony for use in their range of Camcorders. The tape is 8mm wide and comes in a cassette slightly larger than a standard audio model. This kind of tape offers very good quality even in long play mode.
6. Hi–8: one of the professional video standards. Uses 8mm tape, but due to a density of particles on the tape, the quality is vastly improved. Few home video machines use this format although the situation is improving.

24–bit images (like this Manga image) can be manipulated in any number of ways.

This 16 million colour 24–bit image was grabbed by the IV–24 Frame Grabber from the Bit Movie Award winners video.

Genlocks

Although the ability to reduce a video signal to a digital representation is very useful, what is even more handy is the ability to superimpose a variety of computer graphics over the top of a real-time video image. This kind of effect is created by an add–on called a genlock.

The use of genlocks crops up all the time. If your television or video is the kind that displays a letter or date on the screen when you change channels then genlock hardware is at work. Similarly, every time you see the titles at the end of a TV programme, it's a genlock that the television company is using. It's simple to create impressive effects with an Amiga genlock because everything that you can display on your Amiga can be plonked over the top of a video image. Captions, titles, comments and effects can all be used to make a video look better.

As with all kinds of presentation, simple is usually best. It's all too easy to get carried away with the entire enterprise and employ flashy effects that obscure rather than illuminate. Before overlaying Amiga images on to video tape get a clear idea of exactly what information you want to get across.

For example, don't use confusing fonts that will be illegible on the screen. Similarl, pick a good primary colour such as white. If you've got a text effects generator, then don't use every wipe and fade in the book, but pick a maximum of two and stick to them. It's extremely unlikely that you'll be able to complete a flawless piece of genlocked video the first time you try.

The secret of creating professional looking footage is to experiment and to learn from your mistakes. Try several different ideas and then use the one that works best. Remember, objectively you aren't the best person to rate your own footage as you're too close to it, so show yourn ideas to other people and take their reactions into account before you settle on the final version.

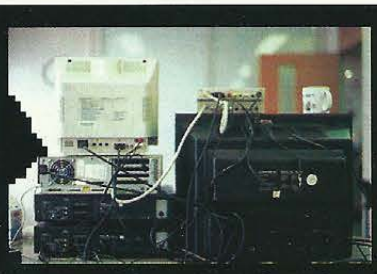
The principal problem you will encounter in video work will be with synchronising the Amiga output over the appropriate video image. So, it's absolutely essential that you make accurate notes of timings. If you do this you can quickly build up an event list like the example to the left.

By sticking to your event list you can quickly zip through the video building up the finished footage on the record video. If you are using text on–screen then make sure that you read it slowly yourself to work out the duration timing. One of the

VIDEO EVENT LIST

Effect	Time	Counter	Duration
Main Title Fade	30.00	00100	04.50
Second Title Fade	34.00	00103	03.00
Production Title Fade	37.00	00105	03.00
Introductory Text Scroll	45.00	00115	25.50
Subtitle Fade (B/W)	57.00	00121	08.00

To create our effects video we're going to use both a genlock and a chroma-key unit. Both of the above are from RocGen. These are the best units we've come across.



Once everything's plugged in to the genlocks and Sony videos, you'll have a serious spaghetti of cables.

Here we're choosing some appropriate video moments to tart up. The man in screen is our sub editor.

Here the video signal is running through the genlock. The foreground graphic is simply an IFF image.

SENSIBLE HARDWARE

Obviously to get the most out of your Amiga video production set-up you're going to need a source video and a record video. This bumps up the cost of the whole deal by a considerable amount, even given the fact that videos have been steadily falling in price for a long time. If you want to record your own footage you're also going to need a video recorder or camcorder.

The most important features on any video recorder are the record playback heads. The better the quality of these, the better the pictures will look on screen and the easier it will be to get quality freeze-framing without any of the associated glitching and noise bars. Look for video recorders that boast solid freeze-frame facilities.

If you want to use the video controlling functions of programs such as Video Director II then you'll need a video with a LANC control. This feature enables you to control your video precisely from your Amiga without having to monkey about with pause keys and counters.

Other useful features include a jog and shuttle control. This is a dial control that enables you to quickly search for the right spot on the tape by flicking the dial left and right (the further you move the dial the quicker the tape moves). This facility, that used to exist only on incredibly ecpensive professional video equipment is now widely available on home video recorders.

If you need really tight editing then look for videos with flying erase heads. Most videos have an erase head that's mounted in a fixed position. This simply erases the tape some way in front of the recording head. For really accurate editing you don't want a delay between what you are erasing and the new material. Some manufacturers mount the erase head on the head drum, a position that is much closer to the recording heads. This makes the whole process much quicker and cleaner.

The Sony 517 is perfect for a post production video editing set-up. It has all the features you'll need including a tight frame freeze, jog and shuttle, LANC sockets and plenty of input ports.

most common mistakes is to leave text on for either too short or too long a period of time. Similarly, if you are using text, don't alter its physical position on the screen; this serves only to confuse the viewer.

Chroma-Keying

This is one of the most popular areas of Amiga desktop video production. Chroma-keying is a process that removes a particular colour field and replaces it with graphics generated from the Amiga. Absolutely anything that you can display on your Amiga can replace a particular colour from your video. This kind of effect is used a great deal by television companies to create effects from graphics for Top Of The Pops and The Chart Show to Michael Fish's weather map.

The process goes something like this. You take some footage in front of a background of one particular colour (usually blue). This image is then piped through the chroma-key device and the Amiga graphics replace the blue area on the video. You could, for instance, put someone in a blue suit and chroma-key the blue out to be replaced by an Amiga animation. Anything is possible.

When you're setting up a chroma-key shot, make sure that you use a uniform background colour. If there are variations in the colour then the chroma-key will pick up on this and patches of video will appear where you don't want them on top of the Amiga graphics. This kind of problem will also crop up if the person you are shooting is wearing some blue; patches of Amiga graphics will appear on top of them.

Simple works best. If you're filming a person then simply place them in front of a background. Avoid using too many clever patches as the edges tend to look blurred and thus detract from the effect. On the Amiga graphics front busy graphics work a lot better than simple ones. Why not try creating the kind of effect they use a great deal on MTV? Many of the demos in the Public Domain would look excellent as the backdrop to someone speaking or singing.

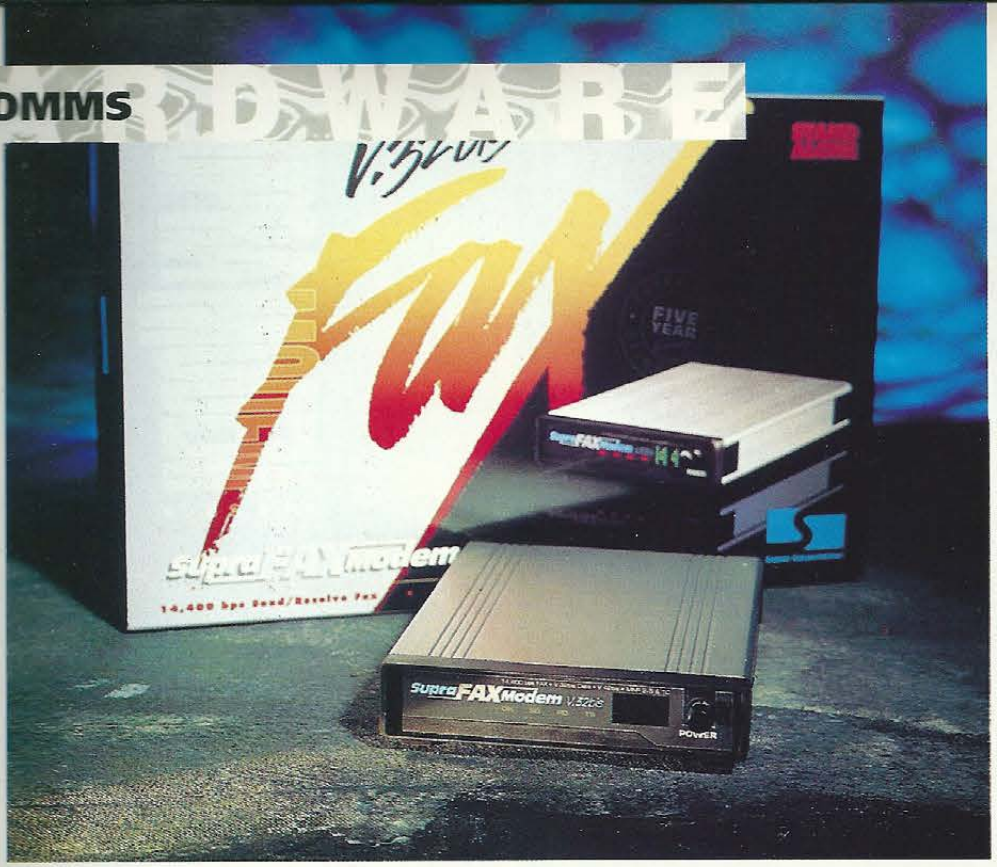
Experiment with the different features on your chroma-key and you'll find that there are some wonderful effects possible, such as luma-keying, where areas of a certain brightness are keyed to the Amiga graphics. This is especially useful if you light your video properly. Try training a spotlight on to the backdrop and then luma-keying into that intensity of brightness to create a sort of sunburst effect.

We can now try chroma-keying. The video image of Sally (our art Ed) is keyed over an IFF of a log.

As you can see, we're just using a plain white background to key on. The monitor shows the video output.

Here's a close-up of the video image. By luma-keying we can replace bits of Sally's face with the log.

Here's my lovely ebullient self (Hutch) after a chroma-key nose job. I'm still available for talk shows or panto.



The FAX about COMMS

Can you get in contact with the rest of the world using your Amiga? Yes you jolly well can, and we can show you how as we examine the wonderful world of Amiga comms and fax-work

Comms is one of the areas of computing that really is not dependent on the kind of machine you have in front of you. You could be using an Amiga, you could be using a PC or even a Macintosh, the fact is that once you're online, you're a member of a large community. This community is populated with people from all over the country, all over Europe, all over the world in fact. There are many diverse topics covered with advice and information being flung around the globe in a form that both you and your Amiga can understand and make use of.

We have already covered the basic and most important piece of hardware you need for comms, the modem, on page16. Over the next two pages we'll be giving you some idea about making the most of your Amiga comms set-up and telling you how to turn your Amiga into a fax machine.

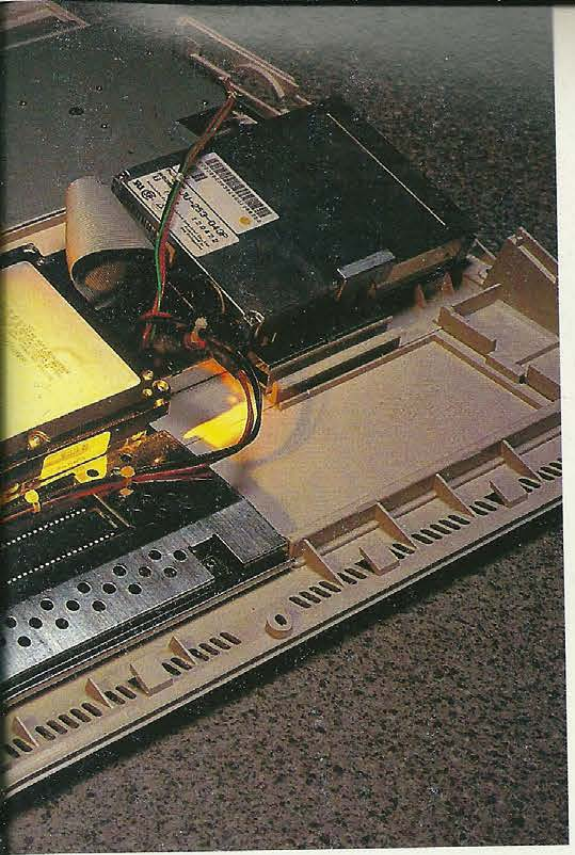
This is a great deal easier than you might think. Frankly all you need to do is to buy yourself an Amiga-compatible fax-modem such as the ***Amiga Format*** Gold-rated Supra Faxmodem V32BIS (£259, it was rated at 93 per cent in ***Amiga Format*** issue 38, September 1992). If you already own a modem you could opt for a piece of fax software such as GPWare's *GPFax* software (£39.99 from First Choice Computers on 0532 319444). This enables you to turn your Amiga into a fax in a matter of seconds although you must have a modem that is capable of recognising and using Class-2 fax commands. You can use it to send and receive faxes, and it even has the ability to take pages created in other programs and send those.

The only other piece of hardware you really need to get the most out of comms is a good hard disk. This is imperative if you are thinking about setting up your own BBS (Bulletin Board System). After a few months dealing with comms you will find that you are getting through floppy disks at a rate of knots because you will be downloading (copying) masses of software and other information from BBSs. If you're playing by the rules of comms, you will be uploading (copying files) to Bulletin Board Systems as well.

Also, if you are thinking of using your comms set-up as a mailbox with messages coming in from hither and thither, you will certainly require the speed, ease and storage space of a hard disk. The rather tiresome alternative is the unending swapping of floppy disks.

With Commodore's recent switch from SCSI to IDE (turn to page 46 for a full explanation of these terms) in the A600, A1200 and A4000, users of these machines now have access to even greater storage space. A knock-on effect is that the manufacturers of SCSI drives (people such as GVP and ICD) are having to drop the prices of their equipment.

For example GVP's excellent A530 drive and accelerator board has recently dropped in price from £638 to £499 (call Silica on 081-309 1111 for more information) and ICD was showing off its Trifector range of hard disks-cum-RAM upgrades at the



Modem times: the modems on these pages are just a small selection of the many that are available in the Amiga market (for our recommended buys turn to page 16). If you want to get into comms, short for communications, you should also invest in a printer, a basic 9-pin dot matrix will do nicely, and a hard disk for storing all those fantastic Public Domain programs you can download from Bulletin Board Systems.

recent ***Amiga Format*** Live Show at highly competitive prices (call Power Computing on 0234 843388 for full price details).

The only other essential piece of Amiga equipment you will need is a decent, low-cost printer. We have already covered the bulk of this ground starting on page 10 so turn to there for our recommendations, but why would you want a printer in the first place?

Simply because you will be getting a great deal of information that is easier to read at your leisure than at speed while on line. A basic nine-pin dot matrix should be perfectly adequate. So there you have it, the hardware line up for the ideal comms world consists of: an Amiga (any model of Amiga), a modem, a hard disk and a dot matrix printer.

The only other point to bear in mind when you get started in comms is to make sure to log-off properly. We have heard a number of horror stories about people who didn't bother to log-off properly and then found telephone bills of rather less than pleasing amounts.

CARDS ON THE TABLE

Many of you will already be familiar with the external modems that most people use for comms (turn to page 16 if you haven't read our modem round-up yet). But there is another, neater alternative if you are thinking of a serious future in comms... the modem card.

Basically the card does exactly the same job as an external modem but fits inside your Amiga. A good example is the Supra 2400zi (the zi suffix denotes that the modem is internal). There are many other internal modems available to the Amiga user and you can also buy fax-modems. These are really handy devices that turn your Amiga into a fax without the need to waste paper.

All the major manufacturers make them, and the only downside for the majority of Amiga users is the fact that these cards are only compatible with the higher-end Amigas such as the A2000, A3000 and A4000. Owners of the A500, A600 and A1200 will simply have to make do with external modems.

