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NEW COMPUTER EXPRESS

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- AMOS delayed
- Monster Cartridge
- Austerlitz review

ST

- Macintosh emulator
- Colour digitiser
- Playing with Time

PC

- Clip-art collection
- Dictionary delight
- An answer for ANSI

CPC

- Monitors found!
- Beverly Hills review

SAM COUPE

- Disk drive arrives

BBC•C64•MSX ARC•XE•PCW SPECTRUM•QL

SPECIALIST COLUMNS

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Virgin cracks down on 'unofficial' machines

EURO MEGADRIVE BLOW TO FAR EASTERN IMPORTS

Buyers of Sega's 16-bit Megadrive games machine have been warned not to buy the console before its official launch in the autumn.

UK distributor Virgin/Mastertronic says the version which will be launched later this year will not be compatible with that sold in the Far East. In effect, anyone who buys a Megadrive from an importer will find that it will not run European standard cartridges.

When the Euro-Megadrive arrives it will be supported by at least twenty games, with more to follow.

Virgin is hoping to scare off anyone contemplating buying a Megadrive from 'grey importers'. These companies have been flying in Megadrives from the Far East for a year now, and have found a relatively lucrative marketplace.

Virgin will feel that profits are being snatched away by companies which have spotted the huge demand for the machine.

However, if Virgin does bring in a European machine it will effectively split the market between those owners supported by Virgin and those who will have to rely on unofficial software imports.

Virgin has not been backward in making this announcement. The firm is pitching it as a strike at grey importers. A spokesperson offered: "All grey imports which have filtered into the European market via certain distributors have been modified without Sega's authorisation in the Far East or Europe and therefore have not been checked for safety or quality... and are not guaranteed.

"We advise customers not to buy these products. People who have already bought grey imports have been purchasing over-priced software which will become increasingly difficult to source. Buyers of the official Megadrive can look forward to a large, exciting range which will include software commissioned only for the European market."

Attempts to crack down on importers are rarely a great success due to the adaptive nature of many of these companies. Anyone who does not want to wait until the official launch to buy a 16-bit Sega will, in all probability, experience no difficulty in finding a machine■



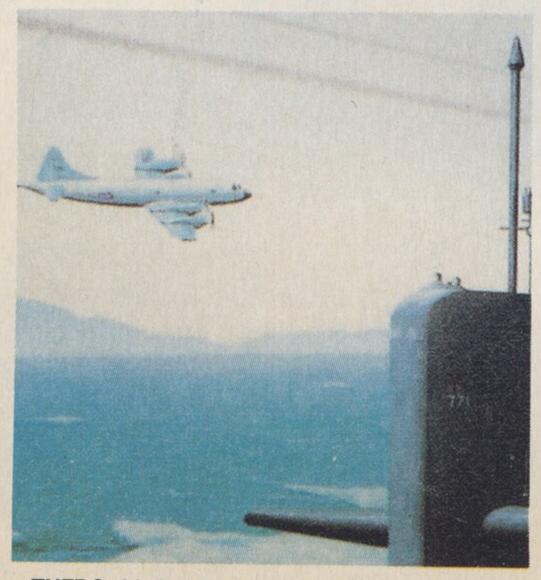
• *Megadrive: the gloves are off*

October revolution

A re-make of Grand Slam's hit game *The Hunt for Red October* is to be launched later this year.

The entirely new game will coincide with the release of the movie starring Sean Connery. Grand Slam says the film is sufficiently different from the book to warrent a re-release. While the original of two years ago was based on strategy, *October II* will feature an action-based slant.

The Hunt for Red October follows the adventures of a Soviet submarine escaping from the USSR and heading for US waters. It has to avoid aggressive NATO and Warsaw Pact vessels. ■



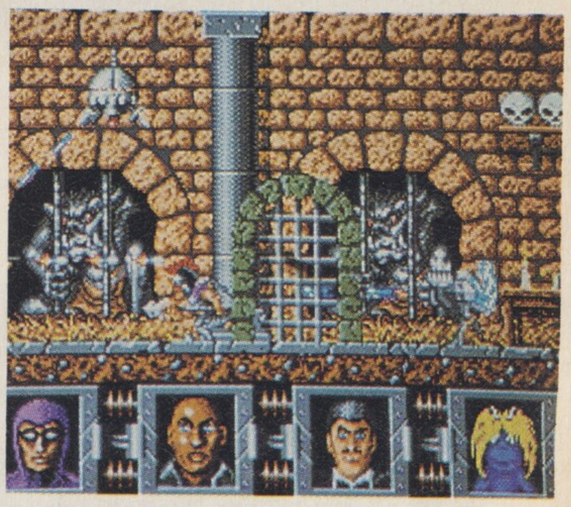
• *THFRO: It's back*

Flash of inspiration

Saturday morning television watchers will already be familiar with the Defenders of the Earth – now they're coming to computers.

The four Defenders, culled from the magic age of comics, are pitted against his unspeakable nastiness Ming the Merciless. In the game from Enigma Variations you have to help Flash Gordon, Mandrake, Lothar and The Phantom get through all manner of tricky situations.

It's an arcade-style blast-'em-up with lots of graphics and loud noises. Out in March on major formats. ■



• *Defenders: TV favourite*

Amstrad goes East

Amstrad is contemplating setting up a manufacturing base in Eastern Europe.

The company, which is at the forefront of establishing links with this emerging market, is looking at siting such a plant in East Germany.

Over the past two years Amstrad has switched its factory commitments from the Far East to the United Kingdom. At present it uses freelance assembling plants in Belfast and Edinburgh. A factory in Hong Kong was closed down last year.

"We don't actually have a manufacturing plant, we tend to use other people," offered a spokesman. "But we wouldn't be averse to setting up in East Germany provided they can keep up supplies and high quality."

Amstrad is already selling low-cost PCs to Eastern Bloc countries, where its brand name is one of the most prominent from the West ■

Research suggests a link between display units and power lines

COMPUTER MONITORS IN RADIATION SHOCK

Radiation emitted by computer monitors and other electrical appliances is being linked with disorders as disparate as miscarriages, leukaemia and cot deaths.

In the February issue of *Electronics World & Wireless World*, scientists and writers have issued urgent calls for further research into the effects of electromagnetic fields already linked with cancers and suicides among people living near electric power lines.

More than 20 pages of articles in the magazine draw together details from many dozens of scientific investigations into radiation emitted from overhead lines, underground cables and a variety of electrical equipment including computer monitors.

All of these give off exactly the same forces, which the magazine says may be highly dangerous to those exposed for long periods.

Previous research into monitors – long suspected of being linked to miscarriages, depression and headaches – has tended to centre on ionizing radiation such as X-rays, little of which get past the glass screen on the front of the monitor, and thermal (heating) effects of non-ionizing radiation.

Investigations into the safety of VDUs have inevitably proved inconclusive in the past. But the mass of accumulated evidence that the electromagnetic fields generated by such equipment have other significant biological effects strongly suggests that research should be re-opened with these forces in mind.

Statistics imply a higher risk of miscarriage for women who use electric blankets and heated water-beds. And there are tentative indications that cot deaths may be related to the victims' proximity to immersion heaters.

All of these appliances generate the same type of electromagnetic fields as monitors – as do some electric storage heaters, under-floor and in-ceiling heating systems.

In the article, *Electronics World* details research conducted over the past 30 years into electromagnetic fields and non-ionizing radiation. In particular it examines the issue of overhead power cables and numerous findings showing that people who live close to power cables suffer higher rates of leukaemia and other cancers.

American scientists Wertheimer and Leeper, for example, have found a two-fold increase in adult leukaemia in houses close to overhead wires. Such research has prompted many US States to impose 350-foot 'right-of-way' zones around cables.

Wertheimer and Leeper also discovered an alarmingly high rate of suicides among people who live near such wires. That rate was shown to vary in direct relation to increasing field strength.

Electronics World's editor, Frank Ogden, told Express that the link between power cables and VDUs is far from a tenuous one. "The electromagnetic fields emitted from overhead power cables are exactly the same as those from a normal personal computer," he said. "The rate of say, a high resolution PC is about 50Hz. The standard rate for overhead cables is precisely the same."

"The VDU gives off radiation in much the same way as a television set," explained Ogden. "When cheap computers appeared in the shops from well known manufacturers they incorporated the same technology. But people generally sit at least six feet away from their television sets. That is not the case with computers."

"The electromagnetic fields emitted from overhead power cables are exactly the same as those from a normal personal computer..."

The radiation from cathode ray tubes, created by the scanning coil which directs the electron beam at the screen, is still thought only to be harmful within a few feet of its source. Therefore, given that people don't sit up close to television sets, they will not be harmed.

But computer owners – professionals or otherwise – usually sit two or three feet from the computer screen. And often with their faces little more than a foot from the screen.

"With computers you are really sitting up close. There are substantial electromagnetic fields in that area which can cause a build up of pathogenic effects."

Disturbingly, Ogden warns that children and unborn babies are especially susceptible to leukaemia. "It seems to have an effect on young skin tissues. Pregnant women who operate VDUs are more susceptible."

Ogden went on: "Electromagnetic radiation is only dangerous through accumulated exposure over long periods of time. People who spend hours playing games or who go into work in the morning, switch on the computer, and only turn it off before they go home are at risk."

"If you have a computer, move further away from the screen. I have moved the monitor right to the back of my desk. Anyone who does this will diminish the risks associated with exposure. Other than that, buy a computer such as a laptop with an LCD screen. These are unequivocably safe."

LCD screen technology is moving fast. Major manufacturers in Japan have already produced 14-inch colour screens and, while expensive, the prices are sure to drop over the next few years.

• All the home computers featured by *Express* are already covered by Governmental guidelines concerning safety. Whether these safety factors will be revised in the light of further research into non-ionizing electromagnetic radiation remains to be seen.■

Don't panic

The implications of the research collected together by Electronics World are serious, perhaps even frightening, but they are no cause for sudden panic.

No-one is suggesting that computer users consign their machines to a dustbin and rush round to the nearest hospital to find out if their brain-cell membranes are still intact.

However, in the light of doubts expressed by scientists about the possible effects of electromagnetic fields, it is certainly worth taking a few simple precautions if you are someone who makes repeated or prolonged use of their computer.

• Don't sit too close to the screen. The strength of the EMFs is higher the closer to the machine you are. Try to sit around one metre away from your monitor where the fields are much weaker – it's probably somewhat kinder to your eyes as well.

• If spending long periods at the back of a computer, stay at least as far clear. The EMFs generated by monitors are generally stronger at the back, sides and top of the machine than they are in front of the screen.

• If you work in an environment with computer monitors, try to arrange your seating so that colleagues do not have to work within one metre of the side or back of an operator's monitor

• Turn your computer off when you are not using it – there is no point in bathing in electromagnetic fields for an hour while you read the manual for your latest software purchase.

NON-IONIZING RADIATION

KILLING FIELDS

The epidemiological evidence

The threat posed by low frequency fields emerged initially because a researcher, looking for environmental factors in childhood leukaemia, observed a link between low voltage, high current power lines and disease occurrence. Cellular evidence now supports the findings but epidemiology still leads the argument. By Simon Best.

Today living systems are exposed to a level of man-made electromagnetic fields (EMFs) in all aspects of modern life to a degree never experienced before on this planet, most of it resulting from technological advances over the past 40 years. Whether at home or at work, EM fields generated by domestic wiring, overhead high voltage lines and occupational equipment, as well as other environmental

lines, they can be criticized on a number of counts, as will be described below. Also, they are proposed only as guidelines, with decisions on new legislation left to the relevant minister; significantly, no mention of electromagnetic fields was made in the Government's recent proposed Green Bill.

Bioelectromagnetics is the study of the effects of electromagnetic fields on biological systems and an understanding of

The Americans, however, developed their guidelines, such as they were, from a model of human absorption of electromagnetic energy that took account only of the effects of heating body tissue — the so-called thermal model. In the 1950s, Professor Herman Schwan, a physicist who arrived in the US after the War and has been based at the University of Pennsylvania ever since, mainly funded by the Department of Defense, invented

debate, much of which, in the face of opposition and limited funding, has been finally carried out over the past decade.

The first well controlled Western study linking power line fields and childhood leukaemia was reported by University of Chicago researchers Drs Nancy Wertheimer and Ed Leeper in 1979, from a case control study of 344 children aged 18 and under in the Denver area. Using a wire coding and configuration assessment of the high-current electric cables near the children's homes to indicate 60Hz magnetic field exposure, they found a statistically significant increase in childhood cancer in the exposed children, a relationship that increased with proximity.

In the UK in the same year an Albrighton GP, Dr Stephen Perry, collaborated with three US researchers in New York to study suicide in the Shropshire/Staffordshire area. He measured the residential magnetic-field strength outside the front door of homes and found significantly higher fields (0.1μT or more) at those of suicides as opposed to controls (less than 0.1μT); the results were published in 1981[4]. A significant trend in risk of suicide was shown with increasing field strength.

A year later Tomenius, in Sweden, reported a two-fold increase in the incidence of childhood cancers in homes within 150m of visible 200KV power

Wertheimer and Leeper ... observed



SAM'S DRIVE ON THE SCENE



• *Sam drive: The 8-bits fight back*

Miles Gordon Technology has finally launched its disk-based sub-system for the new Sam Coupé, allowing users to dispense with potentially frustrating tape loaders.

The ultra-thin 3.5-inch drive simple slots into the relevent port at the front of the Coupé. It has been developed by Citizen and incorporates technology based on wrist-watches.

MGT says the disk drive will put the Coupé way ahead of 8-bit rivals. The firm has wisely chosen what is fast becoming the standard drive size.

It is hoped that software publishers will find it worthwhile to write games and serious software for the fledgling machine's disk system.

At present, owners are limited to delving into their collection of ageing Spectrum games — frustrating to MGT, which considers the Coupé's potential to be almost on a par with that of the ST and Amiga.

The disk drive costs £89.95 including VAT. It comes with a full disk operating system (which is not included in the machine itself.) More on 0792 791100.■

What you see is what you project

Visitors to business-oriented computer shows will be familiar with large colour projections of computer displays which enable onlookers to see how a program works.

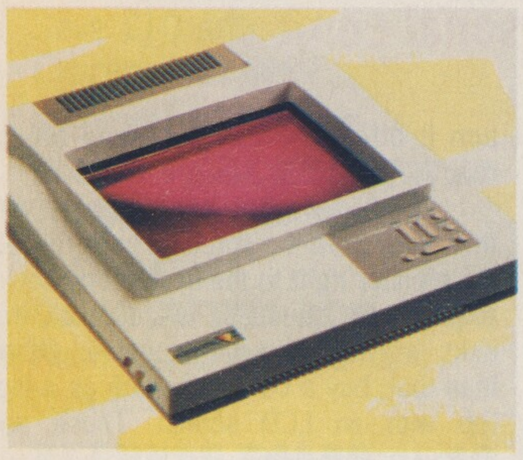
Such trickery is based on heavyweight colour data projectors costing anything from £9,000. That is, until now.

Glasgow-based CRT Displays has launched the first 'true' colour projection panel which is small, portable and costs half the price of the conventional hardware. At £4,500 it's not necessarily the essential purchase for home buyers, but for those interested in software training and demonstrations it could prove more than useful.

The 480C PC Viewer is simply placed on a standard overhead projector, the computer then displays information directly onto a wall or screen – in full colour. The 640 x 480 resolution will support any IBM or Apple-based monitor standard.

"It wasn't just the price that was a problem but the level of portability, which is paramount with this kind of product," offered CRT's Colin Maclean. "I think we're on to a winner."

He predicted that the price of portable colour projection panels will drop over the next few years. Black and white models currently sell for up to £2,500. More on 041-221 0044.■



• *PC Viewer: off the wall*

Acorn comp for the imaginative

Primary and secondary schools are being offered the chance to win a state-of-the-art interactive multimedia CD-ROM Archimedes.

Entrants are being invited to submit an original idea for a CD-ROM application in less than 50 words. It can incorporate text, graphics, audio and even animation snatches. Acorn and Next, which combined to develop the CD-ROM Archie, say it will give students the chance to experiment fully with CD-ROM. There is plenty of scope for imagination, say the organisers.

Schools are required to submit their ideas on a floppy disk of any format. Next Techniology will turn the winning entry around into a real CD-ROM application.

Get thinking and send your submission to Katherine Pierpoint, Acorn Computers, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN. Closing date is April 4. ■

• ***For a full review of the system, see page 53.***

Nixdorf nixes jobs

Troubled West German computer manufacturer Nixdorf is to shed 5,000 jobs over the next six months.

Nixdorf, one of the high fliers of the early 1980s, has recently suffered heavy financial losses brought on largely becuse of a market shift toward low-cost power PCs.

A majority stake in the company was recently taken by electronics group Siemens. Nixdorf, which specialises in larger computers, says it knew the takeover would mean a streamlining of the company.

Siemens says it has every intention of turning Nixdorf's fortunes around.■

ISRAELI CONFLICT GAME DUCKS CONTROVERSY

A potentially controversial game is to be launched which focuses on the troubles in the Middle East.

***Conflict* from Virgin/Mastertronic puts the player in the role of the Israeli Prime Minister. In the game his job is to de-stabilise neighbouring governments.**

Not surprisingly, publisher Virgin/Mastertronic is keen to play down any controversy over such a game. "It's not designed for zealous Zionists, it's just like a smaller version of *Balance of Power*. You're not rewarded for being overly violent," offered an anxious spokesman.

Virgin/Mastertronic points out that *Conflict* is "not a game with goodies and baddies – there can be no right or wrong side in any war." Nevertheless, players are not offered a choice of country.

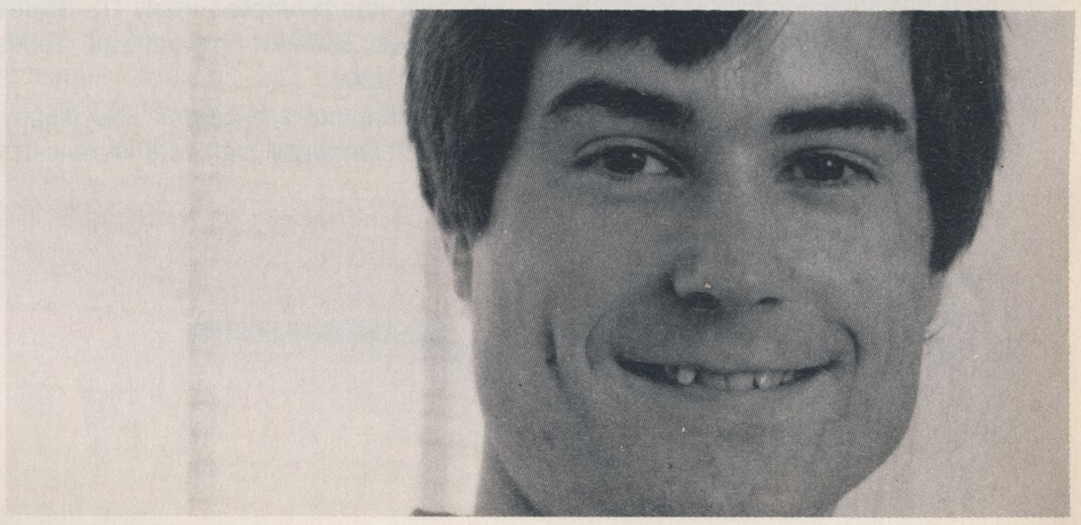
Apparently, the programmers were looking for a strategy game which centred on a real situation. They had considered South Africa and Middle America but discarded them on the grounds that "nobody would buy those".

Curiously, the company also has plans for a game based on "the British secret police". *Conflict* costs £4.99 for the PC, Amiga and ST.



• *Conflict: political*

Braben new world...



• *Conquerer: Braben help*

Fans of David Braben's work will be pleased to learn that his 3D routines are being used in a new game.

Conquerer from Rainbow Arts puts the player in charge of a 16-strong tank squadron based in western Europe. Rainbow Arts had commissioned Braben to write the 3D graphics routines because of his impressive work on hits such as *Virus* and *Elite*. Conquerer's graphics are based largely on the space game *Virus* and the similarity will not go unnnoticed.

Braben is said to be using an improved version of this routine in his long awaited *Elite II* – out some time this century.

Conquerer is launched this month on the ST, Amiga and PC.■

COMPUTER CRIME: THE SYSTEM STRIKES BACK

The full weight of the American legal system was last week threatening to fall on computer hacker Robert T Morris jnr – the first person to be convicted under the Computer Misuse Act of 1986.

Morris, an intelligent but shy 25-year old was found guilty by a US Federal jury of Computer Tampering in November 1988. He had inserted a WORM program into the Internet computer system – a network of university computers with special gateways to the massive military computer system.

His program had buried iself in the network and had tunnelled through thousands of computers, causing chaos. The estimated damage to equipment and the bill for loss of on-line time runs into millions of dollars.

Morris had not been sentenced at the time of going to press, but the maximum penalty would be five years in jail plus a $250,000 fine.

However, there is some sympathy for him following a well-argued defence, which claimed that Morris had simply been experimenting.

The former Cornell University graduate student had been fascinated by the prospect of a WORM on such a large network, but had become frightened when the program spread so quickly.

The prosecution has stated from the outset that it will not be seeking the maximum penalty.■

Airborne AIDS in Oz

The so-called 'AIDS virus' which struck British corporate PCs before Christmas must have mutated on its way to the antipodes – if a recent Australian snippet from Newsbytes is to be believed.

According to a story written by Paul Zucker and published by the US computer news service: "Some unconfirmed reports state that the virus is so powerful that the disk need not even be taken out of the mailing envelope to infect a computer."

Zucker goes on to cite Professor Hillaktic of the AIDS Research School in Eastwick as stating: "Our network froze as the mailman walked in the door with the parcel. We should have used some sort of protection."

Is this a short satire on HIV hysteria? ■

Amiga 3000: sneak preview

The so-called 'Amiga 3000' will be given its European premier to a few selected attendees in Paris next week.

Invitations have been sent out by Commodore to close friends and important software developers for a sneak preview of the machine.

The relatively low-cost 68030 workstation should be shown to the public for the first time in the spring (*Express* 54). The name of the machine and specific technical details, however, remain shrouded in mystery.■



• Amiga: workstation version

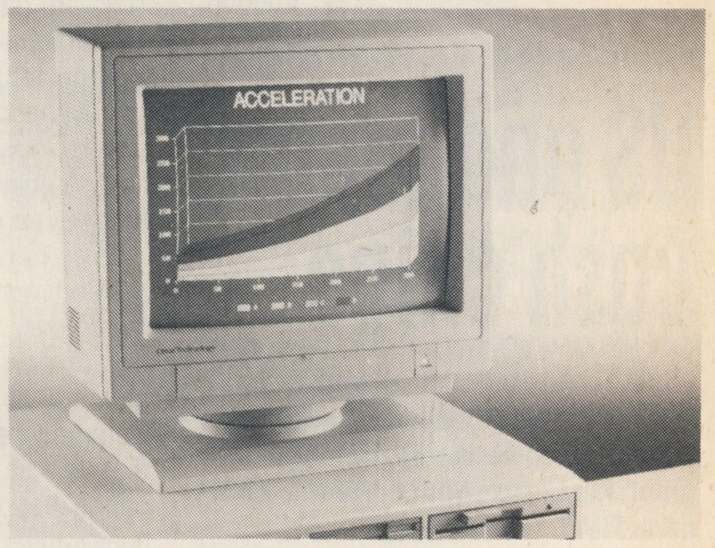
Opus steps in with fast 386

British computer manufacturer Opus has launched a 33Mhz 386 PC.

The new PC7 386/33 will replace the old PC7 at the top of Opus' range of IBM compatibles. Buyers will be offered a 60Mb or 110Mb hard disk option.

Power PC buyers will have to fork out £2,499 for a mono version, with prices rising to £2,999 for a VGA colour machine.

The new PC7 has a zero wait state, 1.1 interleaving and selectable disk caché. It has six internal drive bays, two serial ports, one parallel port, a socket for any extra 80387 co-processors and eight expansion slots.



• Opus: top end

A basic memory of 1Mb is expandable to 16Mb on the motherboard.■

Video action

Still can't decide what games console to buy? There's a new video that has just been launched that might help you make up your mind.

Featuring an hour of comparison and contrast of the big console formats, *The Games Console Video Guide* from Hotshot Entertainments is desribed as "a complete working guide" to the Sega, the Nintendo, the PC Engine and even the Konix machines.

There's an outline of the internal workings of a console and a run-down of the best peripherals. The video is available for the cost of £9.99. For more details, phone 0206 751217.■

Cheap games for 16-bit

Artronic – formerly referred to as the Cascade company – is to launch a series of low-cost games for the ST and Amiga.

As yet the firm has not given the new 16-bit budget label a name, but it has announced that games will include new titles as well as re-releases of previously popular titles.

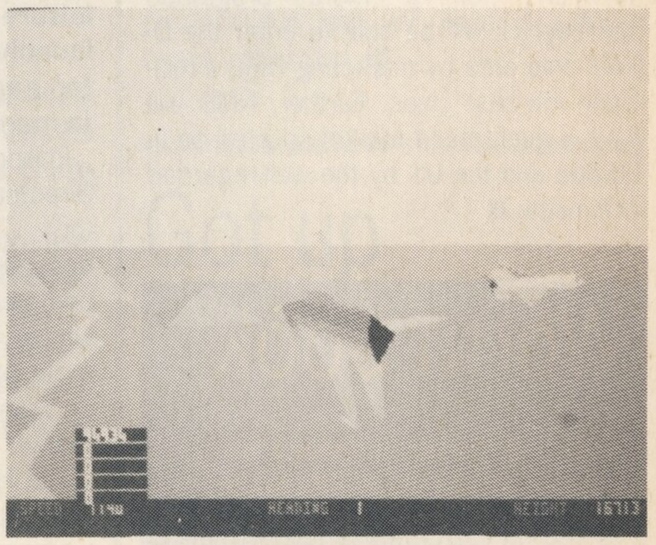
All of the games will, however, be offered to the public at the outstandingly reasonable cost of £4.99.■

Pilots choose the Amiga

The Civil Aviation Authority is to train new pilots with flight simulations running on Amiga 2000 machines.

A total of 24 Amigas are to be installed, all of which utilise touch screen technology developed by a company called ForeFront.

It is not yet known what software the pilots will be using, although one possibility is Mirrorsoft's *Falcon* which has already proved to be popular among budding fliers.■



• Falcon: to be used for the real thing

PSION IN DEEP WATER

Biologists are using portable computers to aid in the fight against pollution.

Concerned scientists at the National Rivers Authority have invested in a batch of Psion LZ64 machines to gather data on numbers and types of animal life in some British rivers.

With the machines, they can calculate the levels of pollution in urban areas and contrast findings to water quality figures gleaned from the countryside.

The biologists say an Organiser is ideal for this sometimes messy work because of its size and robust nature.■

Computer design

The Design Council has turned its eyes towards computers for its annual awards.

Four of the 17 winners were computer based products, including low-cost route planner *Autoroute Plus*. The others were a pregnancy-monitoring system for the PC called *System 8000*, a DTP educational package called *Newspaper* and the pocket Organiser, Agenda.

The Design Council was set up to promote British standards of design. ■

Hit the road, Sam

If you are heartily sick of reading about the Sam Coupé and if you fancy a chance to see the beast for yourself, then watch out for the MGT Roadshow coming your way.

Through late February and early March the company will be travelling through Scotland and Wales armed with all the latest gadgetry for the Coupé. Members of the public are invited to eight hotels all during the time which spans the dinner hours, from 5pm to 8pm.■

Those Coupé dates:

February 26	Albany Hotel Glasgow
February 27	Post House Hotel Newcastle
February 28	Post House Hotel Manchester
March 1	Post House Hotel Leeds
March 5	Post House Hotel Bristol
March 6	Dolphin Hotel Southampton
March 7	Post House Hotel Coventry
March 8	Russell Hotel London

US and Japan cash chips

US chip manufacturer Intel has signed a surprise agreement with giant Japanese semiconductor company NMB.