Apart from how the modem fits to your Amiga, the other major difference between the internal and external units is the way in which you control them. External modems come armed with LEDs to indicate the current state of play, but internal modems such as Supra's 2400zi use an emulator that displays the lights that would normally appear on the modem itself on a window on your desktop.

TEN TOP TIPS TO COMMS

Once you've got your modem, the correct software and, of course your Amiga, you are ready to enter the world of Amiga comms. But before you dive in, we advise that you cast your eyes over the following tips and hints.

1) Make sure that your dealer tells you if your modem is approved by BABT (the British Approval Board for Telecommunications) for use on the public telephone network. If it is approved it will carry a sticker bearing a green circle. If it is not approved the sticker will have a red triangle on it. It is illegal to use a non-approved modem on the public telephone network, although it is not illegal to sell non-approved modems, because you could use them on a private network.

2) Get yourself a telephone splitter. This is a small plastic device that plugs into a standard BT telephone socket and enables you to plug in the telephone and the modem at the same time. This will save you a great deal of backache. The technical name is a Telephone Doubler, and they cost about £10.

3) If you are using your Amiga as a fax machine, with *GPFax* for example, remember that you can have the telephone and the fax system set up simultaneously.

4) Ensure that you always have a clock with you, preferably a large alarm clock, when you are on-line so that you can time your calls or set your alarm for the maximum length of call you want to make. Remember that time is money. Your money.

5) Get yourself a hard disk. The most irritating thing in the world of comms is to have downloaded a likely-looking file from a Bulletin Board System only to find that it has been compressed, and therefore you have to keep disk swapping in order to store the fully decompressed file.

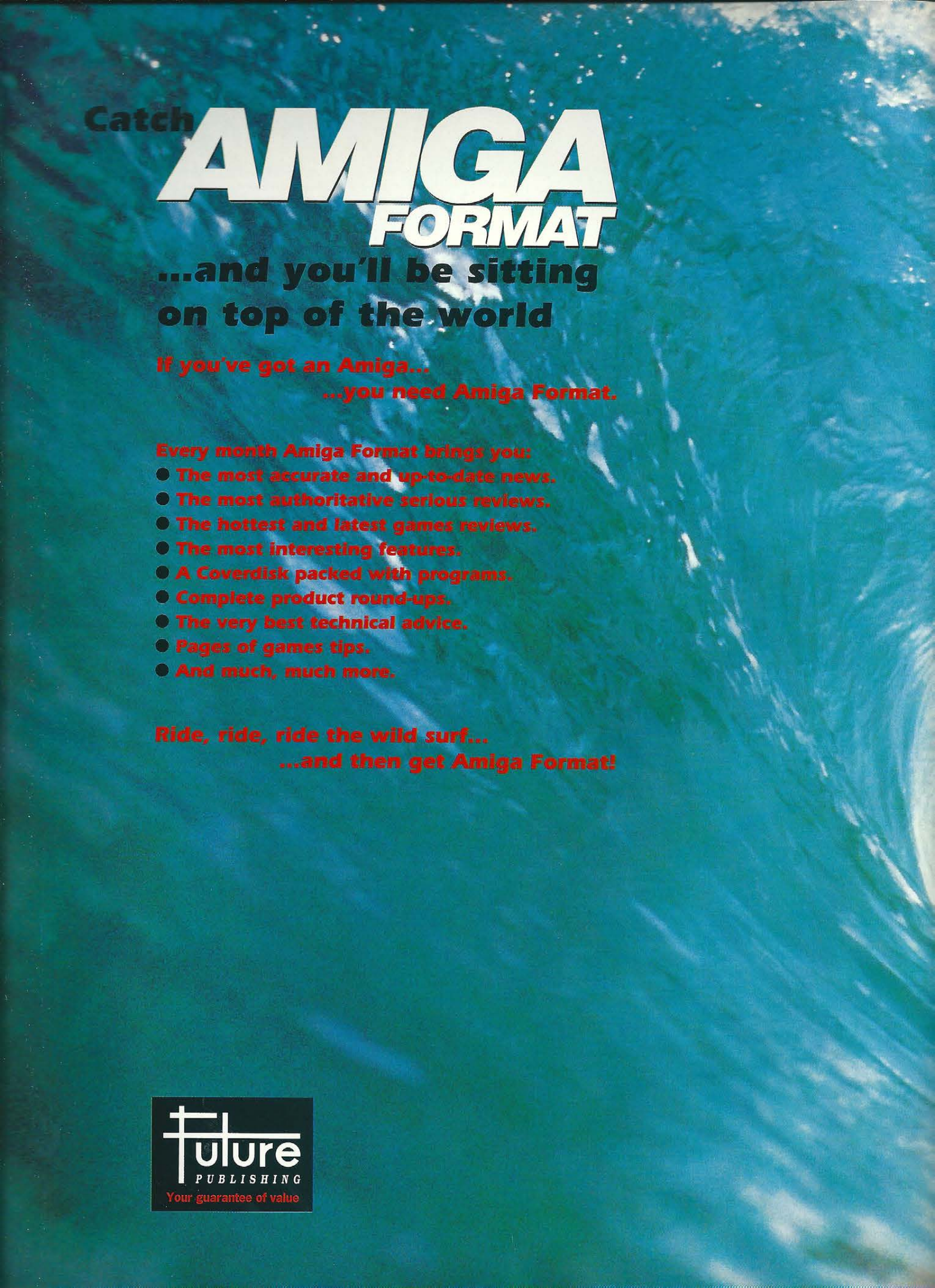
6) If you've got yourself a hard disk, make sure to get a good virus checker, you don't want to lose all the PD programs you've just gained. Partitioning your hard disk is also a good idea. This way you can keep one area defined for your comms useage.

7) Save yourself the cost of a commercial comms program by using Public Domain software. PD software is cheap and the people who write it usually spend a great deal of time on-line and so they know what is needed.

8) Make sure that you keep reading *Amiga Format* every month for updates on all the latest comms hardware and PD programs.

9) It doesn't matter whether you've got a a standard A500 or a turbo-charged A4000, the speed of your comms will be roughly the same. It's the speed of your modem that makes the difference.

10) Remember that you don't have to use BT, Mercury exists too. If you're thinking of getting into Comms seriously, then check out Mercury as well as BT. The main difference is that long-distance and international calls are cheaper with Mercury.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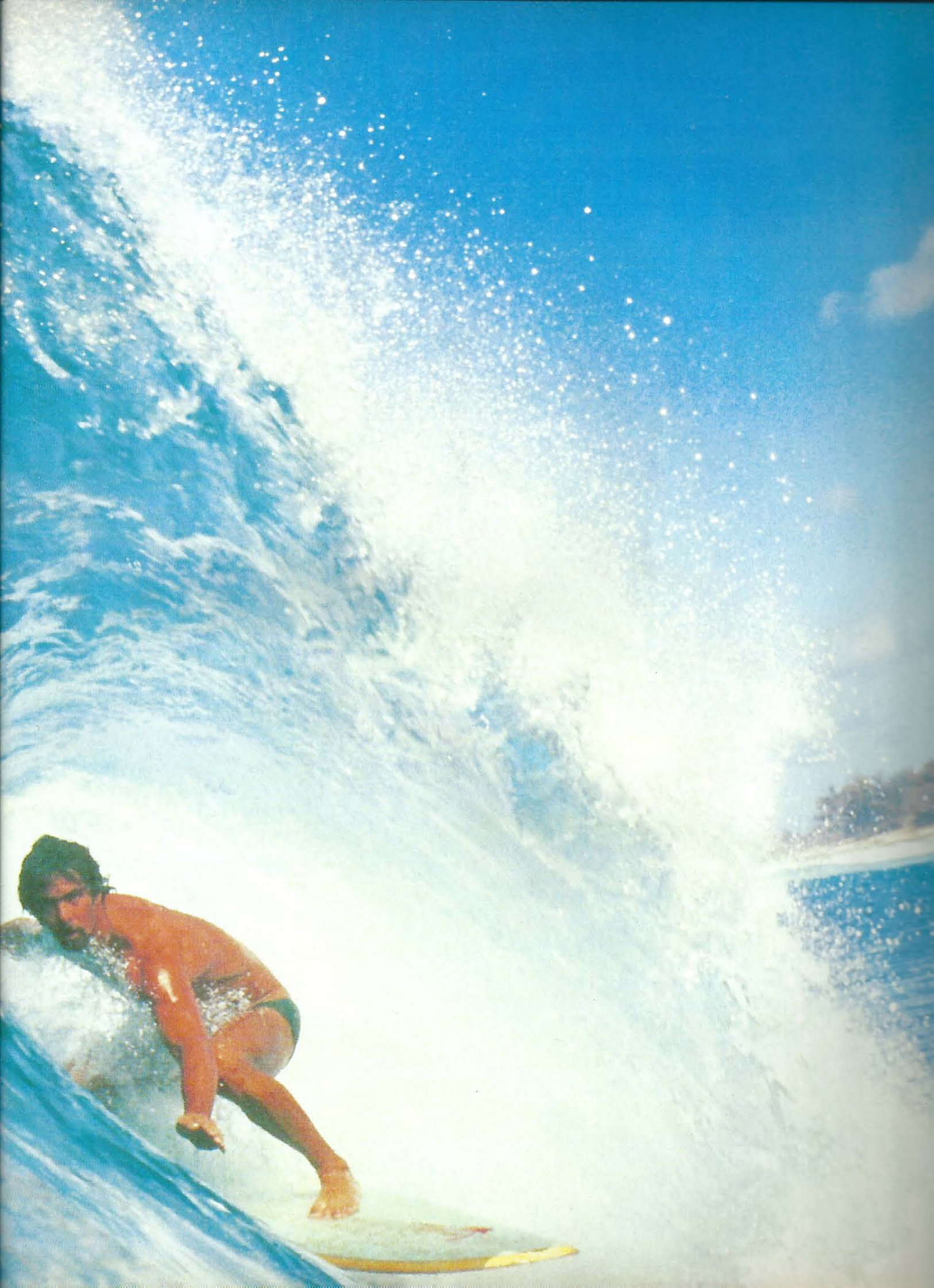


The Amiga and CD have had a strained love affair to date. CDTV and the A570 promised much but haven't yet delivered. So will Commodore's new developments re-ignite the flame? We re-examine Amiga CD

CHANGING DIRECTION

CDTV: 30,000 of these cunningly disguised A500s with CD drive have been sold since 1991.

Compact discs will eventually take over from floppies as the main storage medium for software.

"This will change forever the way we communicate, learn and entertain. The (CDTV) system will be used for reference works, special interest areas, surrogate travel (???), music, entertainment – and when we abandon the high ground, it will play one hell of a game!"

Comments from Commodore at the launch of CDTV, Chicago, June 1990.

"The main target audience for CDTV is the group of adults who want to provide their families with interactive multimedia information, education, and entertainment.

Clearly, entertainment and games software will be a key reason for buying the CDTV machine."

Comments from Commodore to developers in the light of increasingly bad reviews of CDTV software, Chicago, April 1991.

"While I agree with Commodore's sentiment, CDTV proved not to be the machine to realise it. The company is committed to interactive compact disc though, and future machines may well reveal the potential of CD."

Marcus Dyson, editor *Amiga Format*, Bath, April 1993.

Ever since Thomas Alva Edison created the first electronic recording device, the phonograph in 1878, we have sought to record information for later retrieval. Over the years we've seen a whole range of media come and go – from the gramophone to the tape and onwards to the floppy disk. Almost all of these media have been harnessed by computers for the storage of data in digital form. Without such storage, computers like our very own Amiga would be useless. As the power of these machines has grown, so the demands placed upon the storage media has grown with them; no sooner is a form of storage lauded as the "next big thing" than it's already starting to show its weaknesses.

This is exactly what has happened with the floppy disk. The very first Amiga used a 3.5 inch floppy, and at the time this was seen as a revolutionary move, one that enabled Amiga owners to place 800k of data on a single disk. Over the second half of the 1980s as the size of games has expanded, so the number of disks required for Amiga games has grown. It was during this period that computer companies started to spend research money on finding another data storage medium and in 1989 they hit upon the idea of using a CD.

CD has everything that the Amiga needs in terms of a storage medium. It offers fast access times

***Amiga Format*'s prediction for the newest CD-based Amiga was made months before such a machine was created. Full ahead with CD!**

and room for a lot of data. What's more, it doesn't look as though it's going to be superseded within a few years because it has the capability to store so much more data; if you wanted to recreate a CD program such as *Hutchinson's Encyclopedia* it would take 650 floppy disks.

It's the capability of CD to cram so much data on to one disc that has caught the software industry's attention. For years the industry has been honing its programming techniques, trying to store as much data as possible on floppy disks using sophisticated packing techniques. Now it hardly has to worry about this, because it can plonk huge amounts of data on CD without being in any danger of running out of room.

CD-ROM (CD-Read Only Memory) units operate in a completely different way to floppy disks. CDs use lasers to read data, while floppy drives use a magnetic head to read and write information. Because lasers can operate to a finer precision than magnetic heads, this means that more information can be stored on each CD. Information on the CD is stored in a series of tiny pits. These are scanned by the laser and converted into computer-readable data bytes at the rate of about 150k per second.

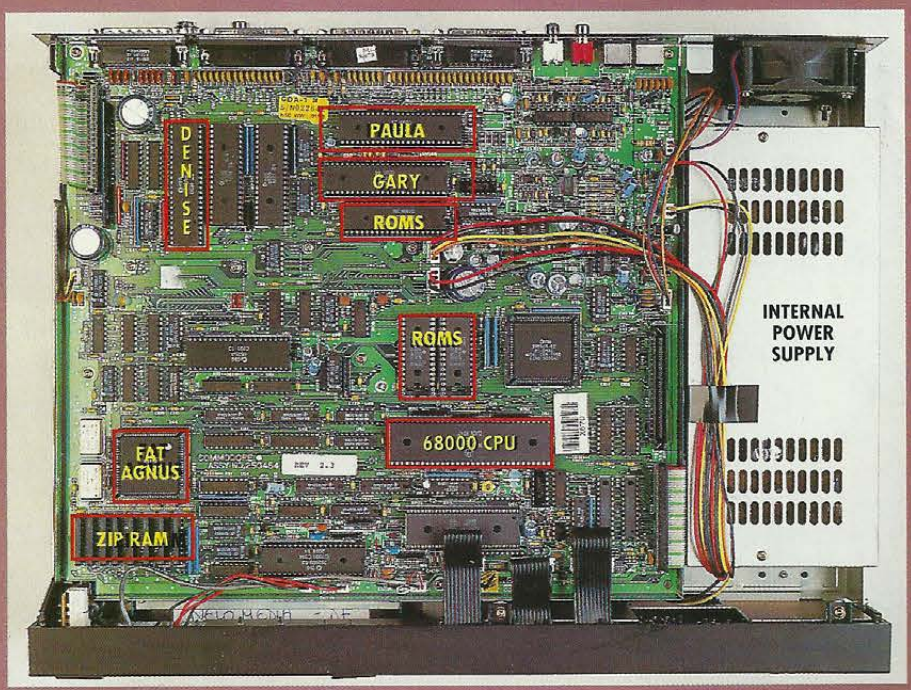
The main problem for the home user is that standard, shop-bought, CDs are read-only devices. However, the major electronics manufacturers are developing read/write CD technology that should be available in the next few years. At this point there are only WORM (Write Once Read Many times) disks, expensive optical drives such as the Magneto Optical (95 per cent in **AF**44, £999.95 from Power Computing on 0234 843388) and some very expensive (£2,000+) CD recording equipment.