Rivalry between US and Japanese industry as regards chip supremacy has been bitter, but the Japanese currently hold an 80 per cent share of the world-wide chip market. An attempt to combat this Japanese lead-share by forming an amalgamation of US chip manufacturers met with a cool response from computer makers last month.

Intel has dropped any nationalistic intentions for a more pragmatic approach. It will be able to enter the D-RAM chip area by marketing NMB's relatively low-cost chips. Further, NMB will have a guaranteed market spurred on in Europe and the US by the well-regarded Intel name.■

Worm book

A new book that details research into computer viruses and WORMs has just been released.

Aimed primarily at computer system managers, *The Computer Virus Handbook* outlines all known viruses, how to avoid them and how to combat them. There are also reviews of 20 leading virus-busting packages and first hand accounts from people who have suffered attacks.

Publisher Elsevier says the book does not take an apocalyptic approach to the virus problem, but a pragmatic one. It is a 375-page hard back and it costs a hefty £85. More detaills on 0865 512242.■

Low-cost deal signals Commodore PC push

BEGINNERS OPTION FOR COMMODORE PC BUYERS

A new low-cost PC package deal is soon to be offered to first-time buyers by Commodore.

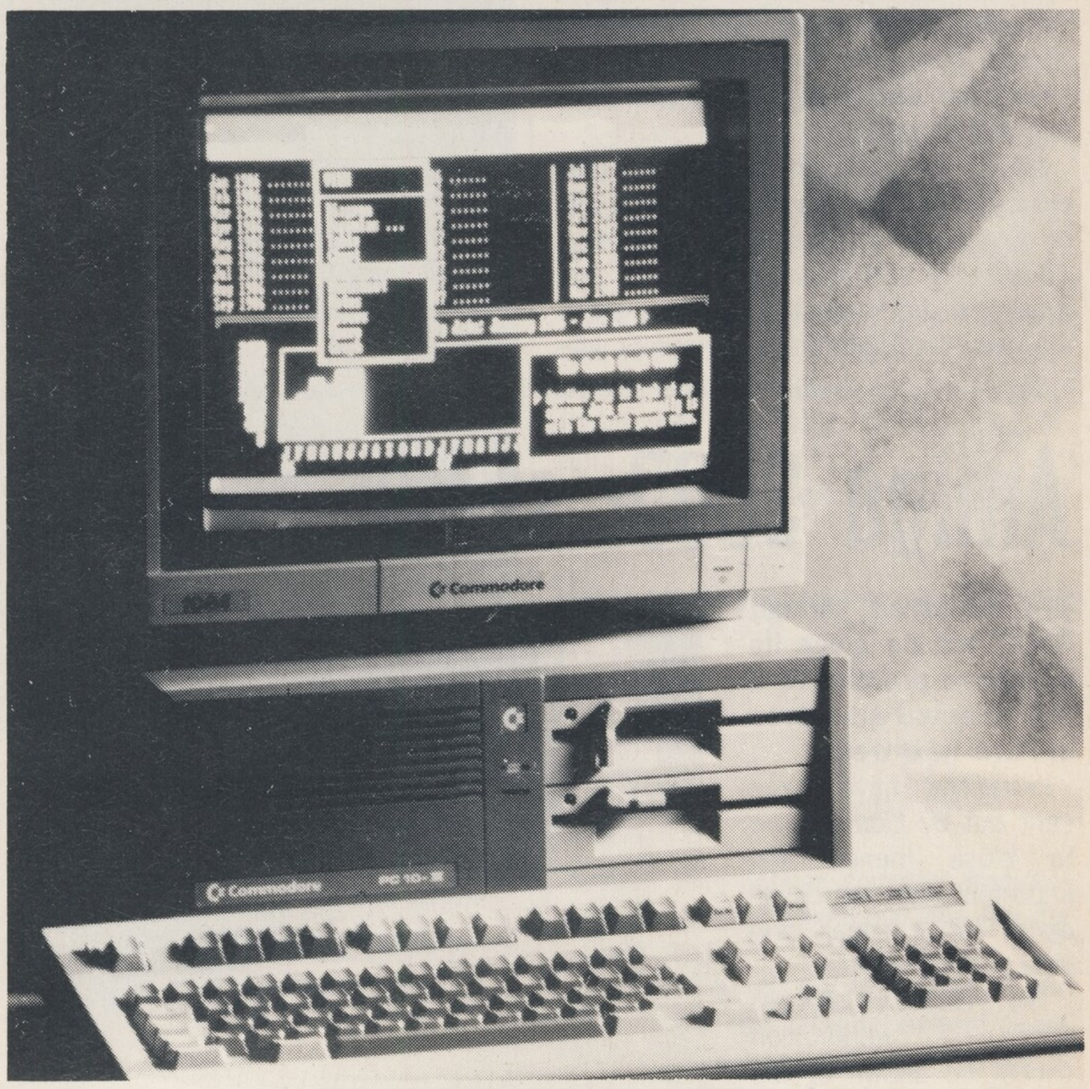
The firm, which has been trying to crack the PC market for years, says it has finally got it right with a £550 Starter Pack. Commodore is hoping to woo those who have traditionally been attracted to the Amstrad name and the low cost of its machines.

Commodore will pump some £3 million into an advertising campaign covering television, newspapers and poster sites.

Further, the bundle will feature a single drive PCXT along with a mono monitor, a suite of educational and simple business software packages and a video featuring TV personality Tim Brooke-Taylor explaining how to use the PC.

A higher-priced option is on offer to buyers looking for a colour monitor version. A colour 286 PC30 will be available for the impressive cost of £1,399.

It has become something of a tradition for Commodore to announce its intention to win over the huge PC market – a number of new initiatives have been implemented in the past three years. Commodore is pointing out, however, that this is the first time a beginners' option has been put together alongside heavy advertising commitments.■



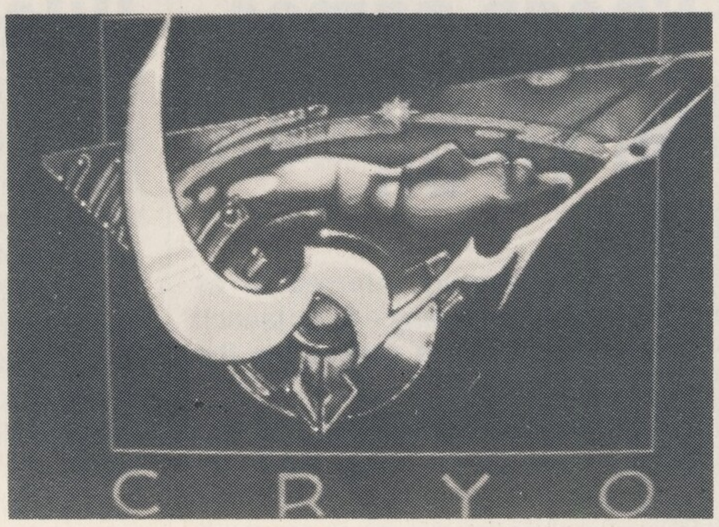
• Commodore PCXT: beginners' kit

Cherchez la femme

Virgin Loisirs, the French arm of the well-known music and leisure group, has launched a new label for games from across *la manche*.

Philippe Ulrich, Directeur de Production for Virgin Loisirs, describes Cryo as "a communication tool whose function is to promote products developed in France for the world market".

The label – which has a logo representing a young woman asleep in a cryogenic container – "intends to open the way to the next generation of software designers: graphists, musicians, writers, programmers, directors, sound engineers and designers of special effects. They will create expanding horizons for our imagination in tomorrow's fascinating technology world".



• The Cryo logo, designed on an Amiga by Didier Bouchon and Jocelyn Valais.

Purple Saturn Day's Didier Bouchon and Remi Herbulot are among gallic gaming gurus whose cyberspeak biographies are featured in early Cryo publicity material.

Virgin Loisirs is the French distributor of games on the Virgin Mastertronic labels, and in 1988 VL signed an agreement with Sega to distribute consoles and associated software through a large network of 'Sega Boutiques'.

More information about "infinite travel, magic, beauty, technology, adventure and mystery" may be had from Virgin Loisirs. Phone the good people in Paris on 010-33-1 42 78 98 99.■

SHOOT FROM THE LIP

"Computers are the antithesis of children. They're quiet, they're clean, they don't answer back, they remember what you tell them, and respond to instructions when you are fed up with them."
Arnold Evans in the *Times Educational Supplement.*

"Boys are more easily hoodwinked than girls. Boys can be persuaded that computers are really fabulous toys. Girls say: 'But all you can do with a computer game is go up and down, side to side or from corner to corner. All computer games are really the same'."
Reading based teacher John Caunter's theory on the unpopularity of computer games among females.

"I know people will say they've heard it all before..."
Commodore UK boss Steve Franklin on his firm's latest PC initiative. Naturally, we've heard it all before. (*CTW*).

Back-up bill planned for crucial computers

Computer systems which are deemed to be of prime importance to the nation are to be protected by a new 'Disaster Bill'.

Anti-hacking campaigner Emma Nicholson plans to put forward a new initiative which would make users responsible for their systems. The bill would only affect large companies and institutions.

The bill, as part of a larger overall proposal, could make computer back-up a legal necessity for certain systems, and it will cover computer maintenence, back-up, upgrade paths and support.

Nicholson says she wants to make sure computers linked to banks, hospitals, the military and power stations are properly protected.

Her bill will be put before the House after Michael Colvin's Computer Misuse Bill is passed. Colvin's bill – which Nicholson supports – is aimed at hackers and virus writers, and it should go through in the summer.



Dedicated communications computer arrives

COMMS GOES PORTABLE WITH TINY MACHINE

A tiny stand-alone communications device being developed by Viewdata specialist BTV Electronic looks set to revolutionise on-line information exchange.

The Argus Communicator is a complete E-Mail and Viewdata terminal that can be linked to PC monitors, allowing users to transmit and receive messages at speeds of up to 19,200 Baud. The device measures 240 x 160 x 40mm.

Part of the speed of Argus is due to its intelligent task management via a built-in procedural language based on a variant of the well-known BBC Basic, which is compiled at run-time.

Cheltenham-based BTV bills the Argus as a 'desktop comms box' equipped to outperform Prestel systems at a fraction of the price. There are three models available with battery backed static RAM amounting to 32K, 128K and 256K respectively. Prices start at £630.

The top-end configuration is a file server with 20Mb hard disk able to handle a network of up to 254 slaves, each of which is fully independent. The server and interfaces are being offered at £3,000, with additional lines available for around £1,000 each.

Already, Local Education Authorities in Shropshire and GPs in Luton are using the system – the latter encouraged by the Government's 50 per cent subsidy on PC purchases. Schools are using the network at a quarter of the annual fee of the Prestel service they used previously, while doctors are logging on as a means of downloading lab reports and information from central hospital computers.

Ironically – despite the advanced viewdata technologies employed – the units are being bought for the simple reason that they feature auto-message detect – flashing a light if they have received a message from an on-line source.

This ease-of-use, coupled with the fact that the units are virtually idiot-proof should ensure widespread sales among companies and institutions using E-Mail and information services. ■

IN AT THE CHEAP END



• Elonex XT: low cost

The exceptionally busy PC manufacturer Elonex has launched yet another PC – this time it offers an entry level 'slimline' XT model.

The 88M runs a 10MHz processor and features a built-in Hercules-compatible graphics controller. It sports one parallel and two serial ports and can handle two floppy drives at once. There are also three expansion slots.

The machine costs £645 and comes with 640K of RAM with a 720K 3.5-inch disk drive and mono monitor. A VGA colour system is available for an extra £300. For more details phone Elonex in London at 01-965 3225.■

Bargain Hunters Paradise

Don't forget – this weekend the New Horticultural Hall in London opens its doors for the first All Formats Computer Fare.

Billed as a 'bargain hunter's paradise' the show is run along the same lines as the old ZX Microfair (*Express* 62). Buyers can expect to see dozens of hardware and software dealers off-loading stock at knock-down prices. There are going to be deals, deals, deals.

Organiser Bruce Everiss says he is absolutely certain that the show will be a success because of the number of companies looking to sell off their old Christmas stocks.

But he warns visitors not to expect the glittering razzmatazz of extravaganzas such as were in evidence at the PC show. This event is strictly functional.

The exhibitors lined up include familiar names such as Software Express, Westoning, Dowling Computers EEC and Data Club UK. The entrance fee is £3 and the fare starts at 10am this Saturday (February 10th).■

More spice to Planner

Sage has just announced a new release of its PC Planner spreadsheet program.

Release 3 provides users with the ability to link files in 3D as opposed to ordinary two-dimensional sheet rows and columns. It will now be possible to work with several sheets at once.

So, an interlocking series of layouts can be created to produce a complex financial model of, say, every department in a company.

PC Planner 3 is compatible with *Lotus 1-2-3* and includes new graphics capabilities as well. It is available for the sumptuous sum of £199.■

Mouse to mouse resuscitation

Tired of all those horrid sticky bits clogging up your mouse? Then you can turn to Romulus Data Systems.

The company has exploded into the computer business with a revolutionary new idea guarenteed to knock your socks off. It's the all-in-one mouse repair service.

For £5.95 Romulus will take your little friend apart, give it a nice clean up and send it back as good as new.

Pretty good, eh? Unfortunately the offer is only open to ST owners. Romulus is at 44, Aylętts, Basildon, Essex, SS14 1UJ. ■

C5 alive

Fans of Sir Clive Sinclair may be surprised to learn that he is contemplating the launch of a follow-up to the C5.

The C15 will be faster than its doomed predecessor and will have a greater range – 20 miles. ■

Got up down-under

The New South Wales police force in Australia was put in an awkward position recently by its own traffic control computer.

In an attempt to reduce the number of outstanding parking fines, the NSW police had established a system whereby your car would be automatically de-registered by the computer for failure to pay up.

The problem started when a top-notch police officer did not pay a parking fine on the unmarked police car that he had been driving – the car being registered to the NSW police department of course.

In turn, the computer de-registered all the cars belonging to the police department and thus all the officers drove illegally registered cars without knowing it.■

COMMENT

Why the question of whether it is safe to sit in front of your computer monitor is still a long way from being a dead one.

Some readers may be wondering exactly why we have chosen to lead this issue of *Express* on the question of the safety of working (and playing) with computers.

Surely, you may be saying to yourself, this is all old hat. Were these fears not firmly knocked on the head back in the early 1980s? Haven't scientists assured us that there are no fearsome particle beams shooting out of the front of the machine, nor deadly gushings of X-rays?

Well, yes and no. Assured, yes, but should we feel reassured? The sheer volume of material collected together by *Electronics World and Wireless World* for its February issue represents a very good reason for us all to pause for thought.

What *Electronics World* is saying is frequently difficult for the lay person to follow. But the gist of the collated research, as we understand it, is that there are numerous sets of findings which strongly suggest that electromagnetic fields of a certain type produce effects in human beings which have not been adequately researched by the people we rely on to tell us whether the things we deal with are safe or not.

AIR OF CONSPIRACY?

Even worse, the magazine tentatively points the finger and says that there are those who do not want this information to come to light.

For the moment, let us allow the conspiracy theories to rest, and examine just what the implications are of the many and varied papers *Electronics World* has gathered together. Here is just some of the information involved:

• Evidence gathered on both sides of the Atlantic points to higher incidences of various ills among people who live in close proximity to overhead power lines – cancers, including leukaemia, depression and suicide are all cited.

• Similar effects may also be attributable to living near underground.power lines.

• High incidences of heart disease and depression have been recorded in high-rise block residents living close to rising power cables in those buildings, and the depression rate higher still among those whose flats have under-floor or storage electric heating.

• Statistics suggest a higher risk of miscarriage for pregnant women living in homes with ceiling-cable heating, using electric blankets, using heated water beds or working with computer monitors of the standard 'cathode ray tube' type.

• Tentative evidence has been found linking 'inexplicable' cot deaths to the baby's proximity to domestic immersion heaters, although there seems to be no money available to expand research in this area.

In all probability, none of the research cited is in itself anything like conclusive. But taken together, these various papers paint a highly disturbing picture.

What power lines, cable and storage heating systems, immersion heaters, electric blankets, heated water beds and cathode ray monitors have in common is the electromagnetic fields associated with them, produced by 50-60Hz supplies.

There is nothing tremendously mysterious about these fields in the sense that they are more or less the same things that make iron filings form pretty patterns on a sheet of paper with a magnet under it.

What is startling is the growing body of evidence that these EMFs, previously considered harmless and thought to do very little other than heat up our bodies by the teensiest amount, now begin to look as if they produce a number of other biophysical changes. Effects which already look more than possible include immune system damage and changes to brain-cell membranes.

BRAIN TUMOURS

Computers are but a small aspect of this subject, but we concentrate on them for the obvious reason that we are a computer magazine and that many of our readers spend a lot of their time – either at work or at leisure – sitting in front of their monitors.

If research from around the world is strongly suggesting that the same electromagnetic fields generated by our computers are associated with leukaemia, brain tumours, miscarriages, foetal abnormalities, depression, suicide, immune system damage and goodness knows what else, then we all have the right to wonder what the people who collect and spend our taxes are doing to check this out.

Doubtless the official response will be that these things have been around for years, and surely we would have noticed long before now that electromagnetic fields were dangerous. The argument is specious at best. Tobacco had been around for centuries before being officially accepted as a health risk; butter for centuries more, and yet we are now told to be careful about our cholesterol intake.

This is not a 'computer manufacturers are killing you' editorial leader, nor one which aims to suggest that employers are cynically exposing their workers to unneccesary risk. We do not point the accusing finger at Commodore, Amstrad or IBM; we do not aim to expose the Confederation of British Industry as satanic despots.

Everyone is in approximately the same boat when it comes to EMFs. Even the top scientists are still effectively groping in the dark. What is needed is concerted action not just by the British Government but by those of all developed countries to research the possible effects of these fields as a matter of urgency. We are, after all, surrounded by them day in and day out.

As computer users in particular, we need to know either that our machines are safe to use or that their associated electromagnetic fields are a hazard to health and that something will be done to eliminate them from our work and home environments.

ONE YEAR AGO

● FREEBIE INCENTIVES for Amstrad, Commodore and Atari machines were announced.

Amiga buyers could get six games and rich DTP fans could pick up a Mega ST with a special word processing bundle.

But Amstrad baffled everyone with a free monitor with every PPC portable.

● US GOLD received a ticking off from the Advertising Standards Authority for its grossly sexist effort publicising *Psycho Pigs* UXB.

● IT WAS REVEALED that Cambridge Computer was planning a PC compatible version of the Z88. are still waiting

TWO YEARS AGO

● THE FIRST Amstrad PPCs arrived in the UK.

● CODE MASTERS announced bold plans for its charity game *The Race Against Time*. The Sport Aid game would, predicted the firm, raise £1 million for Sport Aid.

It arrived later in the year, was dogged with problems, and flopped.

● THE WHICH Computer? Show turned out to be a brilliant success (yes, again!).

FIVE YEARS AGO

● LADY SINCLAIR was divorced from Sir Clive after 22 years of marriage. At the time she was a director of Sinclair Research.

● BRITISH AIRWAYS wised up to the tricks of computer fraudsters who were booking tickets all around the world by tapping into the booking computer. A new anti-hacking device was installed in the system.

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LANGUAGE MASTER

Those nice people at Software Paradise sent in a copy of *Language Master* the other day. This is an on-line dictionary and thesaurus which takes only 100K of memory and pops-up over your favourite word processor.

So what? I hear you say that most word processors contain a spell checker and thesaurus these days. Ah! I reply cockily – preparing to leave you dumbfounded – but how many dictionaries offer you definitions of the words you look up as well as offering the other parts of speech of those words?

How many of them will automatically take the word over the cursor as the subject of the look-up? And how many dictionary-cum-thesauruses can be made to pop-up over another pop-up, like *TopCopy Plus*?

There aren't a lot. In fact – go on – name one.

Indeed, *Language Master* is very useful and it does help with lightning look-ups of any of nearly 80,000 words. If the dictionary doesn't contain the target word (or if it's spelled incorrectly) it will show you a shortlist of possibilities based on phonetic as well as lexical similarities.

The American English version makes use of the Merriam-Webster concise dictionary and thesaurus and the UK one uses Collins' equivalents.

It's fun looking up words in the US version. Did you know that to 'sock away' was to make an investment or saving, and that to 'fun' was to have fun with banter and jokes? Or, did you know that 'chips' and 'crisps' are interchangeable?

"I say, Carruthers, don't quite understand your banter". Looks like Churchill was right – two nations divided by a common language.

Software Paradise can supply the UK English version of *Language Master* for £86.25, and you can make contact on 0222 887521.

WINDOW CLEANER

I recently took part in the *PC Plus* awards for 1989. This is the first time the awards have been run, and it was interesting to see the range of views on the nominated products.

Out of it all – no, I'm not going to tell you who won what – came the impression that Microsoft Windows is going to rule the world, and sooner than Britain enters the EMS. I've already let my feelings show on the efficacy of Windows as the major graphics interface for MS-DOS, but I'm resigned to go with the flow.

GEM may have a prettier interface, DesqView may be a lot more efficient as a multi-tasker, but Microsoft has the muscle. It is for this reason alone that I've never doubted we'll all take Windows to our hearts.

There is a precise parallel, after all. In 1981 we took an old, under-powered, under-capacity personal computer from another multi-national, who presented it as a *fait accomplis*. Just pray with me that Microsoft reworks the DOS Executive for Windows 3.

ANSI, THE ANSWER

The `ANSI.SYS` driver is supplied with all MS-DOS machines to simplify the sending of control characters and graphics to the screen. Once installed, you can produce all manner of interesting effects with a minimum of programming.

The only snag is that some programs don't get on with the ANSI driver. Some code likes to handle this side of things for itself.

Anyone who has a copy of DesqView, the Quarterdeck multi-tasking operating system, should also have a copy of `DVANSI.COM`. This, as the name rightly suggests, is DesqView's own version of the ANSI driver.

As the observant will have noticed, however, the filetype is .COM. This gives a clue to the biggest advantage of the Quarterdeck product – you can install it at any time, not just at start-up, as is the case with `ANSI.SYS`.

This flexible installation means you can run without `ANSI.SYS` until you need it, at which time you can then bang it in without rebooting.

KEEPING BOXES

I moved house this week-end. You know the kind of thing – a hire van and a mate to help you load and unload. All went fairly smoothly, though it took me the best part of a day to get set up again.

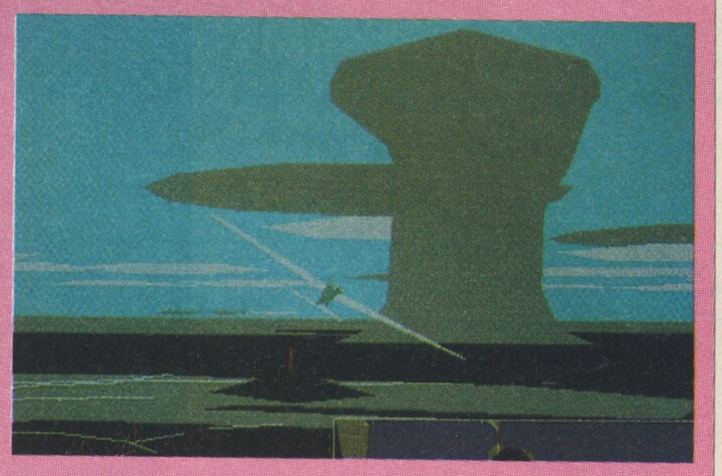
The one thing that was really driven home by the experience is the importance of keeping the boxes your kit arrives in.

It's not only a lot easier to stack and fit cuboid boxes into a van or car boot, it's also a lot easier on your stress factor to know the equipment inside them stands a fair chance of survival.

The only problem is where to store the empties in between moves. My vote, after some partially unfortunate experience with the matter, goes to the loft – outhouses tend to be too damp to store cardboard long term.

Simon Williams

FLIGHT SIM IV: FANATIC'S DELIGHT



There are those who like playing flight simulators because they are good at them. And then there are those who invariably bury their noses, and those of their planes, in the tarmac shortly after take-off. I definitely fall into the latter group.

Therefore, I may not be sufficiently qualified to comment, but – for the record – I find the vector graphics used in flight sims pretty dull.

The fanatics seem to get over excited about a few grey strips (the tarmac), a few blue strips (the coast around Frisco) and the odd dot (the enemy aircraft).

The dots tend to whisk out of view before you have time to find the 'Sidewinder' key, but after they've released Russian equivalents with your name on them.

***Flight Simulator IV*, the latest version of Microsoft's first ever PC game, doesn't suffer the Sidewinder problem, and my colleague Matt Nicholson raved over it in a recent *PC Plus* review.**

Then Matt is rumoured to have taught Chuck Yeager the difficult pancake roll, so there's little doubt he knows a good flight sim.

Nonetheless, I find it difficult to get as excited about *Flight Simulation IV* as I can about *Stunt Car* or *Interphase*.

TI's new printers



Texas Instruments, a company best known for its microchips and its dead handy programmable pocket calculators, has launched a couple of 'entry level' printers. These aren't 'entry level' in the way, say, a Star LC10 is entry level (on sale for less than £150, in other words) but they do seem pretty full-featured.

The 830 and its wide-carriage brother the 835 both have 9-pin print heads, 3-way paper handling (bottom, rear and top) of paper up to 5-part thickness and bustle along at a healthy-sounding 300 cps in draft mode. Near letter quality text is at a more sedate 63 cps.

Prices are £475 and £665 for the 830 and 835 respectively and TI is on 0234 223505.

WORDS, AND PICTURES TO GO WITH WORDS



• A friendly face from Words and Pictures' clip-art

If you've invested in a DTP outfit, one thing you can never have enough of is clip art. This is the collection of small, hand-drawn images that you use to illustrate text and to add life to otherwise doudy pages.

Clip art distinguishes a desktop-published document from one done on a word processor. Indeed, if you are a dedicated computer artist, you will probably be able to create any image you might need.

For the other 99.95 per cent of us, Words and Pictures' range of over 1,300 custom-made clips is probably just the ticket ... or brochure or flyer.

Unlike much commercial clip art, Words and Pictures' catalogue is claimed to be all of UK origin. They're certainly images I haven't seen before, but some still have an American 'style' to them.

There's a wide range of clips on a wide range of themes from which to choose: from cartoons, to maps, to icons. They are available in several versions, including GEM IMG, *PC Paintbrush*, TIFF, MAC, GEM and encapsulated PostScript.

Types of clips come together in packs, including: maps, views, graphics, headlines and borders. Thoughtfully enough, there are also sets for newsletters, for parish magazines and for advertising.

Depending on resolution, cost ranges from £19.95 to £49.95. Words and Pictures also carries out file conversions and resizing – £2.50 for 10 images – and designs custom logos. Ring it on 0295 258335 for more details.

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2 IBM MEMORY

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YOUR FORMAT

MACHINE SPECIFIC COLUMN

A NEW WORLD OF COLOUR

The ST has, on occasion, been criticised for its lack of colour digitising facilities. Now, with the appearance of the Realtiser – a German system imported by Third Coast Technologies – this alleged deficiency has been put right.

The device works very fast indeed, digitising at speeds well under a second. To produce colour pictures you scan the same image three times, first in red, then in green and finally in blue.

Then, thanks to some clever trickery – it's the way your telly works – the Realtiser combines the three images into one. Once you've done that, you can import the picture in any of the popular paint packages and edit, cut, paste and alter the image and its colours to your heart's content.