Commodore decided to take advantage of the possibilities of CD by launching its own CD-based machine – Commodore Dynamic Total Vision, or

Continued over

CDs such as *Japan World* led us all to believe that the Amiga's link with compact disc would bear rich fruit. Unfortunately, *Japan World* is one of the few really good CDs to appear so far.

SEE YOUR CDTV



Here in all its native glory is a naked vision of Commodore Dynamic Total Vision. The machine that could have made (or might have broken) Commodore's fortunes. The more experienced Amiga users among you will notice some similarities between the motherboard pictured here, and that of the late (and very lamented) Amiga 500. The reason for this is simple... they are basically the same.

As you can see from the annonations we have made to this picture, the custom chips that make the Amiga the force it is are retained, with Agnus, Paula, Denise and Gary all playing prominant parts in the runing of the Compact Disc-based beastie. As you can also see, there are extra ROMS onboard this motherboard than are usually found on an A500. The reason for this is that extended ROMs are needed to cope with the extra work provided by the CD-ROM drive. This is also true of the other chips and sub-procesors that you see scattered all over the board. The CD-ROM drive itself requires extra processors in order to enable it to access the discs, there is also a provision made for the use of a genlock. Happily, all of this means that if you have a CDTV, you do have an Amiga.

CDTV as it's better known – that went on sale for £599 in early 1991. This is quite simply an Amiga 500 inside a case with a CD-ROM drive. The whole set-up is operated by a remote control or, at an extra cost, by an add-on keyboard.

The CDTV machine was designed to appeal to people who aren't especially interested in computers. This is reflected in the design of the unit which looks more at home in a hi-fi stack than in a sitting room next to a monitor. Similarly the type of software created for use on CDTV machines is more suitable for the family than the computer enthusiast.

The essential difference between a standard Amiga and a CDTV unit is that while an Amiga attempts to recreate the outside world by means of computer-generated graphics and sound, CDTV reflects the outside world by using real images and real sounds. It also differs from a standard Amiga in terms of how you interact with the software.

To load a program on CDTV, you insert a CD into a special cartridge, push it into the machine and it auto-loads. Interaction with the program is far simpler than in most computers because you don't use a keyboard, you use a remote control, this means no tedious typing.

As a result most CD programs use a number of simplified on-screen icons. Because CDTV discs can use CD-quality sound, CDTV also comes with stereo jacks for connection to a hi-fi. Most CDTV games have a proper stereo soundtrack that considerably enhances the level of enjoyment.

The CDTV machine is capable of playing CDTV discs, CD-ROM XA discs, CD+G disks and normal CDs (see the accompanying boxout for explanations of these standards).

However, Commodore made some serious mistakes with regard to the expandability of CDTV, the most obvious of which is that its 2Mb of RAM can't be upgraded, something that led to a lot of criticism when it was launched. On the plus side, the unit incorporates plenty of ports on the back including: parallel interface, serial port, disk drive support, MIDI ports, remote keyboard, remote joystick, stereo audio, RGB video and composite video. So it's easy enough to connect a wide range of peripherals to a CDTV.

The main problem with CDTV is that it operates around the slow old Workbench 1.3 system and, although the CD file operations are quick, the actual processing is far too slow. This becomes obvious on processor-intensive discs such as the *Fractal Universe* disc. In effect it means that CDTV is far too slow for many of the ambitious projects envisioned for it back in the heady days of 1991.

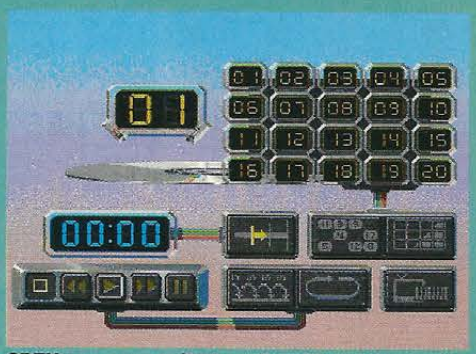
On the face of it, it shouldn't be too hard to create revolutionary software for CDTV. However, as often happens in such cases, the programmers spent too much time trying to dazzle us with the capabilities of CD and not enough time actually creating useable software. This has led to a paucity of decent software, which in turn has led to disappointing sales figures and 'repositioning' of the machine.

To date Commodore has sold about 30,000 CDTV machines, a figure that is far short of the hundreds of thousands the company boasted it could shift at the machine's launch. In fact, at its current price (about £399 with loads of software) it represents good value for money for the first time in its history. This is good news for Commodore which was attempting to clean out all stocks of CDTV before it launched the new Amiga CD console.

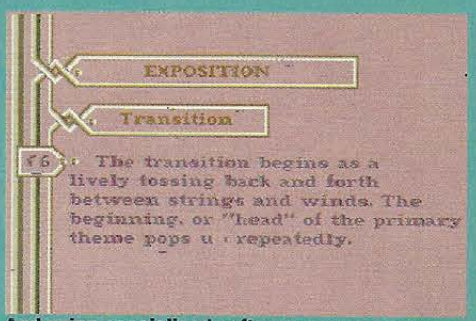
There are any number of reasons why CDTV

SORTING THROUGH THE STANDARDS

Audio CD: standard audio CDs can be played on a CDTV machine. Music CDs are simply placed in the standard cartridge of the CDTV. The machine then displays a graphical interface resembling the LEDs on the front of a CD player. Although CDTVs can play standard CDs using all the tricks of a standard audio player, the sound reproduction is not the best – using a separate amplifier is an excellent idea.



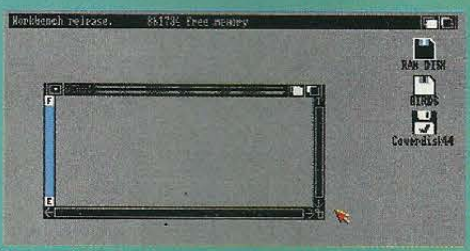
CDTV can cope quite happily with the demands of standard, audio CDs by using this screen.



And using specialised software you can even muck around with your audio CDs.

CD+G: these are audio CDs with an added data track containing graphical information. This graphical data is designed to tie in with the format of the music. So if the CD is classical music you're likely to get lots of soothing 17th, 18th and 19th century paintings. This format hasn't really taken off and isn't likely to until someone starts selling CD-based machines in much larger numbers. As it is, the graphics don't look too brilliant.

CS–ISO 9660: this is the industry standard for CD–ROMs. All CD players should include the ability to read ISO (International Standards Organisation) 9660 and CDTV is no exception. ISO 9660 actually governs the way in which data is stored on compact discs worldwide (among other things, it defines the checksums and the fact that filenames can have up to 31 characters).



Using a CD-ROM drive (the A570 to be exact) with the Amiga couldn't be much easier.

CD–ROM XA: or eXtended Architecture. This is a bridge technology designed to provide CD–ROM with three new sound facilities: CD–Digital audio, FM quality and Speech. The rumoured Commodore CDTV2, said to be based around the A1200 AA chip set, should include CD–XA.

CDTV: combination of high-resolution graphics with high-quality sound all of which is accessed and controlled by an Amiga 500. The principal difference between this format and the others is that it is far more interactive.

Definitely American story about the lass Heather trying to succeed in a bizarre baseball variant. Lots of success-ethic underlying this one: a little bit of indoctrination into the American dream.

However, it does show that CD-based software can make a hell of a difference to the learning process. Not only can you click on the pictures to gain more information, the text also reads itself to your child!

didn't do as well as everyone wanted it to; the software wasn't much cop, the Amiga hardware was lacking, the user interface was unreliable and it was too expensive, take your pick. However, with the launch of the AA chipset machines, it didn't come as any great surprise to discover that Commodore has a new CD-based machine waiting in the wings.

As this feature is written, we are still attempting to wade through the rumours regarding the arrival of Commodore's newest CD incarnation. Thus far we are aware that it is based on the AA (or AGA) chipset that is featured in the A1200 and the A4000s (the 30 and the 40). We don't think that it will be called CDTV2 due to the lack of take-up of the original machine.

So by the time you read this Commodore should have the Amiga CD console machine in the shops. The company has revealed that it has learnt some valuable lessons from the original CDTV. So it has prepared is a totally new development, not simply an upgrade to the old CD system.

Although those software and hardware developers that normally work with the Amiga and the CDTV are remaining tight-lipped about what exactly is in the new, machine, certain information has emerged. The most important of which is that the heart of the machine will be an A1200. When compared to the CDTV's A500 guts, this is a major step forward.

One of the greatest criticisms of CDTV is that you can't upgrade its 2Mb of memory. The new machine is likely to have two megabytes of RAM onboard, sufficient for most applications. We also assume that this upgradability will extend far beyond 2Mb.

Despite the level of criticism levelled at the remote control for CDTV, its successor will undoubtedly be controlled in the same manner. Commodore is keen to sell these machines as new

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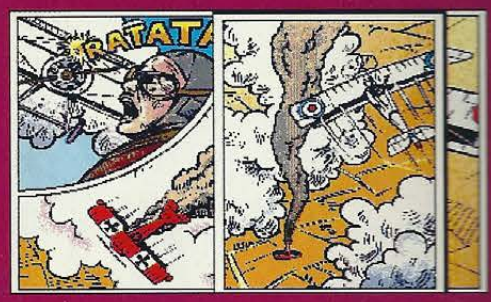
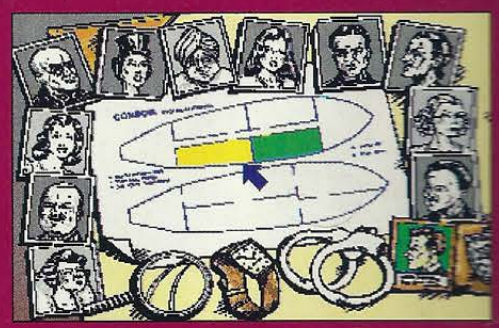
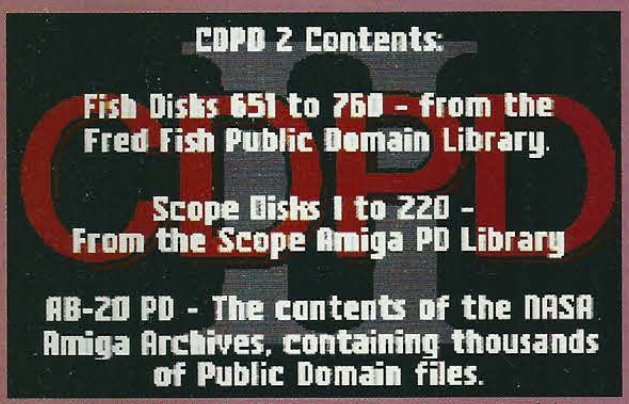




Although CD software has generally not lived up to expectations, there have been a few notable exceptions: games such as *The Case of the Cautious Condor* (79 per cent, *AF*39), which is pictured above, have proved the potential of CD.

Right now we are having to make do, for the most part, with simple ports from floppy to CD with no vast improvements in gameplay or looks. The fact that compact discs have 100s of Mb of storage space means that programmers can pack more sound, greatly improved graphics, and (we hope) can indulge themselves in more plot and more gameplay. All we are really waiting for now is a cheaper form of CD-mastering combined with more CD owners.

CDTV ADD-ONS



One of the ideal tasks for CD is to carry vast amounts of data. PD discs, such as this one, contain entire back catalogues.

There are now quite a few add-ons available for CDTV. Once Commodore realised that the keyboardless machine wasn't such a brilliant idea, it released a range of peripherals to make it a more attractive proposition. These include:

KEYBOARD: this enables you to carry out all those standard computer jobs that are impossible with a remote control.

EXTERNAL FLOPPY DISK: this enables you to extract information from disks such as the Fred Fish PD compilation. You can then save this data in a floppy disk format.

MOUSE: anyone who has tried playing the CDTV version of *Lemmings* soon finds out that the direction arrows fitted to the CDTV remote control are useless for fine control. The mouse plugs in the back and gives you more control.

BRICK-ETTE: enables you to use any wired Amiga compatible joystick, mouse or trackball. This means that you can make use of your favourite mouse, and play games with the best joysticks available to the Amiga.

MONITOR: this is just a bog-standard Commodore 1084S monitor, but in black.

EXTERNAL HARD DRIVE: this enables you to save data as rapidly as you load it. Comes with 65Mb of storage space.

SCSI CONTROLLER: this enables you to add scanners, laser printers and even SCSI-compatible hard disks to your CDTV set-up.

RAM UPGRADE: boosts the chip RAM of your CDTV by 1Mb to 2Mb. Further increases in memory are pointless - there aren't many CDTV programs that need and/or use more than 2Mb of RAM.

INTERNAL GENLOCK: enables you to make use of video for titling and so on.

All of these items are available from Indi Direct Mail Tel: 0543 419999.

Just because you opted to go for the CDTV Amiga option, there is no reason why you shouldn't have peripherals.

consumer durables, close family to the VCRs and televisions of this world. If Commodore is to do that then the console can't look like a computer and that means that it can't have a keyboard.

It is unlikely, however, that Commodore's marketing will pretend that you can't add a keyboard to its very latest CD incarnation, though it may sell a keyboard, mouse, second drive combination in an add–on pack.

As always, the price will be crucial. The £599 asking price for the original CDTV was way over the odds and it soon transpired that no–one was willing to shell out that amount of money on a new, unproven concept. It's far more likely that the new machine will weigh in at £499, though a £399 or less price tag would make it highly desirable.

Software support for the new machine will no doubt be improved by the development of a CD-ROM drive for the A1200. This would undoubtedly increase the interest in Amiga CD among the third-party developers who are looking for a market with a number of machines already in place. This in turn will increase the quantity and quality of CD-based software for your machine.

The A570 drive enables A500 and A500 Plus owners to lock into the world of CD. But because it makes use of the A500's expansion slot, it can't be used with the A600 or A1200. So hurry up Commodore!

The A570

As the cassette gave way to the floppy disk and the floppy disk gave way to the hard disk, so the hard drive is slowly giving way to the CD–ROM drive.

The A570 CD–ROM drive which came out at the end of 1991 is designed to be used only with an A500 and A500Plus. It plugs into the expansion port in exactly the same way as a hard drive does and enables you to access CDTV discs, CD+G discs and audio CDs. Of these, the CDTV discs will be of the most interest because they were designed to be used specifically with an Amiga.

The device looks like an enlarged floppy drive. On the front are two knobs, one for ejecting CDs, the other a volume control for the headphone jack. At the rear of the unit are two phono jacks to connect it to a hi-fi, and a SCSI socket for chaining devices. The A570 is the same length as a floppy drive and sits next to the A500 drawing all its power from the Amiga, rather than an extra power–lead.

Once the unit is plugged in, it hijacks the standard boot–up sequence and displays the CDTV logo instead. This means that it is ready to receive a CD. These are inserted into a special cartridge of the same dimensions as an audio CD case and this is then pushed into the unit. If the disc being used is a CDTV CD then it will autoboot. If the disc is audio

IS THERE A FUTURE FOR FLOPPIES?

Hold on a second though, everyone's rushing headlong into a brave new CD–based future without a single glance back at the faithful old floppy disk. Is the floppy really as prehistoric as we're led to believe? We got in touch with one of this country's foremost programmers, the man responsible for *Elite* and *Elite 2*, David Braben.

We asked David how he managed to fit his games on to so little disk space (*Elite 2* will be on just one disk), when other (primarily American) programmers use as many as 12 for their games. He told us that it is often the graphical information that takes up the space:

"Look at how the game is broken up by the programmer, often the actual game code is only 50K or 60K long," he said.