It has to be said that the results are not of 'professional' standard. But at the remarkably low cost of £150, the Realtiser does open up a new avenue for ST technobuffs to explore.

Indeed, now that the breakthrough has been made, there's every sign that more and more colour digitisers will appear. There are plans to market a video digitiser complete with an RGB splitter – doing away with the need for tinted filters. You can reach the good people at Third Coast on 0257 472444.

HOW TO AVOID GEM

It's difficult to imagine anyone apart from Atari getting very excited about GEM (Graphic Environment Manager), the window environment you see when you switch on your ST. Now, however, an alternative has appeared for people who can stand GEM no longer – provided a hard disk is to hand.

Mission Control (geddit), which is not dissimilar to CodeHead's much praised *HotWire* – but is geared more to the programmer – enables you to install as many as 10 applications, thereby saving yourself all that searching around and hanging about.

All you have to do is identify what you want to load, set up the configurations and parameters, and *Mission Control* does the rest. Contact GFA Data Media for more details about the £29.95 *Mission Control* on 0734 794941.

DISK FOR ADVENTURERS

SynTax, which claims to be the 'world's first ST magazine on disk,' is now up to issue 4. And very good it is too.

There's all that you would expect – news, reviews (lots of reviews, some very detailed), adverts, helplines, contacts, hints and tips and solutions.

There's more too: January's issue includes an interview with Steven Green, the programmer of Empire's *Sleeping Gods Lie*, as well as a couple of competitions and a selection of screens from upcoming titles.

Appearing bi-monthly and produced using STOS, each issue costs £3.50, or £20 for the year (including post and packing). Contact editor Sue Medley on 01-302 6598 (9 to 5, Monday to Friday), or on Prestel Mailbox 01-302 6598.

ON THE MUSIC SCENE

Sequencer One is a new program that features 32 recording tracks, MIDI capabilities and graphic note editing. It costs £89 from Ampsound: contact the good people on 0727 50075.

A little lighter on the pocket is *Beat Box*, a US import courtesy of those diamond geezers at Third Coast. It's a sound introduction (geddit) for anyone just beginning to explore the possibilities of sampling, sound effects and all that kind of jazz.

You don't need any extra equipment, since it can – if necessary – use your monitor's speaker. It can't promise to sound brilliant, though! Contact the Third Coast team on, again, 0257 472444

TOS UPGRADE SOON?

Why version 1.4 of TOS – the new upgrade to the ST's operating system – should have taken so long to arrive is not difficult to fathom. I dare say that Atari's recent bout of product launches (the portable Stacy, the upgraded ST, the STE and the top end TT machine, not to mention new Atari PCs) have kept it more than busy.

But there's a rumour that TOS 1.4 will soon be available for people to install on their own machines. It's already been released in a limited way, of course, being present in the Stacy and also having made an appearance with some Mega bundles.

Indeed, the people at Atari have had other things on their minds recently, such as coping with the horrendous STE uproar (see *Express, passim).* In fact, the STE actually has not 1.4 but version 1.6 of TOS onboard, and it's this in part that has been causing all the incomptability problems.

Don't get too excited, though, for the user-installable version of TOS 1.4, which is said to consist of a six-pack of ROMs, will set you back something over £40. More news as we get it.

MOUSE VET TO THE RESCUE

Pity the poor ST mouse. No-one likes it very much, and it's prone to suffering a breakdown just when you need it most. Never mind, for Basildon-based Romulus Data Systems can rebuild your rodent!

For just under £6 – little more than a quarter of the cost of a new one – you can have it thoroughly cleaned and its two switches (and any other faulty bits) replaced. And should the lead give out on you you can have that replaced too, for £8.50. Contact Romulus at 44 Ayletts, Basildon, Essex SS14 1UL.

TACKY, THEM? (A: YES)

Still, there is a much cheaper way to get a new shell for your ST. Place an order for £6 or more with tacky Brighton PD library Paradise Computers and you'll receive a free Easter egg.

This is widely seen by commentators as an upmarket move for the tacky wacky funsters, who were previously offering a free condom. Avail yourself of this remarkable offer, or simply request a free catalogue, by writing to Paradise Computers at 9 Westfield Crescent, Brighton BN1 8JB.

Please note my admirable restraint in the egg pun department, by the way.

ART ATTACK

From Switchsoft hails *Paintpot*, a new £19.95 ST art package. Phone 0325 482454 for more details.

"SHAMELESS AND BLATANT"

To find out more about the Realtiser (see above) I strongly recommended that you get your hands on a copy of the February issue of *ST Format*, available from all good newsagents, a shameless and blatant plug for which *(ST Format,* that is, not newsagents) now follows.

It's packed with loads of goodies. On the Cover Disk you'll find a rather spiffing fully playable and utterly complete game called *Skate Tribe*, as well as what may well be the world's first sadistic virus killer, an interrupt-driven sound sample player, a K-crushing file compactor and, er, much more.

Inside the magazine there are new series on programming in C and desktop publishing, a review of *Script*, the best word processor yet seen on the ST, 20 pages of game reviews, a look at what is without doubt the best flying simulator ever and, er, much more. *(OK Carey, that's enough blatant plugging for* ST Format. *Get on with it – ed.)*

SPREAD THE GOOD NEWS

If your news isn't featured here, it may be because I don't know about it!

So, if you're starting an ST PD library, adding exciting new ST titles, importing new ST software or whatever, let me know: Steve Carey, *New Computer Express*, Beauford Court, 30 Monmouth St, Bath BA1 2AP. Pip pip!

Steve Carey

PLAYING TIP

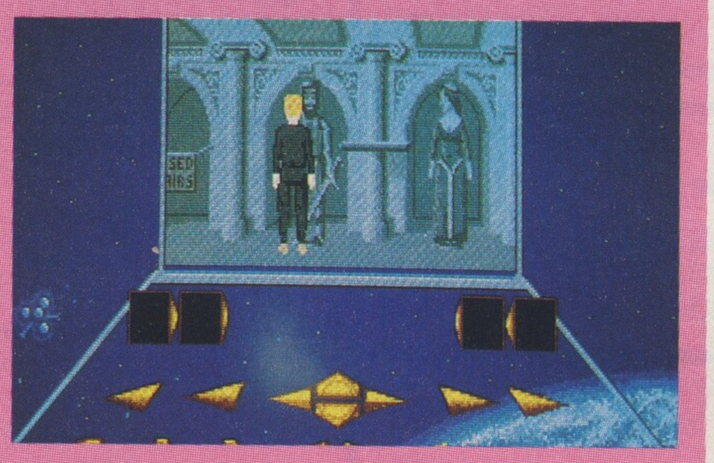
NINJA WARRIORS

Feeling depressed? How about some cheats to make *Ninja Warriors* a real laugh to play?
Hold down the Alternate key and type the following:
CASABLANCA – Black and white screen
GENESIS OF THE DALEKS – Negative screen mode
THE TERMINATOR – Ninja body parts explode when you die
MONTY PYTHON – Enemies come on backwards
SKIPPY – Enemies bounce
A SMALL STEP FOR MAN – Jumping baddies leap right off the screen
EAT TO THE BEAT – Press Q to toggle between slow and ordinary motion

ST GAME of the WEEK

TIME

EMPIRE • £24.95



The last adventure we saw out of Empire's stable was *Sleeping Gods Lie*. Despite its innovative 3D environment, it never approached becoming a great hit.

Now *Time* is here, and it has gone right back to the original adventure format where a good memory and a pen and paper are all that's required.

***Time* is set on a futuristic space station. Earth is under threat from a self-replicating android that is about to totally annihialate both the home planet and your space station.**

To rescue Earth, you must visit five different centuries in time during which you meet Merlin, Florence Nightingale, Julius Caesar, Leonardo da Vinci and the great Confucius.

The famous figures from history recharge a magic amulet for you, and then you dutifully return to your space station to discharge the amulet – a process which neutralises the nasty androids.

The game is played with a viewing window surrounded by a series of icons. And the icons are used to provoke movement, speech or to pick up and use objects.

Speech plays an important role in the game, because as you wander around in search of time machines, you'll meet lots of characters. Clicking on the speech icon will make them talk and they'll give you hints on how to continue.

For example, to meet the doctor you must get passed his wife. She claims that she has a hungry cat and she refuses to talk of anything else.

The answer to this overly-zealous loquaciousness is to go back several steps to the Sea World and talk to the character there until he eventually gives you a dead fish. Now take this back to the wife, and she will let you pass with a big smile.

***Time*'s biggest appeal is the way it guides you through the game. You aren't just set down in a space station and left to your own devices.**

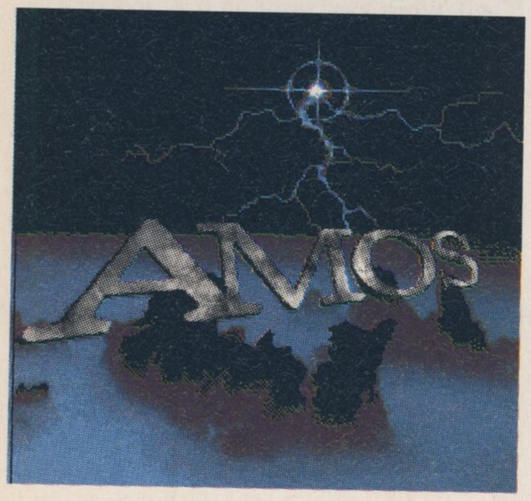
Instead, the characters help you through the game, and if ever you reach points where you're totally stuck, it won't be long before someone comes along to give you a new clue. Consequently, the ardent adventurist will find it boring – but anyone new to this genre will find it exciting and addictive.

AMIGA

AMOS UPDATE

Are you perhaps still patiently waiting for the release of Mandarin's AMOS? If your answer is yes, then I've got some bad news for you – you've got an extra two months to wait. Yes folks – AMOS isn't going to be with us until at least May.

According to Mandarin, the BASIC language is done and only the AMOS Sprite designer and Music editor are still incomplete – on the software side that is. In fact, these remaining modules will take little more than a few weeks to finish, but the manual – yes, the manual – that is an entirely different story.



"We could just knock together a manual in a week or so, but we want AMOS to be as near to perfection as is possible," said a spokesperson.

Once the AMOS language reached a usable state, Mandarin immediately put its programmers and beta testers to work converting STOS (the ST version of AMOS) demos and games to work under AMOS. These demo-games will be bundled with AMOS and even distributed in the public domain as soon as the AMOS package is done. To back this up, Mandarin hopes to produce several books devoted to AMOS.

Also planned from Mandarin are AMOS versions of the STOS add-ons, Sprites 600 and Games Galore.

However, there are no plans at Mandarin to produce an AMOS version of its STOS Sound Sampler, Maestro, but the company is considering reworking an existing sampler and then rewriting the sampling software using STOS.

Additionally, plans are already brewing to produce an AMOS version of Rombo's Amiga video digitiser, Vidi, which will be called (not surprisingly) AMOS Vidi. Although the Vidi hardware will remain the same, the vidi-driver software will be rewritten in AMOS BASIC.

HARDDRIVE SAVIOUR

Hands up all you Amiga 2000 users that still have the old 2090 hard-drive controller and 1.2 Kickstart. Bet you wish you could autoboot from your hard drive without having to shell out loads of dosh for a brand-new hard drive controller and kickstart chip!

Well, now you can with the Centaur Autoboot Card from the Amiga Centre Scotland. The Centaur Autoboot Card sits on top of the 2090 and allows the hard drive to autoboot from both warm and cold start without having to fit the machine with Kickstart 1.3 (although 1.3 users can also utilize the autoboot card – why they would want to, I don't know)!

Additionally, with the Centaur Autoboot Card any hard drive can be defined as the boot device. Indeed, the system will even boot from a Seagate-SCSI drive (which, by the way, isn't even possible with the 2090A).

There is some bad news, of course. Unfortunately, it isn't possible to just whack the board onto your 2090 and start working. Even if you use an older version of the hard disk device-driver (which will be all right for a while), your hard drive will eventually have to be totally reformatted.

Fitting the card, on the other hand, is simplicity itself. All you have to do is open up your 2000 and slot the card into any one of the 100-pin conectors on the main board – and away you go!

The Centaur Autoboot Card is available for the sumptuous sum of £60 from the Amiga Centre Scotland, who can be contacted on 031-557 4242.

DESKTOP VIDEO NEWS

For those of you who use the Amiga for professional video applications, Interactive Media Resources has announced the release of the Multi-dat device. The device is a high-quality RGB distribution amplifier which allows up to four RGB monitors to be connected to one computer.

Because the Multi-dat uses RGB signals – instead of the usual composite video – Amiga graphics can be distributed down long cables without the degradation usually associated with video signals. Even High resolution screens remain pin sharp.

IMR claims that the system is suited to applications such as public information systems in shopping centres, bus stations, train stations, sporting venues, exhibitions and for teaching tools within the classroom and lecture theatre.

The Multidat costs £175 and is available from IMR on 0902 25444.

Jason Holborn

AMIGA GAME of the WEEK

AUSTERLITZ

MIRRORSOFT • £24.95







After triumphs with *Borodino* and then *Waterloo*, Dr Peter Turcan has turned his attention towards the battle of Austerlitz.

As with his war simulations in the past, which were renowned for their devotion to realism, Turcan's *Austerlitz*, too, isn't presented as a map with armies of troops for you to move.

Instead, you're provided with the ultimate viewpoint – you see the battlefield exactly as your leader would have seen it.

As a result you can't simply sit back and watch the fighting – you must get in there and get dirty, by dispatching riders as would a field general. These riders then inform you on the state of battle and the condition of your troops.

The riders also carry orders to troops stationed at the front line – but beware, because the riders may be killed on their way and orders may never reach their intended destination.

Judgements about the units you wish to dispatch must be based on the information you gather. Since you cannot see the formations of the enemy, however, you'll find you end up planning the battle on paper.

The real battle of Austerlitz was fought between Napoleon and the allied forces on December 2, 1805. Napoleon marched to victory by pinning the Allied centre and right flanks with a frontal attack and circling around from the South. Considerable research has gone into making certain the game portrays reality as rigorously as possible – you can either replay with historical orders or issue your own.

Austerlitz is played as a series of turns. Within each turn, you have 15 minutes of simulated play in which you can issue eight orders. The orders must be constructed using a very precise and logical language. For example, Keinmayer – transfer your cavalry to Langeron – is an instruction issued to a Captain to move his cavalry.

Also, troops must be strategically positioned around the map to give the maximum effect. Various commands exist to lend support to front-line troops, to defend spots and to form attack/defence lines.

Austerlitz betters its predecessors and, indeed – if you're looking for the ultimate in wargame simulations – there's no beating it.



DMA BY DESIGN

Anyone remember the Expert System and Action Replay utility cartridges that proved so popular on the Commodore 64?

Those of you who do remember that era of slow disk drives, appalling BASICs and massive colour palettes of little more than 16 colours will no doubt also remember how invaluable the cartridges were.

And did you know that the lowly ST has already gained its own utility cartridge in the form of Romantic Robot's Multiface? Perhaps you would like to know where all the Amiga utility cartridges are?

Ask no more, for DMA Design is soon to release a utility catridge in the shape of the Monster Cartridge. Indeed, most Amiga owners will immediately recognize DMA for its sterling contribution to the Amiga games scene.

Headed by Dave Jones – who I know reads this column every week, so I'd better be careful what I say – DMA is responsible for two of the most popular Amiga forays of all time, *Blood Money* and *Menace*.

However, before Dave moved into games-programming, he worked at Timex for a short spell, developing the early range of Spectrums. Therefore, a move into the hardware market for DMA Design was very nearly inevitable.

Anyway, the complexity of the Amiga's hardware requires that the Monster Catridge employ its own Z80 processor (yes, the very same processor that drives the Spectrums and Amstrads of this world) and feature its own ROM and RAM. Further, as the software is disk-based, the Monster Catridge is fully configurable.

Additionally, the cartridge can be used to stop just about any program in its tracks (games, demos – the works). And once the program has been halted, the cartridge allows you to carry out several different operations.

Features of the cartridge include: full 68000 disassembler, slow mode (slows down games up to 100 times from their original speed) and screen grabbing in IFF format.

The cartridge will be made available in two configurations – Monster 16 (at around £70) and Monster 64 (for about £90), which offer, not surprisingly, 16K and 64K of RAM respectively.

Find out more by writing to DMA at: Dept MSJ, 134B Nethergate, Dundee DD1 4ED. Readers may also be interested to know that Dave is currently writing a series of articles for *Express*' sister publication, *Amiga Format*.

In these articles, Dave reveals the secrets of his profession. Not only that – but the articles are backed up by the complete source code to Dave's first game, the aforementioned *Menace*. *Amiga Format* is available from newsagents on the first Thursday of every month.

SPECTRUM

SOUND WAVES

Everyone already knows about the Plus 3 distorted sound problem and the way it turns the most melodic tune into fingernail-on-blackboard/New Kids on the Block-type noises. But there could now be another reason for Plus 3 owners to pin a life-size picture of Alan Sugar to their dartboards.

According to the latest issue of *Plus 3 Contact* – the magazine of the Plus 3 Users' Group – Spectrum Plus 3's, which are still issued in the Sinclair Action Pack bundles, could conceivably have problems when formatting and writing to discs.

Apparently, the problem lies in the Plus 3 having 'difficulty in making the small space between each sector on the disk a consistent size,' but it can render whole disks unreadable.

Fortunately it's not quite as bad as it first appears because a problem only usually comes about when you try to access a disk that's been formatted by a Plus 3 that carries the inaccuracy problem. Every Plus 3 should be able to read disks that have been formatted in its own drive, even if they suffer from the inaccuracy fault.

The Plus 3 Users' Group has also come up with a few possible cures to the problem. The people there suggest using a drive head cleaning disk or trying to copy a suspect disk to a clean one of your own when the machine has just been switched on. They think the Plus 3 might be a bit more understanding towards disk errors when it's cold.

So, the fault doesn't look like being quite as drastic as the distorted sound thousands of Plus 3 owners suffer from, but it's another clear example of Amstrad ineptness and apparent lack of care for the customer. Any pro/anti Amstrad comments to me c/o *Express*.

VIDEO WAVES

Sam Brewer of Suffolk writes to say he's heard about video digitizers for other computers and wants to get down to some serious digitizing with his Speccy. "Are any video digitizers available for my chosen machine?" he enquires.

Affirmative Sam – there are at least two of these natty hardware add ons available for the Spectrum, although I've never had the pleasure of digitizing with either of them.

1) Romantic Robot (54 Deanscroft Ave, London, NW9 8EN) sells a digitizer by the name of Videoface for £29.95, which strikes me as being pretty cheap.

2) The other model available is the Vide-ZX at £34.95 from P C G (61B School Street, Barrow-in-Furness, Cumbria, LA14 1EW) and I've received a few letters in the past recommending this particular make. Both peripherals can grab images from a normal video recorder or camera and then allow you to alter and generally mess around with the captured screen.

MAKING WAVES

EEC Ltd seems to be selling just about the cheapest Speccys in Britain if my calculations are correct. Its 48K+'s are priced at the bargain rate of £69 with 128K machines selling for only £89. You can make contact at 18-21 Misbourne House, Chiltern Hill, Chalfont St Peter, Bucks, SL9 9UE.

Robin Alway

HACK ATTACK

Mark Taylor of Manchester isn't happy unless he's hacking into some poor helpless game and demanding infinite amounts of various things. Here's his latest seemingly-infinite list of Multiface pokes. Naturally you'll need to have a Multiface or similar interface.

GAME	POKE	EFFECT
Arkanoid 2	33055,255	
	33909,0	Infinite lives
	40420,x	x = Ball speed
Aliens	31014,0	
	30768,0	
	34484,195	No capture
Barbarian 2	40159,0	Energy
	38508,0	Lives
Batman (new one)	54067,0	
	54832,201	
	54708,0	
	54719,195	Time and Energy
Dynamite Dux	44277,0	
	44401,0	Immortality
H.A.T.E.	53246,14	Lives
Indiana Jones & the Last Crusade	33310,x	x = number of lives
KarnoV	36847,201	
Last Ninja 2		
(Level 1)	36576,198	
(Level 2)	35993,198	
(Level 3)	36751,198	

The only thing Mark wants in return is for me to say hello to his two chums Dave and Vince, which seems like a pretty good deal for me. I will also be sending Mark a free piece of software for a truly top hole display of poking, so if you've got pokes, hints or cheats for any Spectrum games direct them to in to me!

PCW

PATTERN BOOK

It was Arthur Marshall who invented the phrase 'it is all part of life's rich pattern'. He never had a PCW, but if he had one, and if he were alive today, and if he had £X, he could play with life's rich patterns on his machine.

HTB Computers of Romsey has brought out a suite of puzzles in which you shift patterns around the screen rather like those number puzzles where you always end up with 1 to 15 in the square in the right order except for 7 and 9 which are the wrong way round.

There's a homespun feel to the program, and it provides light relief from novel writing. Details on 0794 516279.

I GOT BIORHYTHM

Two men, Drs Fleiss and Swoboda, reported at the turn of the century that certain individuals appeared to experience 'ups and downs' in regular cycles. No doubt any woman could have told them that without trying – but the good doctors findings have since been enshrined as 'biorhythms'.

The theory states that we all work in 23-day physical, 28-day emotional and 33-day intellectual cycles of ups and downs, starting from the moment we're born (and not conception, when most religious and scientific commentators would say life begins).

Anyway, *Biorhythm*, a new package from IMC (phone 0604 54814) will tell you your biorhythms for any day, and allow you more sophisticated options such as testing your bio- ratings against your actual performances, plus bio-notes, bio-diary and bio-planner, and probably baby-bio too.

This package is assuredly fun for all the family, if a bit expensive at £20. Still, there are similar programs available in the public domain – try the people at Advantage on 0242 224340.

ASCII NICELY

To save a listing 'THING' in ASCII form, type

```
SAVE "THING.BAS",A
```

– you can still LOAD it, edit it, RUN it etc. in the normal way.

To see what's in it, type

```
TYPE THING.BAS
```

and the contents will be displayed instantly – much quicker than having to LOAD it and LIST it.

HE, BREWING UP

LocoScript may seem a foreign language already to many users.

Now, however, you can get a Hebrew version of LocoScript 2. It's from Dr David Brewer, who designed the thing himself. This version mixes English, Hebrew and Greek symbols and costs just £13.95 from him on 0954 781655.

Rob Ainsley

MSX

GRAND CENTRAL

A couple of weeks ago, I mentioned that the MSX user group MSX Central was able to supply certain items of hardware and software, most of which has, up till now been unavailable in the UK. I have already mentioned the MSX 2+ computers and the price of these machines, this week I will concentrate on some of the other items that are listed.

Firstly, there are a range of tools for the would-be programer, such as MSX DOS Tools (with English instructions), MSX S Bug (English instructions), MSX Plan (ROM), and MSX C, Version 1.2 (English instructions). The prices of these items are from £82.00 for MSX Plan, up to £130.00 for S Bug – expensive items I think you will agree.

An ASCII hard disk interface is also available for £212.00: I presume it will then interface to any popular hard drive. 128K and 256K RAM expansions are on offer – priced at the sums of £112.00 and £139.00 respectively.

I do not know if these expansions will work on MSX 1 and 2 computers, MSX Central is, as yet, unable to confirm that the RAM packs are totally MSX compatible, or just for the MSX 2+. More info when I receive it.

The rest of Central's list is mainly software, and includes *Disk Station* 1 to 7 on three double-sided disks, £15.69, and a title I would love to have but at £76.00 is much too expensive – the game *Gunship 3D Helicopter Simulator*.

I don't think Central will have many orders for software at these prices. There are one or two other interesting items on the list, but space does not permit me to enter into further detail. For more information, contact MSX Central, 14 The Wardens Avenue, Allesley Village, Coventry, CV5 9GJ – and don't forget the SAE.

A DELIGHTFUL SPRITE

Several weeks ago a letter arrived asking if I knew the code that allowed the end sequence of Konami's *F1 Spirit* to be viewed. Well, Mr Ellis of Edinburgh, after a great deal of searching, and even longer tidying up afterwards, I can tell you the code.

Type in the following ... MITAIYOENDDEMO. This should do the job. I just hope the ending is good, and that the search was worthwhile!

A FEW THINGS

This week I received a special audio lead that is designed to connect your MSX computer to your Hi-Fi, thereby making the most of your MSX's sound capabilities – particularly the Konami carts with the SCC chip that make for eight-channel sound. The lead is two metres in length and it retails at £2.49.

Although I have been unable to try the lead, I can already well imagine *Nemesis III* at 60 watts per channel. At any rate write to Sphinx Software, Erw Fyndd Carmel, Llanelli, Dyfed SA14 7SG.

Keith Neal

BBC

FEAR AND SHIVERS

Educational computing – two words guaranteed to send shivers of boredom down the spine of any self-respecting computer hack. But look again, for here is a market absolutely exploding into action as the new government regulations come into force.

Judging by the BETT90 show which I attended recently, that fiery expansion has already started. So just for this column, I am abandoning my usual mixture for a brief rundown of all that appeared new and interesting at BETT90.

Although Acorn had no Master 128s at its stand, it did launch a CD-ROM drive for the show, and representatives were at pains to point out in press releases the main use of the device on mixed Arc/Master networks. Overall there was a strong multi-media flavour with CD-ROMs and hypertext being prevalent throughout. Software star was undoubtedly *Genesis* from Software Solutions, present on just about every stand.

There were many BBCs at the show, and I saw our machine doing all sorts – running programs, naturally, but also connected to measuring instruments, robots, heavy duty tools and projectors.

ESM, for example, had a colourful new catalogue with such items as *Network Folio*, *Kaleidoscope* and *Frieze*. Interestingly, relevant sections from the new National Curriculum were quoted next to each piece of software.

Data Design, progenitor of the popular *Designer Castles* program, has now come up with an additional package called *Medieval Villages*. In this newest a freehand drawing module gives extra flexibility, while huge printouts are also made more readily possible.

Virgin Publishing has released a new Videodisc for the BBC Master Interactive Video system. Called *North Polar Expedition*, it is based on the real exploits of Sir Ranulph Fiennes. As a promising 'Boys Own'-type adventure, the package allows group working in a very realistic atmosphere. A CD-ROM version is also on it's way, and both are priced at the sumptuous sum of £199.

Many smaller software houses were also present. "There are thousands of Model B micros still out there, and I will continue to support them with chemistry software as long as there is a demand," said Bill Wain of Q2 software. Indeed, most of the smaller stands did look to be doing good business, which is an encouraging pointer for this mainly BBC-based part of the market.

EAGLE EYE

In a wider context, remarks made by the Education Minister partly explain this surge of interest in education, particularly by large companies like Apple and Commodore. In short, the Local Management for Schools (LMS) budget will increase to £25m – up from £15m. IT in schools has a budget of around £10m, while the equipment budget for the National Curriculum, despite what some say, rises to £17m next year.

Obviously there is far and away too much here for detailed coverage. So in the next few weeks I'll try and analyse in greater depth some of the items launched at BETT90.

Andrew Brown

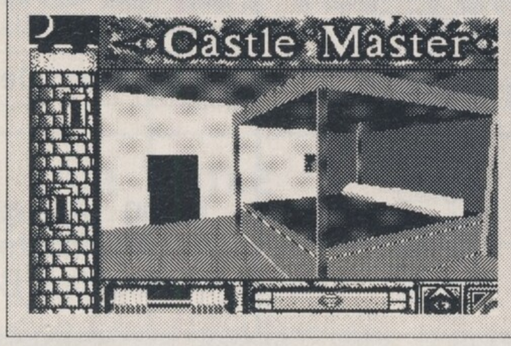
CPC

CASTLE MASTER PREVIEW

All those Freescape addicts who just can't wait to see what the new Domark/Incentive blockbuster *Castle Master* is going to look like – wait no more!