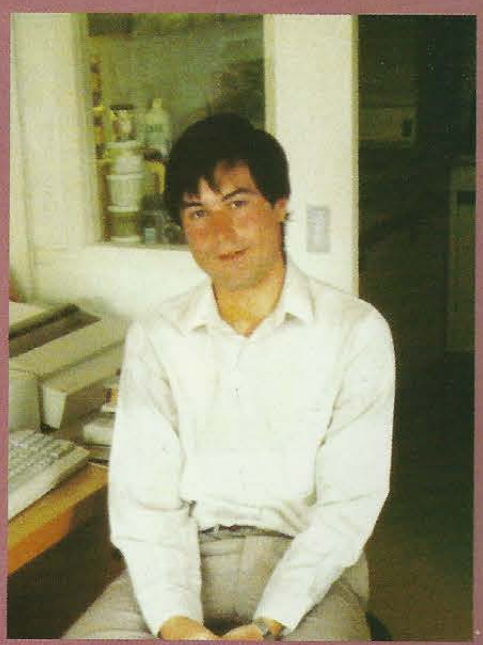
"If you look at something like *Wing Commander*, all of the images of the ships are pictures, not bitmaps. The reason the images look quite jerky is because they use eight different views of the ship. Each of these views has to be rendered at about 20 different sizes, all of which takes up a lot of disk space."

He thinks that this emphasis on large graphics detracted from games such as *Street Fighter II*.

"If you look at the sprite animations, particularly when a character dies, they ping between movements; it's obvious that the sprites took up a lot of space."

David feels that certain styles of game would work well on CD, particularly those utilising full motion video (FMV) or drawing on photo information. He also told us that he'd be interested in using the CD format, partly because it is cheaper to produce a game on CD than on floppy disk, but also because, used properly, some amazing effects can be created.

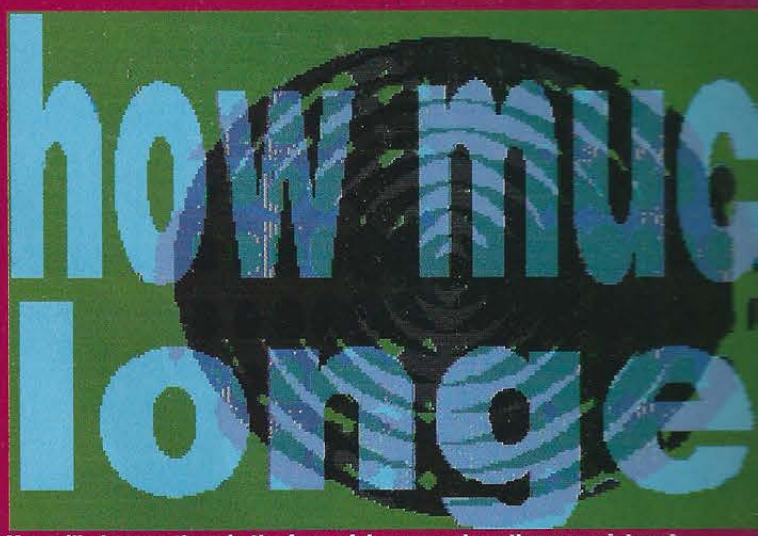
So, even the top programmers are showing their colours. CD is on its way in, and we can expect to see the death of the floppy disk format as the primary data carrier in the next two or three years.



David Braben, the man who designed *Elite*, thinks that CD has great potential for games.

***Streetfighter II*: the graphics were unnecessarily large for the floppy disk format says Braben.**

As soon as the first real 'economy' price read/writable set-up becomes available to the average Amiga user, we can expect some stunning graphics and sound. These won't just appear in commercial programs and games either.



You will also see them in the form of demos such as the ones pictured here. Coding for CD is different to standard floppy coding, it is actually a great deal less difficult and gives programmers greater scope.

CARING FOR CDs

What not to subject your CDs to and how to improve their life expectancy...

When CDs first burst on to the scene, they were roundly applauded as being virtually indestructible. Sadly, it soon transpired that CDs weren't indestructible, but were vulnerable to just as much blight and decay as floppy disks and gramophone records.

CDs store data in a series of microscopic bumps (called lands) and pits. The lands reflect the light from the laser that acts as the read-head (providing a binary digital 1 or 'on'). The pits capture and scatter the light (providing a binary digital 0 or 'off'). The last thing you want is for the pits and lands to be clogged with gunk – dust, smoke particles and so on. With this in mind, the actual surface of the disc is plastic coated – the laser can still read through it but not write to it (hence read-only) – even so it's wise to only handle a CD by its edges.

Discs galore. Before too long, the CD will be the primary data storage media.

If a CD does get dirty use some warm water and a cloth to wipe it clean. Do not use a strong detergent or bleach because this will erode the plastic coating and render the disc completely useless. Similarly, don't use boiling water or this will have the same effect.

Avoid exposing the CD to too much heat because this is liable to warp it. Fortunately the CD cannot be affected by magnetism, so unlike floppy disks, it's perfectly all right to leave them on top of speakers or televisions. You should avoid doing anything that scores the surface of the CD as this leads to disc-rot. Basically, once air starts getting at the surface of the disk it will slowly dissolve the tiny lands making the disc completely useless.

If a CD does get grimy then you should clean it before you insert it into your CDTV or A570. The laser head that reads the data from the CD is just as susceptible to grime and dirt as the CD itself. This dirt is quite easily transferred from CD to optical read head which is a lot harder to clean. To stop stray dust and dirt getting into the machine you shouldn't leave a cartridge half in and half out of the machine because this leaves the flap open, thus making it easier for muck to enter the case.

As with all forms of technology, it's a bad idea to allow too much smoke near CD-ROM drives and CDs because the tar in the smoke sticks to the surfaces inside the drive and disc. Over a long period can build up to disruptive amounts. If too much tar gets on to the CD then this will obscure the tiny pits and lands in its surface that make up the data.

Avoid jarring the CDTV or A570 because this might knock the read head out of alignment, causing it to read disks incorrectly, if at all. This is especially dangerous if the unit is actually operating at the time, because then the read head will be in transit over the surface of the disk and not at rest in its slot.

then a graphical front-end akin to a normal CD player will appear and the disk can be played back.

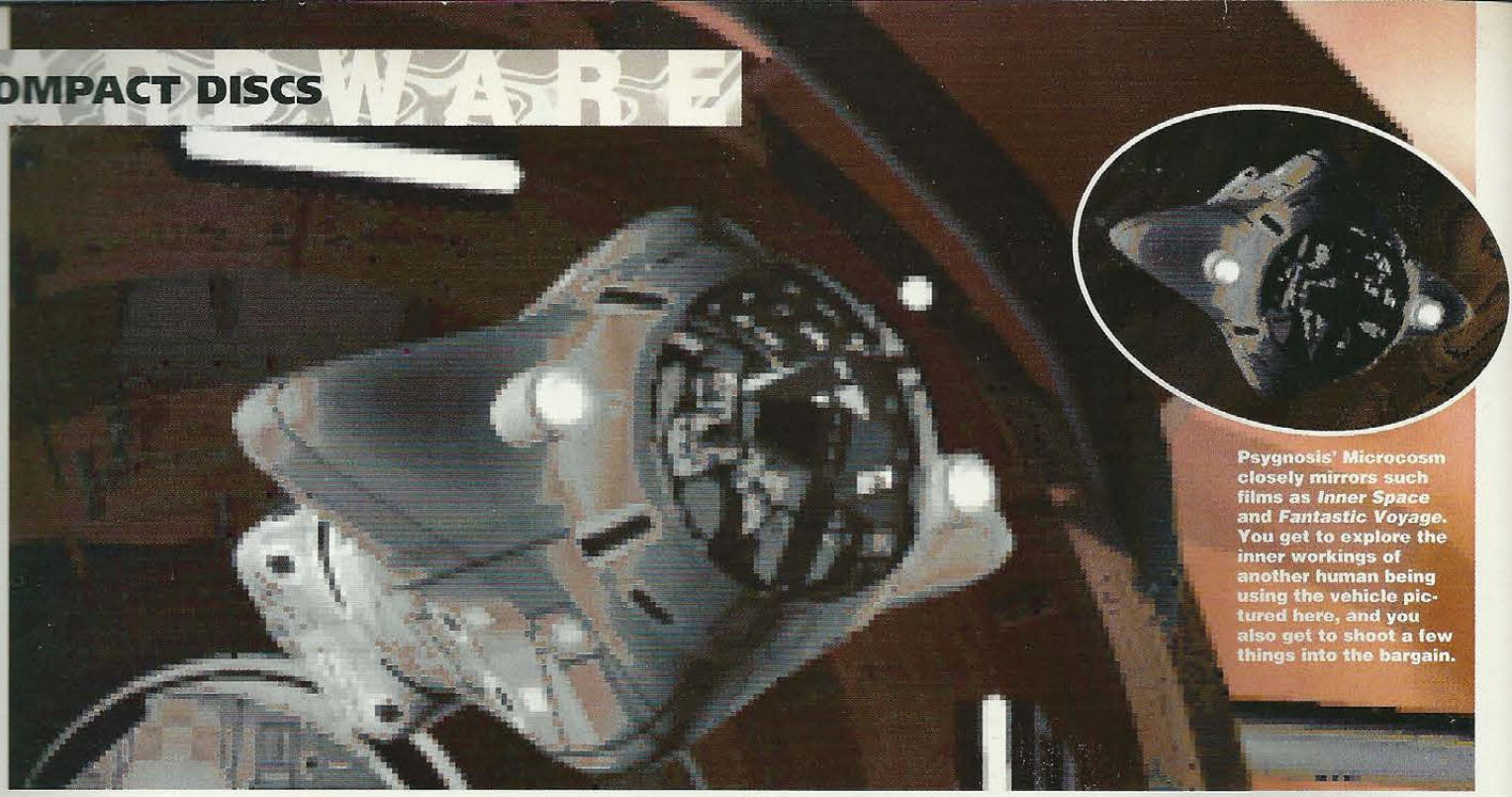
The principal strength of a CD drive is that it gives you quick and easy access to massive amounts of data. One CD can hold 650Mb of data, which is the equivalent of 812 floppy disks. Even the LucasArts teams responsible for the *Monkey Island* games would have problems filling up that amount of space with one game. The main weakness of the system is that at present Amiga CD-ROM drives can't record data. However, by using an A570 in combination with a hard or floppy disk drive, you can transfer data.

So why would you want to access CDs on your A500? Well,this is the way that computing is going and you may as well be ahead of the pack. CD programs are unlike anything you'll have seen before, because they have been designed to utilise enormous amounts of graphical and audio data. Rather than using computer generated sounds, CDTV programs use recorded speech and music played back at the standard CD rate of 44.1KHz.

The range of software available on CD is growing all the time. Titles such as *Dr Wellman's Medical CD*, *Fractal Universe* and *CD Remix* have been around for a while and provide a good idea of just what's possible on the system. Lately, programs such as the *Global Chaos CD* (a dance music and graphics CD) and *Trivial Pursuit* have proved just how much more can be extracted from the machine.

The A570 is a powerful add-on to an A500 because it enables you to have the best of both worlds, rather than being stuck with an over-expensive, over-glorified CD drive you get a decent Amiga with keyboard. You're not just tied to the use of floppy or hard drives any more, but can access the vast amounts of data already available on CD.

It's worth noting that just as the original CDTV was based around A500 technology, the new machine will be based around the AA chip set technology that features so strongly in the A1200 and the A4000s. It seems extremely likely that Commodore will release an A1270 CD-ROM drive, thus enabling owners of the A1200 to use the advanced CD software being developed for the new machine. If this is the case, then the future of Amiga CD looks as bright as it has ever been.



Psygnosis' Microcosm closely mirrors such films as *Inner Space* and *Fantastic Voyage*. You get to explore the inner workings of another human being using the vehicle pictured here, and you also get to shoot a few things into the bargain.

THE WAY FORWARD

We have the CD technology, but so far no games have taken full advantage of it. According to Psygnosis, its new offering, *Microcosm*, will change all that...

There's no doubting the fact that CD offers incredible potential as *the* new storage medium for all forms of software – particularly games. There's equally no doubt that since the launch of CDTV in 1991 that potential hasn't even come close to being fully realised. The software, especially the games, that has been developed (or more often converted from older Amiga-based games) for CD, has been extremely disappointing.

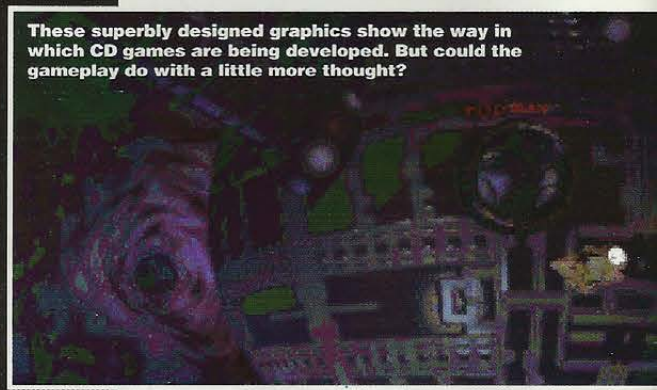
But all of this is about to change. Several of the leading publishers are even now developing games that will take advantage of the huge data storage capabilities of CD. One of the software houses leading the way in CD games development is Psygnosis, best known for the excellent *Lemmings* games, who will shortly unveil *Microcosm*.

Microcosm has already been a great success in Japan where it was released in April this year on Fujitsu's new CD-console, the Marty. But according to Mark Blewitt of Psygnosis the Amiga CD version will look even better.

The game is due for release in the autumn. But what about the price? According to the game's Producer, Richard Browne: "I would hope that it will be no more than £70, but that decision is out of my hands."

Seventy pounds for a game! Now even on the hugely clunky PC (the machine that needs software to help it scroll games, so the games ship on five, six or ten disks) this is a hell of a lot of money for what could be just a few hours entertainment. So just what are we to expect from this brave new world?

That there capsule contains you. That tunnel is actually a vein. That slime is actually plasma.



These superbly designed graphics show the way in which CD games are being developed. But could the gameplay do with a little more thought?

COMMODORE AND CD

We all know that CDTV didn't do as well as anyone expected. Commodore expected to sell 80-90,000 machines in the first year of release (1991), and boy did this not happen. As this article is typed, Commodore is sticking to a figure that is 60,000 CDTV's fewer than the initially projected figure. So how did this failure happen?

We spoke to the head of marketing for Commodore's CDTV, Mike Gosheron, about the past and future of Commodore and CD. As you'd expect, Mike doesn't think that CDTV failed, despite just 30,000 machines being sold to date,

"30,000 is a very respectable figure. When we first launched the Amiga we managed 13,000 sales in the first year and 35,000 in the second, so 30,000 is actually a very solid figure. Initially, I think we confused a lot of people, but you have to remember that CDTV was a brand new concept and so it took a while for the public to realise exactly what it was."

But there's no getting away from the fact that sales were well short of what was expected. 30,000 is also not a terribly impressive figure, given the great success of the Amiga itself. And there lies another part of the problem, Commodore avoided using the enormously successful 'Amiga' name when it first marketed CDTV (which, after all is merely a glorified A500).

Another major problem was the £599 price-tag. So, does Mike think that CDTV was released at the wrong price?

"It was all down to how we positioned it. Because it was at the leading edge we thought we could sell it at £599; you simply don't release something at a price you don't think you can sell it for. Once we got the message across [about what CDTV actually is] we thought that the price point was very justified."