Which doesn't actually mean that it's finished yet. I can, however, reveal exclusive – never seen before – screenshots of the CPC version.

Expect a full review of *Castle Master* soon. In the meantime, just check out the screenshots and drool...





MURPHY'S LAW

T'was with sinking heart and tired sigh that yours truly loaded up Tynesoft's latest, *Beverly Hills Cop*. I've never been a terrific fan of Eddie Murphy anyway, and the prospect of a game-of-the film was none too appealing. And it didn't help that the game came from Tynesoft – let's face it, they're not usually quoted in the same breath as the Oceans of this fair world.

However, I was wrong. *Beverly Hills Cops* follows the now-traditional formula of scenes-from-the-film made into individual multi-load stages. The sub-games work as a sort of mini-compilation, featuring different styles and perspectives each time. The plot is not one from any specific film, but the individual scenes are reminiscent of some of the scrapes that lovable, fast-talking cop has got himself into.

Level One is a *Rolling Thunder*-style platform-wandering shoot-'em-up. Your aim is to wipe out all the bad guys at a smugglers' HQ. You dodge between crates, blasting away at the felons, who've been stockpiling arms ready for a major ship-out.

Level Two's more of a *Chase HQ*-style game. You're now driving a Mercedes, chasing after escaping vans and wiping them out as they chuck huge crates in your path.

Level Three is different again. Here, you view your character almost-but-not-quite from directly above. Your job here is to get to the mansion of the big gangland boss himself, the problem being the 40-odd guards waiting in the grounds for the chance to wipe you out.

The final level takes place inside the mansion. You get a pseudo-3D view of the corridors and rooms as you wander round zapping guards and looking for the Head Man. Oh, and there's a hostage to find too. Ah yes – have I told you – there's a bomb planted somewhere in the building.

The graphics are competent – if not inspiring – with a couple of quite-good between-level screens depicting our hero either jubilant or *in situ* in hospital, depending on whether you came through or not. The soundtrack ain't too bad, neither.

The levels are varied and quite playable, and the whole thing hangs together quite well. Not a bad little game. *Beverly Hills Cop* costs £9.99 on tape and £14.99 on disk.

GOING UNDERGROUND

Graham Smith has produced this wonderful inifinite lives routine for the Adam Waring classic *Lost Caves* (£10 in used oncers please – Adam). Simply run the poke and then load the game.

The codes at the start of each line are not to be typed in but can be used to check your typing utilizing the Typewriter program published in sister mag *Amstrad Action*.

```
{EuAr} 1 ' Lost Caves  -tape-
{HvAq} 2 ' By Graham Smith
{EwAs} 3 ' Infinite lives
{JsAm} 4 ' Method 1
{FuAj} 5 '
{JlAt} 10 DATA c4,14,ac,af,32,21
{EsAu} 20 DATA 11,fb,c9,3e,8f,32
{HnAv} 30 DATA 7f,41,3e,b3,32,cc
{BwAu} 40 DATA 41,21,62,46,36,92
{HkAt} 50 DATA 2b,36,83,2b,36,df
{AuAp} 60 DATA c3,05,40
{GjAs} 70 FOR j=0 TO 32:READ a$
{DsAt} 80 x=VAL("&"+a$):y=y+x
{PxAt} 90 POKE j+48640,x:NEXT j
{MuAs} 100 IF y<>3335 GOTO 130
{HiAr} 110 MEMORY &3FFF:LOAD"
{EpAp} 120 CALL 48649
{KiAq} 130 PRINT"data error 1
```

MONITOR MARVELS

How fascinating! This letter from a Mr Steven Burrows fell through our letterbox the other day:

"On hearing Dixons were not to restock their shelves with CPC hardware, I enquired about any surplus monitors (colour) for my 6128. They got me one for £99.99. I snapped their hands off! I own a 6128 with green screen, the kids have a 664 with MP2. I needed the colour monitor so the kids could use the green screen.

"The man at Dixons said he had in the region of 30-surplus monitors in stock, and having seen so many adverts from people needing colour monitors I thought it an ideal chance to let your readers know of this surplus.

"The address of the branch is: Dixons, Cheapside, Barnsley, South Yorkshire."

Blimey! Bearing in mind that until now the probability of finding somewhere selling CPC monitors on their own has been precisely zero, this is great news. If you're in the market for a new screen, Dixons could quite well be the bunch to talk to.

Rod Lawton

YOUR FORMAT

PC 10
ST 12
Amiga 13
Spectrum 14
PCW 14
MSX 14
BBC 15
CPC 15
Atari XE 18
QL 18
Archimedes 18
C64 18

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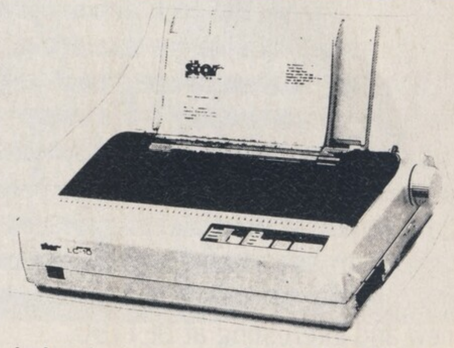
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QL

MEGA RAM

One of the more interesting add-ons available for the QL is ABC-Electronik's Mega RAM, which provides a full additional megabyte of RAM. The board contains a new version of the QL's MC68008 processor that can address a total of 4Mb, while the standard MC68008 can only handle up to 1Mb.

It is advisable to put the QL in a larger case if you add the Mega RAM, as it mounts on top of the QL circuit board. This would also minimise overheating problems. I have heard that the modification is tricky, and should be attempted by people with hardware expertise.

Mega RAM costs £195 with RAM, and £99 without RAM, and ABC-Elektronik is at Hugelstr, 10-12, 4000 Bielefeld 1, W. Germany, Tel:0521-890381.

QUANTA DOINGS

QUANTA has organised a workshop for Saturday, February 3. The venue is Papworth Village Hall, near Cambridge. Everyone is welcome. Further details from Phil Borman on 0472 349850.

John Torofex

QDOS DISK FORMAT (PART 3)

A map of sector allocations follows the header (described last week). This always fills the first three – logical – sectors of the drive, padded with dummy sectors if necessary so as to fill the `((512 * 3) - 96)/3 = 480` bytes allowed. A 720K disk has a sector allocation size of three, that is, three groups per side.

The medium name, random number and update count allow QDOS to detect when a disk is changed. The update count also indicates if a disk has been put in another drive (or another machine), written to, and then put back in the same drive. Clever!

Sectors are allocated to files in multiples of the allocation size, which seems a bit wasteful – a one byte file will take up three sectors.

The logical sector is derived from the sector map by the following formula:-

```
(sector in map * alloc size + sector in alloc group) MOD sectors/cylinder.
```

Additionally, in the logical to physical translation table published last week, the MSB of the translate byte indicates the side number. The remaining seven bytes give the sector number (0 - 8).

C64

AND SPEAKING OF DISKS

Disks of the computer kind, that is. Owners of Maverick 2 – a disk utility for the C64 and any of the Commodore-produced disk drives that are normally used with it – might like to upgrade to Maverick Version 3.

I'm sure FSSL – those good people who produce the thing – would like very much to hear from you. Indeed, for more utilities and general disk-based 'goodies' than you can shake a stick at, or for Maverick 3 on its own at a cost of £24.95, you can contact FSSL at Masons Ryde, Defford Road, Pershore, Worcs, WR10 1AZ.

BY ANY OTHER NAME

A joystick is still a joystick. Indeed, there must be hundreds of joysticks available for the C64, but one I saw recently seemed reasonable enough to mention to you.

The device is produced by Euromax and is called the Professional 9000 Deluxe. Inded it was the advert that caught my eye, because it extolled the features of this new wonder joystick, and in particular its 'top fire button and dial-a-speed rapid fire'. Whatever that might be!

THE FOOD OF LOVE?

Datel Electronics (old friend of ours who lives at Fenton Industrial Estate, Govan Road, Fenton, Stoke-on-Trent, has now got a very nice musical offer going.

The Datel MIDI 64 interface, and the software package called Advanced Music System (does everything, including print out your musical masterpieces), plus the Yamaha SH10 MIDI Synthesiser (it looks a bit like a guitar but is definitely all keyboard), are all available at £99.99.

WILL YOU STILL LOVE ME?

Issue 65 of *Express* arrives, with the Commodore 64 still going strong. In 1982, as the editor of Commodore Computing International, I was given the opportunity to review one of the first C64s in the country.

However, what we got was an American 64, meaning that it wouldn't run on our televisions, and the only suitable monitor we could get was a silent black and white one. I had to write 3000 words about...!

POKE POKE THAT 64

Three for the Action Replay fanatics and anyone else who can restart a game without needing a SYS location. *On Pulse Warrior*, you `POKE 9316,240` for infinite lives. On *Netherworld*, you could `POKE 12116,44` to achieve the same result, but on *Dark Side* you'll need two pokes to achieve infinite time: `POKE 26272,173` and `POKE 29005,173`.

XE

PRINTER PROBLEMS

I've a letter from P Mann of Bantry Bay, County Cork, who recently bought a Star LC10 printer and a Tandata TM500 modem. Mr Mann wants to use both of these peripherals with his Atari 800XL.

All is well, because Computer House of Earl's Court, London has the answer to P Mann's prayers. For the incredibly-cheap sum of £55, the good people will despatch to anyone a shiny new Atari 850 interface enabling complete compatibility with both devices.

HISTORY LESSON

Atari introduced its 850 interface a few years ago in an attempt to counter the growing criticism that the 8-bit range was inadequate without standard interfaces, such as parallel and serial ports. It's one thing having the best small computer, but quite another if you can't connect it to the outside world.

Of course, Atari itself marketed own-brand printers and – in the States – modems, but although of reasonable quality, particularly some of the later devices, they never seemed to offer competetive value for money.

The 850 interface features a standard parallel-printer interface and an RS232 serial port. Using this interface, you can connect any parallel or serial printer and all modems.

You cannot however, use split baud rates as the 850 doesn't support this speed. You can contact Computer House on 01 731 1276.

Edmund Blake

ARCHIMEDES

HELP AT HAND

The Arc is without doubt one of the most complex micros around. The operating system has to cope with a multitasking environment as well as all the usual disk, screen and keyboard tasks.

Indeed, getting to know your Arc can be quite a daunting job. One thing to remember, though, is that the built-in help system is a very good adjunct to Acorn's manuals. It's only ever a few keystrokes away.

From the MOS you need only type HELP followed by a keyword to receive on-screen help with many areas of the machine. At the top level, typing HELP COMMANDS lists all the commands within RiscOS, the MOS, File Switching, BASIC etc.

You can take it down one level, though, by typing HELP and one of the listed commands. For example, under File Switching is listed the command CDIR, used to create a new directory. Typing HELP CDIR tells you about it and shows the correct syntax for the command. To print all available help, set up your printer and then type HELP .. – that's HELP followed by a space and two full stops.

The help system only covers the operating system ('star' commands). Typing HELP REPEAT to try for help on the BASIC keyword prompts the response 'No help found.'

COLLEGE FONTS

Most people have noticed that Acorn uses a rather quaint system of naming its scalable fonts, to give the lie to the typefaces they're based on. Each face is given the name of a Cambridge University college with the same initial letter.

Thus, Times becomes Trinity, Helvetica becomes Homerton and Courier becomes Corpus. Since the company is slowly working through the whole Adobe PostScript font set, I wonder what they'll use for Zapf Dingbats?

But, then, by the time they get through to Zed, I'm sure Acorn will be on to utilizing Cambridge professor's names instead: Zinnia Cognition from the Philosophy department might be of some help in this instance...

ARM3 VERSUS FPU

The ARM3 upgrade from Aleph One has proved popular – if more than a mite expensive. The alternative is Acorn's floating point unit (FPU). Priced at £688.85, this half-width podule will only fit 400 series Arcs, and then only in an Acorn-specified slot.

The FPU doesn't use a custom-chip to pair it to the ARM processor, but instead draws on an off-the-shelf chip, the WE32206. This is not directly compatible with the ARM processor, so Acorn have had to marry it to a protocol convertor chip of its own design.

Even with the extra processor overhead this must involve, the chip is claimed to offer up to eight times the throughput on certain maths-intensive tasks. In practice, though, these tasks will be few and far between – they're mainly reserved for languages like C. BASIC uses its own floating point routines and is unaffected by the FPU.

It all comes as a bit of a disappointment for the home Arc owner. In my estimation this device might well be aimed at the top of the range R140 machine, which is designed to run Unix anyway, and will, therefore, have as many C programs to speed up as anyone could ever want. Indeed, if you happen to have over £600 to spend on your Arc, you'd be well advised to go for the ARM3 upgrade instead.

BASIC GRIPE

I wonder if anyone else is as frustrated as I am by BASIC's insistence on upper case characters for keywords. I don't mind this per se, in fact, I strongly approve of listings displayed in mixed case – it aids readability.

What I object to is having to put the capitals in myself. Most modern BASICs can recognise their own keywords and automatically capitalise them as you enter each line. Indeed, many automatically indent listings to show control loops, too. This keeps the program readable, without worrying the programmer about it.

KEEP IT COMING

I'm always interested in news of any kind for the Arc. Send your contribution in to me at the Archimedes column, *New Computer Express*, Beauford Court, 30 Monmouth Street Bath BA1 2AP.