Mike Gosheron: head of marketing for CDTV

Mike says he sees Commodore being at the forefront of this new media, and (perhaps surprisingly), he still sees a lot of life in the old CDTV system. Given the fact that CDTV hasn't yet done very well, we wondered whether Commodore had got its fingers burnt?

"Absolutely not, we're completely committed to going forward in the interactive CD market. We're always developing, both hardware and software." Does this mean that we're going to see the long-awaited Amiga CD console soon?

"We're committed to going forward" repeats Mike in one of those diplomatic tones that has an implied: "I bloody hope so!" in it.

All right, so given the natural progression of Commodore products, it's a safe bet that there will be an AA chip set-based CDTV at some point. We asked Mike whether this would be compatible with any of the other CD standards such as CD-XA or CDTV itself or the new 3DO machines, but he wouldn't be drawn.

"We simply want to make sure that we have the best products possible. There will be a time when there are more CD drives than floppy drives and we intend to be at the forefront of that change." Similarly Mike wouldn't give us any idea of a price for the Amiga CD console.

"When we launched the A4000 a couple of months ago we didn't set the price until the day before the launch. So at this stage we haven't set a price point."A price for what Mike? Certainly not for a non-existent machine.

So, the future looks as if it will contain a link between Commodore and CD. The chances are that CBM will be aiming at the business community as well as the rest of us, but one thing is assured, the Amiga architecture will be there too.

Well, *Microcosm* is an action shoot-em-up over six levels set inside a human body. The president of the fictitious Cybertech, Tiron Korsby, has been injected with a microscopic device by the rival corporation, Axiom. You must enter the body and remove the resultant infections before Axiom can gain control.

There are four different styles of shoot-em-up over the six levels, some viewed from a first-person perspective others from a third-person angle. Throughout the game, animations are used to relay the storyline in a film-like fashion. The excellent graphics were developed on high-power Silicon Graphics workstations and all levels feature fully-rendered animations that Psygnosis claims are interactive but, from what we've seen of the Marty-based demo, merely involve you choosing which route to take. The soundtrack was and produced by 70s pomp-rocker, Rick Wakeman.

But what of Commodore's involvement with the project? We already know that Commodore was co-funding the game, so surely this means that we could expect to see Microcosm on CDTV and even the A570. Apparently not, Psygnosis publicity man, Mark Blewitt told us: "The Commodore conversion will be CDTV2 compatible only, there seems very little point in developing for the already outdated first version (of CDTV)." CDTV2?

It appears that Psygnosis knows more about the state of play in Commodore CD-dom than anyone else. Sadly though, Mark refused to be drawn any further on the subject, and since Psygnosis has recently been bought by Japanese electronics giants, Sony, we imagine that Mark will stay quiet for a while. What we do know however, is that Psygnosis is also developing several other CD titles including *Dracula*, based on the Francis Ford Coppola movie, *Last Action Hero* based on Arnie's new flick, and *Journey To The Centre Of The Earth* based on a new TV series.

"As far as CDTV2 conversions of these titles is concerned we shall have to wait and see the success of the machine before fully committing ourselves to them" said Mark Blewitt.

Mmmmm right. But what of the Amiga itself? It is undoubtedly true that the A1200 is wonderfully armed to take up the CD challenge, all we have to do is wait for Commodore to realise this and develop a CD-ROM drive for the machine. It is also, frankly, absurd that the A4000 still doesn't have a CD-ROM drive. As for the A570 drive, we can only hope that the software houses remain true to their words, and do produce more and better CDware.

Microcosm is a step, but only a step, forward. Oh, and the gameplay needs improving too!

MICROCOSM FACTS

Microcosm was developed by a team of 30 people including animators working on Silicon Graphics hardware and Amigas, programmers, artists, research programmers, sound technicians, props builders, costume designers, managers, co-ordinators and designers.

The Microcosm project took about eight months to complete. That works out at almost 21 man years of development.

About 44,000 frames of animation were used to produce *Microcosm*, many were ditched along the way and don't appear in the finished game, but that still works out at 1,622,016,000 pixels throughout the game.

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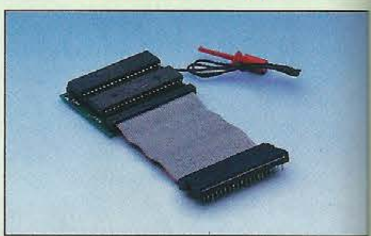

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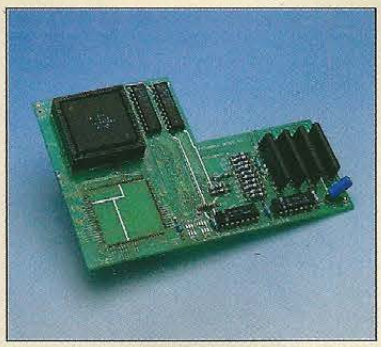

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• Pro Agnus 2MB **£139**
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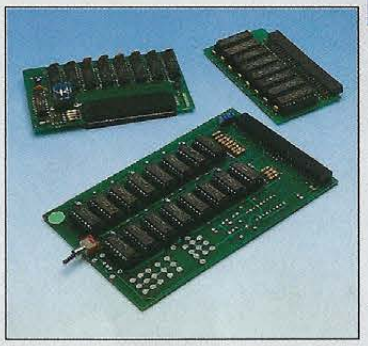


A500 Memory Expansi

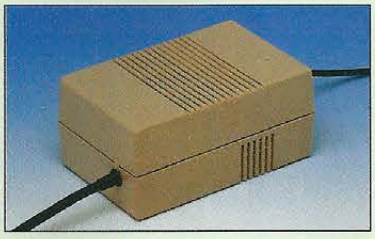
A500 Pro-RAM 0.5 Meg. Upgrad
• Allows 1MB software to run
• Chip memory compatible
• British made

• Without clock
• With clock

A500 Pro-RAM 1.5 Meg Upgrad
• Gives a full 2MB of memory

A500+ 1MB Meg Upgrade **£**

High Current Power Supply



• Allows the addition of peripherals without damage to computer or power supply
• Why risk damaging your expensive kit when one simple investment will ensure total peace of mind now and for the future
• Switch mode design
• Full crow bar projection
• British made

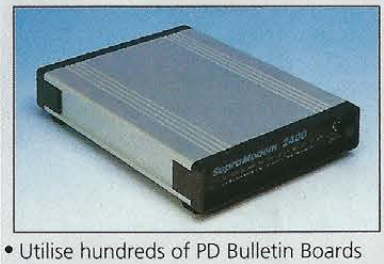
• A600 Power supply unit **£44.95**
• A500 Power supply unit **£44.95**
• A590 Power supply unit **£44.95**
• A1200 Power supply unit **£54.95**
• A2000 Power supply unit **£99.95**

Cumana 3.5" External Drive

• High Quality
• Renowned and proven reliability
• Top notch specification
• Anti-click
• Long moulded cable
• Slimline design
• High impact plastic

• Cumana external drive **£59**
• Cumana external drive + 100 capacity disk box **£62**
• Cumana external drive + 100 disk box + 20 blank disks **£68**
• A500/A500+ Internal replacement disk drive **£46**

Supra Modems



• Utilise hundreds of PD Bulletin Boards
• Communicate with fellow computer users
• Cuts down on telephone bills by using fast efficient baud rates
• 100% Hayes compatible
• Tone pulse, Auto Dial/Auto Answer
• Standard RS232 Interface
• Programmable number storage
• Free Coms software

• Supra 2400 Modem **£89**
• Supra Fax Plus (0-9600 BPS) **£148**
• Supra v.32 BIS (Fax Modem) **£358**

Chips and Spares

• WTS have sole distribution rights Americas biggest Commodore ch distributor

• Workbench 2.04 Kit (Includes manuals, disks & chip)
• Kickstart 2.04
• Kickstart 1.3
• Kickstart ROM Swapper (Swap between kickstarts)
• Fatter Agnus 8372
• Obese Agnus 8375
• High Res Denise
• 1MB x 9 Simms (3 chip)
• 1MB x 4 Zips
• 8520 CIA

SALES HOTLINE 0582 491949 (6 LINES), 0480 471117 (24HR), FAX ON 0582 5059

Credit Card ordering by phone is easy. Simply phone our sales hotline quoting your credit card number., expiry date, name and address the products you wish to order and we'll do the rest. Alternatively write the above details on your letter when ordering by post.

When ordering by post in cheque form please write your cheque card guarantee number on the reverse of the cheque and send along your order. Postal Orders are also accepted.

NO DELIVERY CHARGES TO UK MAINLAND. MINIMUM ORDER AMOUNT £15.00.
Should you wish your order to be sent by courier service please add £5. This method includes Comprehensive insurance.

WARRANTY: One year return to base (excluding chips).
ONE YEAR EXTENDED WARRANTY: Available on all products (excluding chips) at 10% of purchase price when ordering.

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WTS Electronic Ltd
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0582 491949

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Bedford
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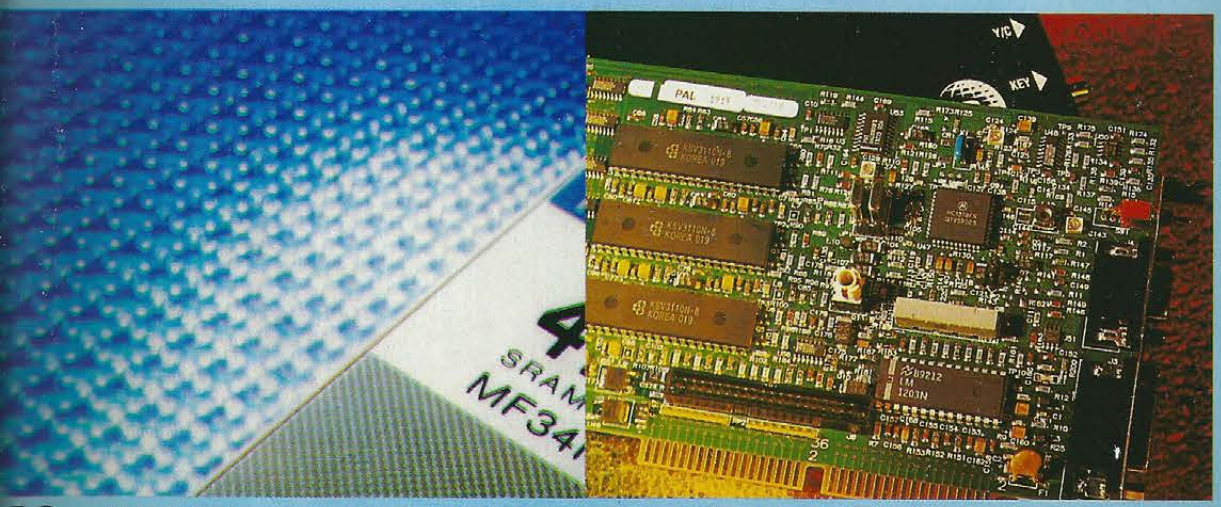
No.6
Priory Mall Shopping Centre
St. Neots
0480 471117

Computer Mall Hertford
49 Railway St.
Hertford
0992 503606

Computer Mall Dunst
84 High Street Nor
Dunstable
Bedfordshire
0582 475747

YOUR AT-A-GLANCE HARDWARE GUIDE

Use these eight pages giving full details of every piece of hardware ever reviewed in *Amiga Format* as a reference guide before you buy new or second hand add-ons



Your Amiga hardware compendium would not be complete without at least eight pages packed with essential information on the prices, features and contact points for the hardware worth *Amiga Format*'s attention over the years.

We are more than aware that the average ***Amiga Format*** reader is also an Amiga enthusiast, keen to make the most of his or her prized machine by constantly upgrading and improving on the basic framework of the Amiga.

With this firmly at the front of our mind, we proudly present our comprehensive guide to all of the hardware reviewed in the world's best Amiga magazine.

Eeach entry includes the price, the issue and page number of the ***Amiga Format*** review, the ***AF*** percentage rating and a contact number.

In most cases the price is the recommended retail price at the time of release, this is intended to act as a guide, so you may well find that prices have fallen or risen. Check prices with your dealer or by calling the contact number. Also, make sure to shop around and check the advertisements in ***Amiga Format*** to get the best deal.

As the more observant of you will notice as you peruse these pages, in some cases we have included an ***Amiga Format*** issue number but we have not included percentage rating.

The reason for this is ***AF*** only started giving hardware ratings from issue 24 onwards.

Where there is no contact number this is because we have been unable to contact the company that originally distributed the hardware in time to meet our deadlines.

You may still be able to find these products through a dealer or if you are buying second hand. We hope that this list is of use to you. We will be updating it in future issues of the ***Amiga Format***'s *Good Hardware Guide*.

7CM3209 (£429.99, *AF*38 P124 , 76%): *Philips colour monitor with stereo output.*
Contact: Philips, 081-689 4444.

A-Max Emulator (£134, *AF*1 P64): *Emulator that enables you to run Apple Macintosh software on your Amiga.*
Contact: Entertainment International 0268 541126.

A-Max ll (£150.00, *AF*27 P134, 85%): *Updated version of the Mac emulator. Released at £250 with Apple ROMs.*
Contact: Entertainment International 0268 541126.

A-Max-II Plus (£324.99, *AF*38 P128, 91%): *The major new feature is ability to use Mac formatted disks in the Amiga drive.*
Contact: Entertainment International 0268 541126.

A1200 Control Centre (£39.95, *AF*48 P 139, 75%): *Workstation designed to help stop your A1200 disappearing under a pile of disks and other rubbish.*
Contact: Premier Micros, 0480 300738.

A1500 (£230.00 to £450.00 *AF*11 P82): *DIY kit that enables you to turn an A500 into an A2000.*
Contact: Checkmate Digital, 0707 664684.

A2058 (£149): *Commodore's 2Mb RAM card does not compare well with the cheaper opposition.*
Contact: Commodore UK, 0628 770088.

A2630 (£920): *Accelerator card for A1500 and A2000 that comes as standard with a 25 MHz 68030 chip, a 68882 maths co-processor, 4 Mb of 32-bit RAM and room for further 32-bit RAM expansion.*
Contact: Commodore UK, 0628 770088.

A5000 (£295.00, *AF*20 P132): *32-bit accelerator card with FPU (Floating Point Unit) and 32-bit RAM options.*
Contact Solid State Leisure 0933 650677. Read the piece about SSL on page 31 first.

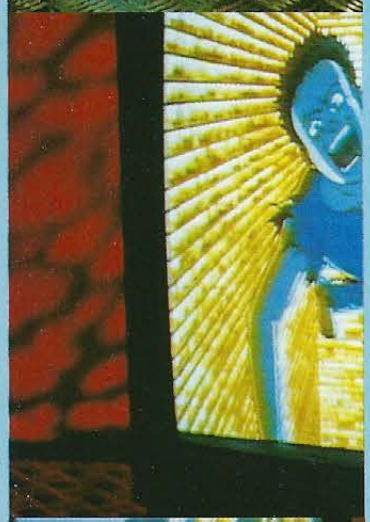
ADAT (£3,499): *Digital eight-track studio that produces excellent sound quality.*
Contact: Sound Technology, 0462 480000.

ADD501 (£21): *512K trapdoor RAM expansion for the A500. A good buy at a good price.*
Contact: Ashcom, 0530 411485.

ADDAX (£125): *Bus port RAM expansion for the A500 that comes as standard with 2Mb of Fast RAM and can be expanded up to 8Mb.*
Contact: Ashcom, 0530 411485.

AEHD Disk Drive (£140.00, *AF*22 P145): *High density floppy disk drives that can store 1.52 megabytes on a single disk.*
Contact: Applied Engineering, 0101 214 241 6060.

ALF3 Hard Drive (£299.99, *AF*30 P196, 82%): *High-quality, but expensive hard disk card. The cost quoted here is without a hard disk unit.*
Contact: Gasteiner, 081-365 1151.



AMINet (£59.99, AF37 P170, 85%): *Budget networking system that enables you to connect Amigas and exchange data.*
Contact: Meridian, 081-543 3500.

AX128 (£199): *RAM expansion card for the A1200 that comes as standard with 4Mb of RAM, and can be expanded up to 8Mb.*
Contact: Ashcom, 0530 411485.

AX601 (£45): *1Mb RAM expansion board for the A600 that features a RAM disable switch.*
Contact: Ashcom, 0530 411485.

Action Replay (£59.99, AF12 P88): *Original version of the utility cartridge that enables you to freeze programs and save graphics and sound data.*
Contact: Datel, 0782 744707.

Action Replay II (£59.99 to £69.99, AF20 P111): *Update of the utility cartridge.*
Contact: Datel, 0782 744707.

Action Replay III (£59.99, AF38 P152, 90%): *Third version of the utility/freezer cartridge.*
Contact: Datel, 0782 744707.

AddHard (£279, AF44 P50, 30%): *Relatively unimpressive hard disk drive for the A500.*
Contact Ashcom, 0530 411485.

Alfa Data Optical Mouse (£35.95, AF38 P159, 64%): *Expensive optical mouse.*
Contact: Golden Image UK, 081-365 1102.

Alfa Data Scanner (£335.00, AF40 P164, 79%): *Expensive mono hand-held scanner, that performs well, but at a price.*
Contact: Gasteiner, 081-365 1151.

Alfa Data TKB-MT (£29.99, AF28 P193, 71%): *Good-looking, but poorly-designed trackball. Virtually impossible to use if you are left-handed.*
Contact: Golden Image UK, 081-365 1102.

Alfa Data TKB-MT-A (£39.99, AF28 P193, 86%): *One of the better, if not the best, trackballs seen in the Amiga Format offices.*
Contact: Golden Image UK, 081-365 1102.

AlfaPower HD (£199-£349, AF45 P130, 87%): *Good-value hard disk drive available in 40Mb and 120mb sizes.*
Contact: Golden Image UK, 081-365 1102.

Amiga Phazer (£39.99, AF25 P93): *One of the more successful light guns for the Amiga. The price here includes two games,* Duck Hunt *and* Orbital Destroyer.
Contact: Trojan, 0554 777993.

Amiga Pro Sample Studio II (£69.99, AF24 P138, 43%): *Expensive and fiddly music sampler package. You can buy more for less.*
Contact: Datel Electronics, 0782 744707.

Amiga Tutor Video (£19.99, AF18 P248): *Useful tutorial video designed for A500 users, but now difficult to get hold of.*
Contact: Audition, 0780 55888

Amitek 600 (£45): *Well-designed 1Mb RAM expansion card for the A600 has a battery-backed clock.*
Contact: Silica Systems, 081-309 1111.

Amstrad SM 2400 (£125.00, AF38 P137, 77%): *Good-value, bog-standard V22bis modem.*
Contact: Centresoft, 021-625 3388.

Aries 2000 (£129): *A2000 RAM expansion board for the A1500 and A2000 has 2MB of RAM and can be expanded to 8Mb.*
Contact: Power Computing, 0234 843388.

Atari ST Emulator (£30.00 Approx, AF18 P229): *Software-based Atari ST emulator. Good value for money.*
Contact: N/A.

Atari Trak-Ball (£28.99, AF10 P116): *The Amiga version of Atari's famous track ball.*
Contact: N/A.

Audiomaster IV (£75.00, AF36 P161, 94%): *One of the best sampling programs available for the Amiga. Includes time stretch, pitch conversion, retune and a host of other effects.*
Contact DMI Marketing, 0753 686000.

B5000-25: *25 MHz, 68030-based accelerator card for A500 and A1500.*
Contact Solid State Leisure, 0933 650677.
But first read the piece about SSL in the accelerators section.

BASEboard (£299.95, AF18 P236): *RAM expansion card for the A500. Installing it involves carrying out some major Amiga surgery.*
Contact: N/A.

Bodega Bay (£350.00, AF23 P171): *A500 expansion case that enables A500 owners to upgrade to similar specifications to the A1500 and A2000.*
Contact: Amiga Centre Scotland, 0896 87583.

Boing! Mouse (£79.95, AF5 P69): *Optical mouse.*
Contact: Amiga Centre Scotland, 0896 87583.

Book TV (£249.99, AF38 P120, 85%): *Stylish TV/monitor with excellent sound and picture quality.*
Contact: Philips, 081-689 4444.

Break! (£19.99, AF6 P138): *Device that enables you to slow down software, making games playing easier. This price included two free PD game.*
Contact GTS, 0707 664654.

Brush Mouse (£29.99, AF39 P167, 65%): *Cross between a mouse and a lightpen. Takes a lot of getting used to.*
Contact: First Choice Computers, 0532 319444.

Bug, The (£14.99, AF29 P125, 92%): *Classic joystick.*
Contact: Cheetah, 061 707 7080.

CBM 1084S (£299.99, AF38 P122, 80%): *Reasonable quality monitor from Commodore.*
Contact: Calculus, 0543 251275.

CBM 1085S (£299.99, AF38 P122, 75%): *Commodore monitor with virtually identical specifications to the CBM 1084S.*
Contact: Calculus, 0543 251275.

CBM 1960 (£563.00, AF38 P124, 72%): *Commodore's multisync monitor can handle all Amiga*

screen modes but is a touch disappointing when it comes to picture quality and price.
Contact: Calculus, 0543 251275.

CBM 21MP (£2,197, AF38 P124, 75%): *Expensive monitor that doesn't really warrant that breathtaking price tag.*
Contact: Calculus, 0543 251275.

CBM A590 (£289.00, AF28 P200, 69%): *CBM's "official" 20Mb hard drive for the Amiga. Although the price is attractive, there are better hard drives available.*
Contact: Evesham Micros, 0386 765500.

CBM MPS1550C (£160, AF39 P145, 48%): *Commodore's 9-pin colour dot matrix printer has little to recommend it. It is slow, noisy and there's only one font.*
Contact: Silica, 081-309 1111.

CM8844 Mk2 (£229.99, AF38 P123, 92%): *Outstanding value-for-money Philips monitor.*
Contact: Philips, 081-689 4444.

CMI MIDI 1 (£29.99, AF6 P139): *A500 midi interface. High quality at a low price.*
Contact: Third Coast Technology, 0257 472444.

CSA Derringer (£299): *Accelerator board for A500 and A1500 with a 25MHz 68030 and 1Mb of 32-bit RAM. Replacement for the MegaMidget Racer.*
Contact: Omega Projects, 0924 682206.

Canon BJ10sx (£227.99): *Excellent portable bubblejet printer with battery power supply.*
Contact: Canon, 0800 252223.

Canon BJ20 (£299.00, AF39 P146, 95%): *Excellent bubblejet printer that produces results almost up to laser standards.*
Contact: Canon, 0800 252223.

Canon BJ300 (£499.00, AF39 P146, 78%): *Bubblejet printer that produces good results, but is let down by limited number of fonts.*
Contact: Canon, 0800 252223.

Canon BJ-200 (£349.99, AF 48, 95%): *This bubblejet printer hasthe same print mechanism as the BJ10sx, but is faster and comes with a 50-sheet paper feeder.*
Contact: Canon, 0800 252223.

Canon LBP-4 Plus (£1,175): *Expect excellent print quality from this laser printer.*
Contact: Canon, 0800 252223.

Cherry MK.IV Tablet (£450, AF28 P195, 91%): *Well-designed digitising tablet that performs well, and is particularly attractive to the professional user.*
Contact: N/A.

Citizen 224 (£216, AF39 P144, 78%): *Easy-to-use, if unspectacular 24-pin dot matrix printer.*
Contact: Citizen, 0753 584111.

Citizen 240C (£435, AF39 P145 90%): *Outstanding 24-pin dot matrix colour printer. Quiet with good print quality.*
Contact: Citizen, 0753 584111.

Citizen Notebook (£380, AF39 P143, 82%): *This 24-pin dot matrix printer was designed as a portable printer, it's small (at the size of a box of Jaffa cakes), but the quality is so good it can give the best 24-pins a run for their money.*
Contact: Citizen, 0753 584111.

Citizen ProJet (£583, AF39 P147 85%): *Inkjet printer.*
Contact: Citizen, 0753 584111.

Citizen Swift 24x (£573, AF39 P143, 60%): *Expensive wide carriage 24-pin dot matrix printer.*
Contact: Citizen, 0753 584111.

Citizen Swift 9/9x (£280, AF39 P142, 84%): *One of the better 9-pin dot matrix printers.*
Contact: Citizen, 0753 584111.

Clarity 16 (£149.95, AF44 P149 41%): *A distinctly unimpressive stereo sound sampler.*
Contact: Microdeal, 0726 68020.

ColourPic Plus (£699, AF40 P188, 91%): *Impressive, if pricey, digitiser for the A500.*
Contact: JCL, 0892 518181.

Colourpic (£499, AF38 P145, 82%): *Real-time colour digitiser.*
Contact: JCL, 0892 518181.

Commodore A570 CD Interface (£349, AF39 P32, 92%): *Commodore's CD drive that enables you to use CDs rather than floppy disks with your A500.*
Contact: Silica, 081-309 1111.

Complete Colour Solution (£179, AF38 P144, 92%): *High value combination of Vidi-Amiga digitiser, Vidi-Chrome, and an RGB splitter.*
Contact Rombo, 0506 414631.

Concept Keyboard (£246.40, AF26 P137, 85%): *Keyboard designed for people with special educational needs.*
Contact: DMI Marketing, 0753 686000.

Contriver 5-in-1 Mouse (£29.99, AF23 P172): *Mouse that is compatible with the Amiga, Atari and three different kids of PC.*
Contact: Power Computing, 0234 843388.

Contriver Mouse (£15, AF38 P158, 72%): *Unremarkable, but good value mouse.*
Contact: Power Computing, 0234 843388.

Counter Display (£34.99, AF6 P138): *External disk drive display panel – helps you to see where on disk your Amiga is reading.*
Contact: GTS, 0707 664654.

Cube, The (£279.99 to £329.99, AF38 P120, 90%): *High-quality monitor. The prices are for 15-inch and 17-inch versions.*
Contact: Philips, 081-689 4444

DA-R100 (£399): *Budget portable home studio. A good buy.*
Contact: Sound technology, 0462 480000.

DA88 (£3,999): *Digital eight-track studio that offers outstanding sound quality.*
Contact: Tascam, 0923 819630.

DAATAmouse (£39.99, AF23 P172): *Stylish mouse with 360 dpi resolution.*

Contact: Pandaal Marketing, 0234 843355.

DCM100 (£499): *Rack-mountable line mixer with eight stero channels designed for use with electronic instruments.*
Contact: Fostex, 081-893 5111.

DCTV (£499, AF31 P126, 90%): *Outstanding 24-bit colour graphics hardware/software combo, enables you to digitise, process, paint and animate true colour images. Its software,* DCTVPaint *is also quite outstanding – so there!*
Contact: Silica, 081-309 1111.

DG40 (£149.99, AF20 P129): *Automatic RGB splitter.*
Contact: Third Coast Technology, 0257 472444.

DaataScan Pro GS (£109.95, AF36 P126, 75%): *Good-quality hand-held mono scanner.*
Contact: Pandaal Marketing, 0234 843355.

Dataflyer 500 (£349.99, AF30 P195, 65%): *Hard disk drive.*
Contact: Trilogic, 0274 691115.

Datel Digitiser (£199.99, AF38 P144, 66%): *Functional, but unspectacular real-time colour digitiser at a good price.*
Contact: Datel Electronics, 0782 744707.

Datel Real Time (£199.99, AF40 P192, 66%): *Real-time digitiser.*
Contact: Datel, 0782 744707.

Datel Video Digitiser 2 (£89.99, AF38 P144, 90%): *Mono digitiser. Easy to use, provides good results.*
Contact: Datel, 0782 744707.

DigiView 4.0 (£150): *Low cost, high performance digitiser.*
Contact: HB Marketing, 0753 686000.

Dream GMX-1 (£249, AF44 P142, 86%): *Midi sound module.*
Contact: Zone Distribution, 071-738 5444.

ED PAL Genlock (£350, AF30 P222, 85%): *Good value-for-money genlock.*
Contact: Electronic Design, 0257 472887.

Elan Performer (£49.95, AF6 P157): *Presents garaphics and animations of different formats.*
Contact: DMI Marketing, 0753 686000.

Emplant (£300, AF48 P120, 85%): *One of the newest Macintosh emulators. It can be tricky to set up, but produces impressive results.*
Contact: Blittersoft, 0908 220196.

Emulator 2 (£39.95, AF23 P160): *Emulator that enables you to run BBC software on the Amiga.*
Contact: DMI Marketing, 0753 686000.

Epson EPL-4000 (£799 AF39 P147, 80%): *Laser printer.*
Contact: Epson, 0800 220546.

Epson GT-6000 (£1,175, AF38 P154, 97%): *The* ***Amiga Format*** *rating says it all. This flatbed colour scanner and software is truly excellent.*
Contact: Epson, 0800 220546.

Epson GT-6500 (£799 + VAT AF44 P154, 97%): *Exceptionally high-quality colour flatbed scanner. Current version of the GT 6000.*
Contact: Epson, 0800 220546.

Epson LQ100 (£245): *Good quality 24-pin dot matrix printer with a wide range of fonts.*
Contact: Epson, 0800 220546.

Epson LQ570 (£399, AF39 P144, 80%): *Good-quality 24-pin dot matrix printer.*
Contact: Epson, 0800 220546.

Epson LX100 (£189): *Perhaps the only, nine-pin dot matrix with a built in cut sheet feeder.*
Contact: Epson, 0800 220546.

Epson LX400 (£199, AF39 P142, 50%): *Below average 9-pin dot matrix printer.*
Contact: DMI Marketing, 0753 686000 or Epson, 0800 220546.

Epson SQ-870 (£659): *Impressive, but expensive inkjet printer.*
Contact: DMI Marketing, 0753 686000 or Epson, 0800 220546.

External CDTV (£299.95, AF44 P51, 83%): *External hard drive for CDTV.*
Contact: ZCL, 0543 414817.

Fast Fax (£688.85, AF11 P145): *Fax package that enables you to send and receive faxes on your Amiga.*
Contact: Microdeal 0726 68020.

Fast Trak (£599, AF28 P201, 82%): *Hard drive.*
Contact Third Coast Technology, 0257 472444.

Firepower (£17.99, AF6 P138): *Joystick add-on, enables you to switch normal and rapid fire.*
Contact: GTS, 0707 664654.

Fostex R8 (£1,551): *Eight-track multi-tracker for Amiga musicians.*
Contact: Fostex, 081-893 5111.

Frame Grabber (Around £500, AF7 P107): *Video digitiser.*
Contact: Marcam, 0604 790466.

Frame Grabber V2.0 (£500, AF17 P233): *Video digitiser. Software extensively updated after original US Frame Grabber release.*
Contact: Marcam, 0604 790466.

FrameMachine (£379): *Fast and impressive digitiser.*
Contact: MicroPace, 0753 551888.

Framegrabber 256 (£599, AF38 P145, 82%): *One of the best real-time colour digitisers. But expensive and difficult to find.*
Contact: Marcam, 0604 790466.

FreeWheel (£39.95, AF44 P105, 69%): *Steering wheel input device in analogue and digital (£29.95, 52%) form.*
Contact: RC Simulations,0272 550900.

Fujitsu B100 (£349): *Impressive but expensive inkjet printer.*
Contact: Fujitsu, 081-573 4444.

Fujitsu DL1100 (£350, AF39 P146, 76%): *24-pin dot matrix colour printer.*
Contact: Fujitsu, 081-573 4444.

G2 Genesys (£799): *new genlock from G2 that offers excellent picture quality at a good price.*
Contact G2 Systems, 0252 737151.

G2 Illusion (£995): *new chroma-key system that promises much, and should do at this price.*
Contact G2 Video Systems, 0252 737151.

G2 Video Centre Plus (£975): *Very (costly) good quality genlock.*
Contact: G2 Systems, 0252 737151.

G2 Video Centre Plus: (£495): *Good entry level genlock at a reasonable price.*
Contact: G2 Systems, 0252 737151).

G2 Videocentre VC3 (£1,700, AF30 P222, 82%): *Broadcast quality genlock with a price to match. However, much of G2s video hardware has been drastically reduced in price of late, so you shouold find them at well below the recommended release prices.*
Contact: G2 Systems, 0252 737151.

GST Gold Genlock (£500, AF17 P185): *Basic, no frills genlock.*
Contact: Third Coast Technology, 0257 472444.

GVP A1230 Turbo Plus (£299): *Accelerator for A1200, has a 40 MHz 68030, a 68882 maths co-processor and space for up to 32 Mb of 32-bit RAM. Recommended.*
Contact: Silica, 081-309 1111.

GVP A530 (£499, AF38, P36, 94%): *Hard drive and accelerator that plugs straight on to the side of an A500. Excellent package, just reduced in price by almost £150.*
Contact: Silica, 081-309 1111.

GVP G-Force 030 (£399): *Accelerator card for the A1500 and A2000 that comes as standard with a 25 MHz 68030 chip that can be upgraded to to 40 or 50 MHz.*
Contact: Silica, 081-309 1111.

GVP G-Force 040: (£1,299): *Accelerator card for the A2000, currently the fastest processor accelertor for any Amiga. It offers up to 64 Mb of 32-bit RAm based around a 28 MHz 68040 chip.*
Contact: Silica,

081-309 1111.

GVP G-Loc (£349): *Very high quality genlock. Recomended.*
Contact: Silica, 081-309 1111.

GVP HC8ll (£149): *RAM expansion board for the A1500 and A2000, unpopulated as standard, but can be expanded up to 8Mb.*
Contact: Silica Systems, 081-309 1111.

GVP Impact 2 (£499, AF28 P200, 92%): *High-cost, high-quality hard disk drive for the A500.*
Contact: Silica, 081-309 1111.

GVP SCSI/RAM Plus ((£199): *RAM expansion card for the A1200 that comes as standard without any RAM, but can be expanded up to 8Mb. Expensive.*
Contact: Silica Systems, 081-309 1111.

General MIDI SC-7 (£273): *Budget synth module.*
Contact: Roland, 0252 816181.

Geni Trac Trackball (£49.95, AF38 P160, 82%): *Probably the best of the trackballs.*
Contact: ZCL, 0543 414817.

Genitizer GT-906 (£129.99, AF28 P194, 73%): *Digitising tablet. Reasonable value.*
Contact: Datel Electronics, 0782 744707.

Genius Happy Mouse (£14.95, AF38 P158, 82%): *Good price for a good mouse.*
Contact: Indi Direct, 0543 419999

Golden Image Mouse (£14.99, AF38 P158, 90%): *Came equal first with the Mega Mouse in the AF mouse round-up.*
Contact: Ladbroke Computing, 0772 203166.

Golden Image Optical Mouse (£39.99, AF23 P172): *Optical mouse from Golden Image.*
Contact: Ladbroke Computing, 0772 203166.

Gravis Mousestick (£69.95, AF14 P145): *Combination of mouse and joystick.*
Contact: RC Simulations, 0272 550900.

HD CDTV (£699, AF41 P197, 45%): *CDTV hard drive package including CDTV, floppy disk drive, keyboard and hard drive.*
Contact: Calculus, 0543 251275.

HP PaintJet (£820, AF41 P200, 82%): *Colour inkjet printer.*
Contact: Hewlett Packard, 0344 369222.

Ham-E (£300, AF27 P44, 90%): *Graphics display enhancer.*
Contact: Checkmate Digital, 0707 664684.

Hyundai HMD2401 (£99): *Basic, cheap 2400 baud modem. An ideal choice for beginners.*
Contact: Personics, 0252 311332.

ICD Adspeed (£200, AF20 P131,): *Budget priced 68000 CPU replacement/accelerator card that did little to impress* ***Amiga Format*** *reviewers.*
Contact: Third Coast Technology, 0257 472444.

ICD Novia 30i (£399, AF27 P142, 73%): *Mini hard disk drive.*
Contact: Power Computing, 0234 843388.

Impact Vision 24 (£1,300): *High-quality 24-bit graphics card that comes with an impressive array of software. (see below).*

Impact Vision 24 v2 (£999, AF48 P116, 87%): *Updated and improved version of IV24. New software is particularly good.*
Contact: Silica, 081-309 1111.

IVS Trumpcard (£399, AF28 P205, 66%): *High-price for basic hard disk drive.*
Contact: Third Coast Technology, 0257 472444.

Impact II Combo Board (£1,495, AF26 P132, 95%): *When it was released in Autumn 1991 this outstanding GVP product was the fastest, and most expensive, A500 accelerator available.*
Contact: Power Computing, 0234 843388.

Jin Mouse (£9.99, AF38 P158, 30%) *Probably still the cheapest mouse you'll find. But look at that rating.*
Contact: Ladbroke Computing, 0772 203166.

KCS PC Powerboard (£299, AF15 P185): *Hardware based PC emulator. Now available for under £100.*
Contact: Bitcon, 091 490 1919.

Logimouse Pilot (£27, AF25 P155, 85%): *Lightweight, popular mouse.*
Contact Logitech Ltd, 0344 891313.

Logitech Kidz Mouse (£32.00, AF38 P158, 77%): *Overpriced kids novelty mouse that actually performs quite well.*
Contact Logitech Ltd, 0344 891313.

MBZ1200C (£145.95): *RAM expansion board for the A1200 that can be expanded up to 8MB. it comes as standard without any RAM, so bear this in mind when you compare prices.*
Contact: MicroPace UK, 0753 551888.

MX100 (£1,199): *Akai's keyboard is for serious music-makers.*
Contact: Akai, 081-897 6388.

Magneto Optical (£999.95, AF44 P47 95%): *Optical disk drive capable of storing 120Mb of data on each disk.*
Contact: Power Computing, 0234 843388.

Marconi RB2 Trackball (£49.95, AF38 P160, 48%): *Expensive and clumsy trackball.*
Contact: Silica, 081-309 1111.

MasterBoard VB1 (£1,750, AF21 P161): *24-bit graphics digitiser and display card. Now very dated.*
Contact: G2, 0252 737151.

Medusa ST Emulator (£150, AF16 P131): *Emulator for the Atari ST, don't ask us why.No longer available as far as we know.*
Contact: N/A

Mega Miget Racer (£375, AF18 P235): *Accelerator card fitted with 68030 central processing unit.*
Contact: Bytes'n'Pieces, 0253 795376.

Mega Mouse (£12.95, AF38 P159, 90%): *Came equal top of the AF mouse round-up along with the Golden Image Mouse.*
Contact: Golden Image UK, 081-365 1102.

Microverb 3 (£249): *Digital reverb unit that can give depth to your musical mixes.*
Contact: Sound Technology, 0462 480000.

MiniGEN (£99.95, AF30 P221, 65%): *Cheap poor quality entry level, basic genlock.*
Contact: N/A.

NEC 4FG (£599.99, AF38 P124, 93%): *Needs a flicker fixer, but this (expensive) monitor is one of the best available.*
Contact NEC, 0345 300103.

Naksha Mouse (£29.24, AF38 P159, 89%): *Still a lot of people's favourite mouse.*
Contact: Silica, 081-309 1111.

Nordic Power (AF12 P88): *Freezer cartridge that enables you to save graphics and sound data from programs.*
Contact: N/A.

Novia 30i (£399, AF28 P202, 73%): *A very average quality hard disk drive.*
Contact: Power Computing, 0234 843388.

Oki OL400 (£899, AF43 P148, 90%): *High-quality LED (Light Emitting Diode) printer, a new technique that provides excellent results.*
Contact: Oki, 0800 525 585.

Oki OL400e (£499): *redesign of the OL400 LED printer. Good buy.*
Contact: Oki, 0800 525 585.

Oktagon 500 (£249, AF28 P201, 80%): *Good reliable hard disk drive. £499 with 52 Mb drive.*
Contact: Gasteiner,

081-365 1151.

OpalVision (£800, AF41 P178, 96%): *Outstanding true colour art package. True brilliance.*
Contact: Calculus, 0543 251275

PC Powerboard (£299.00, AF9 P83): *Hardware-based PC emulator for the A500.*
Contact: Bitcon, 091-490 1919.

PC-150 (£139): *Roland's keyboard is a good buy for Amiga music-makers the world over.*
Contact: Roland, 0252 816181.

PC1204 (£185): *A1200 RAM expansion with 4Mb of 32-bit RAM, a battery-backed clock and space for a maths co-processor.*
Contact: Power Computing, 0234 843388.

PC501 (£29.95): *512K RAM upgrade for the A500.*
Contact: Power Computing, 0234 843388.

PC501 Plus (£35.95): *This 1Mb trapdoor RAM expansion for the A500 Plus is one of the best around.*
Contact: Power Computing, 0234 843388.

PC601 (£39.95): *1Mb RAM expansion card that fits to the A600 via the trapdoor slot.*
Contact: Power Computing, 0234 843388.

PPS2 (£185): *If you need a sync' box to enhance your Amiga music making, this one is probably the best for the average user.*
Contact: Sound Technology, 0462 480000.

Pace Linnet 24 (£175): *This 2400 baud modem would be an excellent entry-level buy, if it was a touch on the cheaper side.*
Contact: Silica Systems, 081-309 1111.

Pace Linnet Quad(£349.00 + VAT, AF38 P137, 65%): *High price for a basic modem.*
Contact: Pace Micro Technology, 0274 532000.

Pace Ultralink Quad (£399.00 + VAT, AF38 P136, 66%): *Nice modem, shame about the price.*
Contact: Pace Micro Technology, 0274 532000.

Panasonic KXP 1123 (£282, AF39 P143, 80%): *Good-quality 24-pin dot matrix printer.*
Contact: Frontline, 0256 463344.

Panasonic KXP 2180 (£199): *Latest nine-pin dot matrix from Panasonic with a quiet mode that makes it almost as quiet as an inkjet. Good buy.*
Contact: Frontline, 0256 463344.

Panasonic KXP1124i (£340, AF39 P144, 88%): *Regarded by* ***Amiga Format*** *as one of the best 24-pin dot matrix mono printers money can buy.*
Contact: Frontline, 0256 463344.

Panasonic KXP1170 (£218, AF39 P142, 80%): *Easy-to-use 9-pin dot matrix printer.*
Contact: Frontline, 0256 463344.

Pandaal Daatascan (£189.95, AF23 P169): *Hand-held scanner.*
Contact: Pandaal Marketing, 0234 843355.

Pandaal Mouse (£15): *A good solid mouse at a very good price.*
Contact: Pandaal, 0234 841223.

Phantom (£249): *Dr T's MIDI interface with a SMPTE read/write generator – that's impressive innit.*
Contact: Zone Distribution, 071-738 5444.

Philips CM8833 Mk2 (£299): *One of the best single scan monitors available for this or any other computer. Tim's even got one.*
Contact: Philips, 081-689 4444.

Phonic BkX-8800 (£199): *Eight-channel mixer with a MIDI splitter, aimed quite accuratley at the home recording market.*
Contact: Audio Awareness, 081-598 8081.

Pocket Biscom (£249 + VAT, AF38 P136, 63%): *Portable modem.Useful, but expensive.*
Contact: Daytona Comms Ltd, 0494 474799.

Podscat PT-3030 (£178.80, AF28 P194, 86%): *Good value for money digitising tablet.*
Contact: DMI Marketing, 0753 686000.

Power 8Mb Board (109): *Bus port expansion for the A500 that can be expanded up to 8Mb.*
Contact: Power Computing, 0234 843388.

Power Colour Hand Scanner (£239, AF44 P155, 79%): *Budget hand-held colour scanner.*
Contact: Power Computing, 0234 843388.

Power HD Drive (£99.95, AF48 P123, 93%): *Excellent value high density external disk drive.*
Contact: Power Computing, 0234 843388.

PowerScan Pro2 (£99.99, AF36 P127, 90%): *Reckoned by* ***Amiga Format*** *to be the best hand-held mono scanner available for the Amiga at this present moment in the history of person-kind.*
Contact: Power Computing, 0234 843388.

Practical Solutions Cordless Mouse (£25): *Avoid cord snagging with a mouse that uses infra-red technology to read movement data.*
Contact: Silica, 081-309 1111.

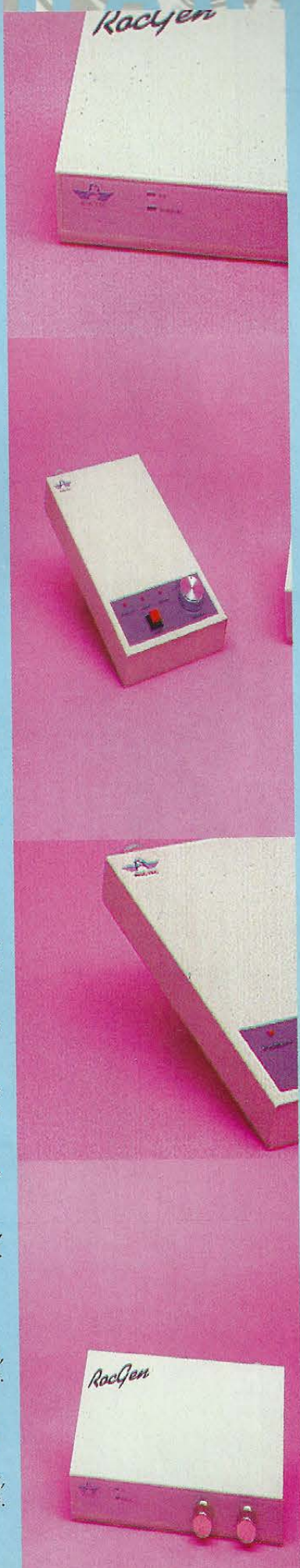
Prima 105 (£499, AF27 P143, 82%): *Mini hard disk drive.*
Contact: Power Computing, 0234 843388.

Pro Scanlab II (£599 + VAT, AF27 P50, 72%): *Colour scanner and 24-bit board.*
Contact: ASDG, 010 608 273 6585.

ProRAM 501 (£19): *512K trapdoor RAM expansion card for A500. Yes, another one, there are loads of them you know. We mention the best ones in our round-up on pages 24-27.*
Contact: WTS Electronics, 0582 491949.

ProRAM A601 (£38): *RAM expansion card that doubles the amount of Chip RAM on an A600 to 2Mb.*
Contact: WTS Electronics, 0582 491949.

R-70 (£645): *This Roland drum machine is notable for its great sound and flexibility. Ideal for Amiga users who are thinking of getting into the Ms Glennie world of precussive musicianship and who have a few quid to chuck at the problem too.*
Contact: Roland, 0252 816181.



Reference 40/100 (£229, AF44 P46, 84%): *Value-for-money hard disk drive available in 40Mb or 100Mb size.*
Contact: Evesham Micros, 0386 765500.

Rendale 8802 (£189, AF30 P222, 66%): *Solid, basic genlock.*
Contact: Marcam, 0604 790466.

Rendale Super 8802 (£599.99, AF30 P219, 69%): *Reasonable genlock aimed at the semi-professional/professional market.*
Contact: Marcam, 0604 790466.

Ricoh LP1200 (£821, AF41 P200 92%): *Good price for an excellent laser printer.*
Contact: Silica, 081-309 1111.

RocGen Plus (£199.99, AF30 P221, 70%): *Reasonably good-quality genlock.*
Contact: Silica, 081-309 1111.

RocGen RG 300C (£119, AF30 P221, 72%): *Good-value, budget genlock for the Amiga.*
Contact: Silica, 081-309 1111.

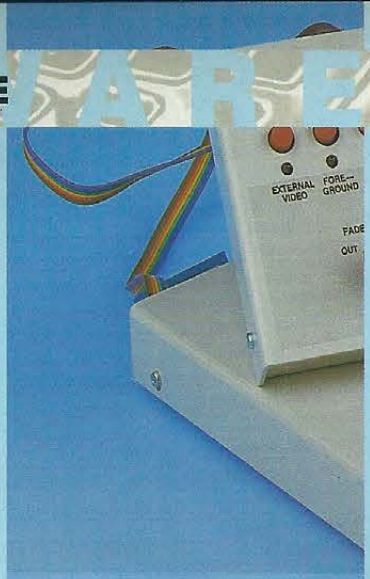
RocKey (£399, AF42 P210, 90%): *Impressive chroma-key system.*
Contact: Silica, 081-309 1111.

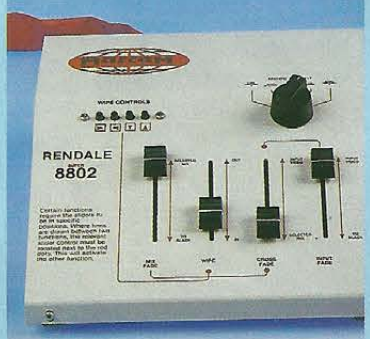
Roctec Mouse (£16.99, AF38 P159, 74%): *Reasonable value mouse. But not the best.*
Contact: Silica, 081-309 1111.

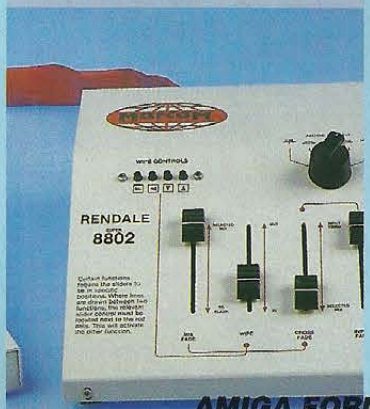
S S01 (£799): *Akai sampler that offers 16-bit (CD-quality) sampling, a 1Mb expandable memory and eight-voice multi-timbrality.*
Contact: Akai, 081-897 6388.

S1100 (£3,299): *Top-of-the-range sampler with 24-bit processing.*
Contact: Akai, 081-897 6388.

SPX900 (£699): *Signal processor that offers a wide range of effects for Amiga music.*
Contact: Yamaha, 0908 366700.







SR16 (ff299): *Probably the biggest selling budget drum machine. It offers233 sampled percussion sounds.*
Contact: Sound Technology, 0462 480000.

Seikosha SL90 (£182): *Latest 24-pin dot matrix from Seikosha is a cheap and cheerful performer.*
Contact: Seikosha, 0753 685873.

Seikosha SP1900 Plus (£129): *Value-for-money nine-pin dot matrix printer.*
Contact: Seikosha, 0753 685873.

Seikosha SP2400 (£235, AF39 P143, 89%): *Good-value 9-pin dot matrix printer.*
Contact: Seikosha, 0753 685873.

Snapshot Pro (£585, AF38 P144, 78%): *Digitiser. Unfortunately it doesn't handle colour in real time.*
Contact: Silica, 081-309 1111.

Snapshot RGB and Pro (£499, AF40 P192, 78%): *Digitiser and RGB splitter.*
Contact: Silica, 081-309 1111.

Spirit Folio 12.2 (£410.98): *Mixer with features that include phantom powering for condenser microphones.*
Contact: Soundcraft, 0707 665000.

Squik Mouse (£16.98, AF38 P159, 80%): *Good value-for-money mouse.*
Contact: Silica, 081-309 1111.

Star LC100 (£219): *Full colour nine-pin dot matrix printer. Good value for money.*
Contact: Star UK, 0494 471111.

Star LC20 (£235, AF39 P142, 65%): *Solid and reliable 9-pin dot matrix printer.*
Contact: Star UK, 0494 471111.

Star LC200 (£259, AF39 P145, 82%): *Reasonable 9-pin dot matrix colour printer.*
Contact: Star UK, 0494 471111.

Star LC24-100 (£239): *Good 24 pin dot matrix printer with an impressive range of fonts.*
Contact: Star UK 0494 471111.

Star LC24-20 (£305, AF39 P144, 85%): *Good-value 24-pin dot matrix printer with a colour option. Look for price drops.*
Contact: Star UK 0494 471111.

Star LC24-200 (£410, AF39 P146, 77%): *24-pin dot matrix colour printer. A bit pricey though.*
Contact: Star UK 0494 471111.

Star Laserprinter4 (£1,173 to £1,643, AF39 P147, 78%): *Excellent quality, but pricey laser printer. The higher price includes a Postscript emulation board.*
Contact: Star UK 0494 471111.

Star Laserprinter5 (£849): *Flash new design of the Laserprinter4.*
Contact: Star UK 0494 471111.

Star SJ48 (£583, AF39 P147, 65%): *Perfectly capable bubblejet printer.*
Contact: Star UK 0494 471111.

Star XB24-200 (£586, AF39 P145, 75%): *24-pin dot matrix colour printer.*
Contact: Star UK 0494 471111.

Superpic (£499, AF38 P145, 82%): *Same as the Colourpic real-time colour digitiser, but with genlock included.*
Contact: JCL 0892 518181.

Supra 2400zi (£125): *Modem that fits internally to all Amigas capable of handling a Zorro card. Ideal for settting up a BBS as it doesn't tie up the serial port, so several 2400zis can be plugged in at the same time.*
Contact: Power Computing 0234 843388.

Supra 9600 (£249, AF38 P137, 90%): *Excellent modem, but difficult to find.*
Contact: WTS 0582 491949.

Supra FAXmodem V.32BIS (£259, AF38 P138, 93%): *Modem that can also transmit faxes. Excellent value, excellent package.This price includes*

Ncomm *software, but fax software is an extra £40.*
Contact: First Choice Computers, 0532 319057.

Supra Fax Modem Plus (£139): *Modem that is also capable of sending and receiving faxes. Maximum speed is 2400 baud.*
Contact: Power Computing, 0234 843388.

SupraDrive 500XP (AF28 P205, 85%): *Well-received hard disk drive.*
Contact Supra, 0101-503 967 9075.

SupraModem 2400 (£149.99, AF23 P171): *Small and sturdy modem.*
Contact Supra, 0101-503 967 9075.

SupraModem 2400MNP (£179.99, AF23 P171): *As above but with MNP error correction.*
Contact Supra, 0101-503 967 9075.

SupraRAM 2000 (£119.99, AF21 P136): *A2000 RAM expansion (maximum 8Mb).*
Contact Supra, 0101-503 967 9075.

SupraRAM 500 (£69, AF21 P136): *Amiga 500 trapdoor RAM expansion (0.5Mb).*
Contact Supra, 0101-503 967 9075.

SupraRAM 500RX (£198, AF25 P119, 89%): *A500 memory pack. (This is the price for the 2Mb version).*
Contact Supra, 0101-503 967 9075.

Supradrive 2000 (£399, AF21 P133): *40Mb A1500, A200 and A3000 hard disk drive.*
Contact Supra, 0101-503 967 9075.

TG500 (£999): *Good-quality rack-mount synth module. Make music with the Amiga – turn to page 54.*
Contact: Yamaha, 0908 366700.

TKB Trackball (£34.95, AF38 P160, 71%): *Good all purpose trackball.*
Contact: Golden Image, 081-365 1102.

TV Paint (£900.00 AF27 P40, 85%): *True colour art package.*
Contact: Amiga Centre Scotland, 0896 87583.

TV Paint 1.6 (£940, AF35 P142, 89%): *True colour art package.*
Contact: Amiga Centre Scotland, 0896 87583.

TV Paint 2 (£600, AF47 P138, 92%): *Latest version of the excellent true colour paint package.*
Contact: Amiga Centre Scotland, 0896 87583.

TV-8500 (£249.99, AF25 P155, 85%): *LCD television, useful as a line monitor on a video signal – or so we said back in 1991.*
Contact: Casio, 081-450 9131.

TWIN-IT (£11.99, AF6 P139): *External disk drive connector.*
Contact: GTS, 0707 664654.

Tascam Porta 07 (£345): *Four-track cassette-based tracker for Amiga musicians.*
Contact: Tascam, 0923 819630.

Trojan Light Pen (£39.99, AF30 P198, 78%): *Light pen. One of those ideas that really should have worked better than it did. As it is very little is compatible with it. Still, that doesn't make it a bad person does it?*
Contact: Trojan, 0554 777993.

V2000 Board (£104.99, AF25 P157, 65%): *A500 internal memory pack (this price is for a 2Mb version).*
Contact: N/A.

VIDI Complete Colour Solution (£179, AF40 P187, 92%): *Digitiser package comprising the mono VIDI Amiga, RGB colour splitter hardware and the* VidiChrome *software.*
Contact Rombo, 0506 414631.

VIDI-RGB (£69.95, AF17 P237): *Full colour video digitiser.*
Contact: Rombo, 0506 414631.

VLab (£299, AF40 P187, 96%): *Digitising Zorro card for A1500/2000/3000.*
Contact: Amiga Centre Scotland, 0896 87583.

V-Lab V1.0 (£299.00, AF35 P130, 88%): *Video digitiser, not that you would have guessed. V-Lab is probably the best digitiser that is available for the Amiga at the moment.*
Contact: Amiga Centre Scotland, 0896 87583.

VXL-30 (£400): *Impressive accelerator board for the A500 and A200 that comes as standard with 25 MHz 030 chip, but no maths co-processor or 32-bit RAM.*
Contact: MicroPace UK Ltd, 0753 551888.

Vanilla Monitor (£15-inch £385, 17-inch £575, 20-inch £1,130, AF47 P 143, 85%): *Good-quality low-cost multisync monitors, but can't be used with standard Amiga modes.*
Contact: New Horizon Computers, 0989 750260.

Victory Trackball (£22, AF38 P160, 75%): *One of the better trackballs for the Amiga.*
Contact: Computer Mates, 0753 553535.

Video Backup System (£59.99, AF45 P140, 93%): *Useful, easy-to-use backup system that enables you to store data on a video tape.*
Contact: Power Computing, 0234 843388.

Video Digitiser II (£89.99, AF24 P157, 90%): *Very good value real-time mono digitiser.*
Contact: Datel Electronics, 0782 744707.

VideoMaster (£69): *Incredibly cheap digitiser. Ideal for beginners.*
Contact: MicroDeal, 0726 680020.

Videon (£99, AF38 P145, 78%): *Digitiser that's now looking its age.*
Contact: DMI Marketing, 0753 686000.

Vidi-Amiga (£129.95, AF38 P144, 77%): *Real-time mono digitiser system with some useful animation features.*
Contact Rombo, 0506 414631.

Vidi-Amiga 12 (£99.00, AF41 P188, 88%): *Excellent value-for-money colour video digitiser. Well it wasn't going to be a cucumber at that price now was it?*
Contact: Rombo, 0506 414631.

Viper 1230 (£TBA): *New A1200 accelerator that promises to be one of the market leaders, if the price is right.*
Contact: Power Computing, 0234 843388.

Vortex ATOnce (£199, AF23 P155): *PC emulator. For some strange reason, it appears that some people want to emulate those clanky pieces of out-dated, non-multitasking, grey, tedious, trainspottery daleks. Why?*
Contact: Silica, 081-309 1111.

Wavestation A/D (£1,512): *Expensive, but high-quality rack-mount synth module.*
Contact: Korg, 081-427 5377.

Xetec FastTrack (£499.00 to £1,795, AF5 P133): *Hard disk drive.*
Contact: Third Coast Technology, 0257 472444.

Zappo A601 (£54.99): *Although this 1Mb RAM expansion board for the A600 may be a good piece of kit, the price is far too high.*
Contact: Calculus, 0543 251275.

Zappo Disk Drive (£54.99, AF42 P212, 85%): *Good value external floppy disk drive.*
Contact: Calculus, 0543 251275.

Zappo Hard Drive (£299.99, AF42 P212, 87%): *A500/A500 Plus hard disk drive.*
Contact: Calculus, 0543 251275.

Zeus 040 (£799): *A500 accelerator board with a 28 MHz 040 chip that is now (unfortunately we think) difficult to find.*
Contact: MicroPace, 0753 551888.

Zoom 9001 (£249): *Signal processor that enables you to add a wealth of interesting effects to your music.*
Contact: N/A

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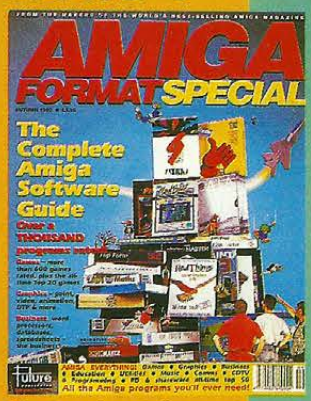

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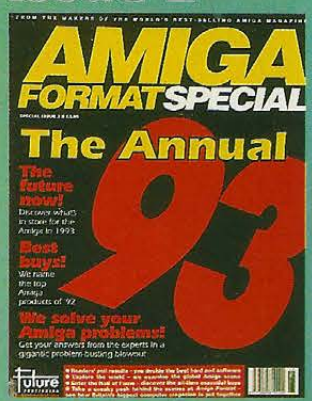

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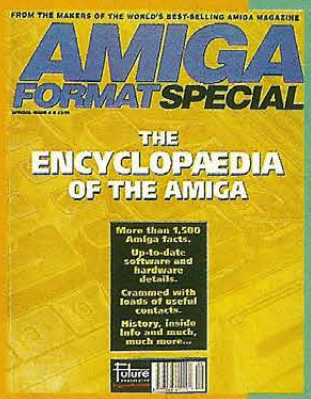

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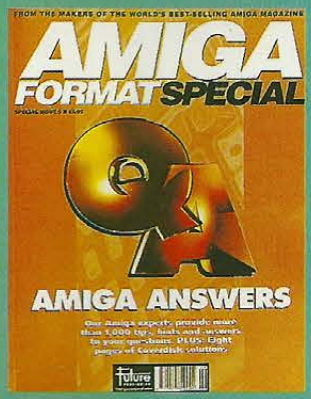

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