Bertrum Carrot

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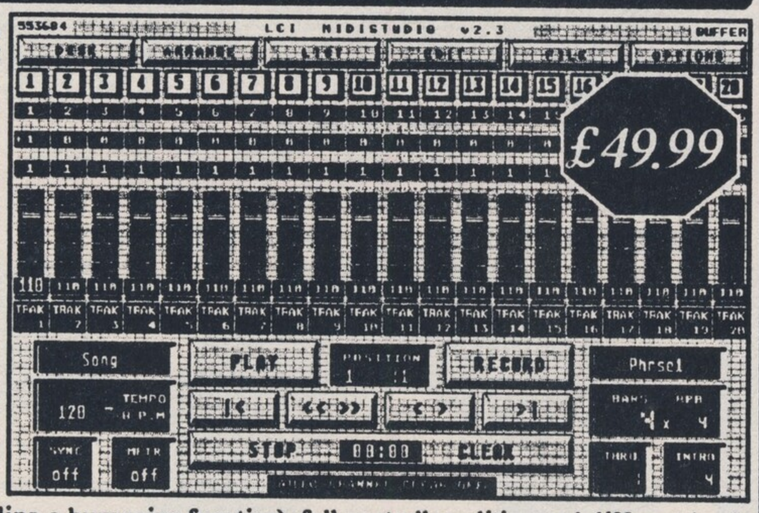
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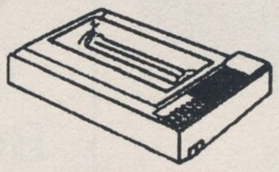
The IMG scanner is a realistic, low cost scanner which can offer high quality graphics digitising for a tenth of the cost of other scanners. This simple unit plugs into the cartridge port of the ST and accepts scanned information via optical cables which fix easily to the head of any Epson compatible dot matrix printer. The software allows grey scales to be replaced with colours, 4 in medium resolution and 16 in low resolution and offers scanning resolutions of 75, 150, 216, 300, 360 and 1000 dots per inch horizontally. Best results are achieved with photocopies. Greater than screen resolution images are saved in IMG file format and can be edited with any compatible art package. Screen resolution images can be saved in Raw data, Degas or Neochrome formats and edited with compatible art packages.



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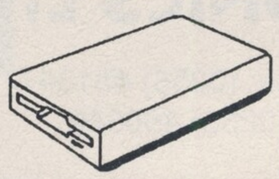
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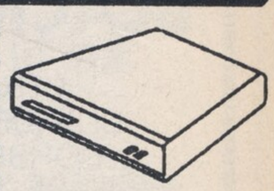
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The most vital piece of computer software for most serious users is the word processor – many use their micro for nothing else. Here is Express' verdict on the best you can find for every machine

Probably the most important 'serious' use of your micro is word processing. Anything from a letter to a novel is better prepared on a micro than on a typewriter: editing is easier, and you can keep making those final adjustments right up to when you decide to print.

All word processors allow you to create, edit and print simple documents, and all word processors allow you to store documents on disk or tape for retrieval at a later date. All let you move, copy or delete blocks of text, and use a variety of type styles. And you can set up different layouts – change margins and tab settings in a document and so on. Many packages allow you to write 'macros' where you give a series of commands which can subsequently be enacted with a single command or keystroke (for example, copying all the chapters of your book from one disk to another for backup just by the one command DO BACKUP or suchlike). Fine for letters or doing the odd bit of writing.

Expensive word processors have extras like spell checking facilities, word counters, the ability to display bold or italic or different type size effects on screen ('what you see is what you get' or WYSIWYG) and/or mail merge (where you can send letters to each name in a list with each person's details automatically included at the top of the letter). 'Serious' use – for writing or business – will demand a program like this.

Really advanced programs let you include graphics in a document, work on several documents at once each in a separate 'window' on screen, automatically generate footnotes and indexes and bibliographies and so on. This is for the professional – the large-scale business user, academic or writer.

Here's the *Express* guide to the best word processors for each machine. A brief description and the highlights and drawbacks of each are included. In 'Value for Money' five stars is the maximum.

PC

● PROTEXT V4

£100 • Arnor • 0733 68909

For sheer text and file handling *Protext* stands out. It's fast, flexible and full of features; good spell checker and mail merge facilities so powerful you can write program-like text and file handling routines. A must for writers and journos.

▲ Fast
▲ Spell checker
▲ Powerful mail merger
▲ Powerful macros
▲ Loads of extras – calculator, word counter etc
▲ Two file editing

▼ No real graphics capability
▼ Not good at handling complex layouts

VALUE FOR MONEY ★★★★★

● TASWORD

£50 • Tasman Software • 0532 438301

Superb value and fast. A few odd limitations but an excellent basic word processor. *TasSpell*, the spell checker, also available, along with *TasRes*, the memory resident version of the processor.

▲ Memory resident and fast
▲ Easy to customise
▲ DOS shell macros
▲ Word count, notepad features etc

▼ Clumsy text insertion
▼ Some limitations – find and replace won't accept spaces, blocks must be whole lines etc

VALUE FOR MONEY ★★★★★

● CELEBRITY

£80 • Software Paradise • 0222 887521

A well designed word processor with a lot of extras and plenty of appeal for the first time user. It doesn't show the compromises usual with beginner's packages.

▲ Good clear command structure
▲ Calculator, calendar, DOS manager etc
▲ Thesaurus and spell checker
▲ Up to four text windows

▼ Thesaurus US and a bit slow
▼ Window dimensions fixed

VALUE FOR MONEY ★★★★

● MULTIWRITER 2

£115 • NewStar Software • 0245 265017

A very powerful package that includes many features usually found only on really expensive word processors. *WordStar* dot commands can be included directly in a document so this may be ideal for *WordStar* diehards. Lots of extras – author's utilities and a filing program, for example.

▲ *WordStar* compatible
▲ Good menu and context sensitive help
▲ Extras: contents and index generator etc
▲ Filer utility

▼ Filer awkward to use

VALUE FOR MONEY ★★★★

● BORLAND SPRINT

£199.95 • Borland • 0734 320022

A hugely powerful word processor – certainly worth looking at if you need the complete works. Breathtakingly fast with an autosave feature that means even if the power goes your document has been saved exactly as it was at that moment. Comes with front ends that make it look like *WordStar*, *WordPerfect*, *MultiMate* or Microsoft *Word* if you're used to those packages. A bit complicated to use though and modelled on C, which doesn't help.

▲ User interfaces for *WordStar* etc
▲ Thesaurus and check-as-you-type spell checker
▲ Cross-referencing
▲ Very powerful indexing facilities
▲ Laser and PostScript support

▼ Very complex to use – only get it if you really need all the power
▼ Still a few little bugettes

VALUE FOR MONEY ★★★★★

● MICROSOFT WORD

£395 • Microsoft • 0734 500741

Another of the heavyweights. Packed with every feature you can imagine, but you're paying for it. Easy and intuitive to use for such a high-powered package – ideas outliners, contents/ indexing and footnotes, very good graphics facilities – and of course it runs under windows and OS/2.

▲ All the heavyweight features:thesaurus, spell checker, author utilities
▲ Ideas outliner
▲ Good graphics import facilities
▲ Runs with windows and OS/2
▲ Easy to use

▼ Very pricey
▼ Need a powerful machine – slow unless you have a 286 or 386

● WORD PERFECT 5.1

£425 • Sentinel • 0932 231164

The biggest selling word processor on the PCs, and the *de facto* standard in academia. A huge program with everything you could ever need: thesaurus, spell checker, two column text, footnote and index generation, automatic date insertion, end notes, mathematical symbols etc etc etc. New version has mouse option. Frankly though a disappointment for the huge price; only any use if you're already committed to the program because of training – or if you can get it on expenses.

▲ Everything you could ever need in a word processor
▲ Exemplary manual
▲ Available on minis, mainframes as well as micros
▲ Good discounts for educational users (but still expensive)

▼ Vastly expensive
▼ Some very complex keystrokes for functions – must be learned by rote

VALUE FOR MONEY ★★★

● CHIWRITER

£92 • Shareware Marketing • 0297 24088

The word processor for scientists. Originally a shareware product, this word processor lets you design and use predesigned fonts for scientific use. Can cope with any mathematical symbols – even the most complex integrals for example. The most impressive WYSIWYG you'll ever see! If all you want is a word

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TV Modulator.....£15
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Phillips BM7502 12" green monitor.....£79
Phillips BM7522 12" amber monitor.....£89
Amiga To Philips cable.....£8
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2 Meg RAM Upgrade, plus in board with on/off switch.

AMIGA DRIVE

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1 Meg 3.5" internal.....£63
1 Meg 5.25" external.....£99

ATARI COMPUTERS

520 STE Power Pack.....£325
520 STE (Includes; Hype Draw, Hype Paint, ... Borodino)
520 STFM Explorer Pack.....£248
520 STFM Super Pack.....£329
520 STFM Power Pack,.....£322
1040 STFM Super Pack.....£399
1040 STE.....£389
1040 STE Power Pack.....£469
SM124 mono monitor.....£110
SC1224 colour monitor.....£229

ATARI DRIVES

1 Meg 3.5 external.....£68
1 Meg 5.25 external.....£99
1 Meg 3.5 internal.....£63

STAR PRINTERS

Star LC10 mono.....£135
Star LC10 II mono.....£165
Star LC10 colour.....£168
Star 2410.....£225
Star LC15 9 Pin 136 column.....£264
Star LC2415 24 Pin.....£328

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Panasonic 1081.....£125
KXP 1124.....£219
KXP 1180.....£144

CITIZEN PRINTERS

Citizen 120D.....£115
Citizen 180E.....£127
Swift 24.....£255
Colour upgrade for Swift.....£42

MANNESMAN TALLY

Mannesman MT 81 Dot Matrix.....£115
Mannesman Sheetfeeder.....£62
Mannesman Serial Interface.....£49

REPAIRS FOR AMIGA AND ATARI

processor that can handle the odd bit of maths, have a look at LocoScript PC before you decide between the the two.

▲ Handles any maths – integrals, complex set theory symbols etc
▲ Does foreign characters too
▲ Footnotes and font designer

▼ Limited as a word processor: no mail merge, word count only after spell check
▼ Only one document at once
▼ Hidden extra costs for hi-res or screen

VALUE FOR MONEY ★★★

● TOPCOPY PLUS

£109 • Innova Software • 0453 835379

Big brother of *Topcopy* – a very powerful and well-featured word processor. Verging on the 'big league'. Very fast – memory resident – and keeps everything reformatted as you go. Multi document handling together with the speed of operation makes it ideal for people who shunt text around a lot. good spell check and mail merge too.

▲ Memory resident
▲ Can import text from defined areas of underlying screens
▲ Auto reformats but still fast
▲ Three files on screen at once, handles up to six documents
▲ Spell checker and mail merge
▲ Very fast

▼ One or two useful commands missed or difficult to find
▼ No auto backup of files

VALUE FOR MONEY ★★★★

● GALAXY

£42 • Shareware Marketing • 0297 24088

A shareware word processor that resembles WordStar. Doesn't compete with ones you pay a hundred quid for, but for the price you get a program ideal for occasional use.

▲ Menus
▲ Spell checker
▲ Very reasonable price

▼ Restricted power – best for occasional user

ST

● 1ST WORD PLUS

£79.95 • Electric Distribution • 0480 496789

The big brother of *1st Word*, the program that comes with the ST, this handles graphics and can even capture screens directly in Degas format. Lots of good features, but the keystroke sequences can be a bit tedious.

▲ Reads Degas, *Neochrome* and Doodle format pics
▲ Spell checker
▲ Mail merger
▲ Multi column printing
▲ Fast and efficient
▲ Good display

▼ Keystroke sequences get tedious
▼ Have to save files before printing
▼ No index on manual!

VALUE FOR MONEY ★★★★

● WORD WRITER

£79.95 • Electric Distribution • 0480 496789

This is a great little WYSIWYG word processor without graphics facility but excellent text handling – spell checker, mail merger, thesaurus. Good shortcuts which you can make up yourself. Outliner included to help you structure your writing. Only grumble is with its layouts – having more than one in a document is very awkward.

▲ Spell checker, mail merger and thesaurus
▲ Excellent shortcuts – delight to use
▲ Outliner included to help you structure your work
▲ Good use of mouse

▼ Layouts restricted

VALUE FOR MONEY ★★★★★

● PROTEXT

£99.95 • Arnor • 0733 68909

For sheer text and file handling *Protext* stands out. It is fast, flexible and full of features; it has a good spell checker and mail merge facilities so powerful you can write program-like text and file handling routines. For writers and journalists this is a must. Although odd on the ST as it doesn't use GEM, *Protext* is really a powerful keyboard-driven text editor.

▲ Fast
▲ Spell checker
▲ Powerful mail merger
▲ Powerful macros
▲ Loads of extras – calculator, word counter, memory editor etcetera
▲ Two file editing

▼ Restricted WYSIWYG
▼ Ignores GEM totally
▼ Command driven – no menus

VALUE FOR MONEY ★★★★

● THAT'S WRITE

£129 • Cavendish • 01-323 4761

A powerful, non-GEM word processor that offers many features not found on many other programs. Produces great printed results and this machine is excellent for the 'printout-oriented' user. Font designer, facility to grab screens, WYSIWYG, automatic index and contents generation, hyphen control etc. included.

▲ Excellent printed results, good layout control
▲ Contents and index generation
▲ Good font use – font editor too
▲ Powerful macro system

▼ Manual dodgy
▼ No spell check/ mail merge/ graphics
▼ Funny screen fonts

VALUE FOR MONEY ★★★★

● WORDUP

£59.95 • HB Marketing • 0895 444433

This is almost a DTP package with some excellent features like graphic import, automatic text flow round graphics, lots of different type sizes and styles. Great for producing fancy and

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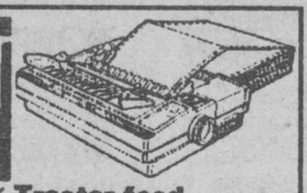
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▲ **Good choice of fonts**
▲ **Lots of control over style**
▲ **Graphics import**
▲ **Auto text flow around all the graphics**
▲ **Mail merger**

▼ **Can only print Wordup's fonts**
▼ **Best with a laser or a 24 pin printer**
▼ **No spell checker**

VALUE FOR MONEY ★★★

AMIGA

● PROTEXT

£99.95 • Arnor • 0733 68909

For sheer text and file handling Protext is the best Amiga text processor. It's fast, flexible and full of features; good spell checker and mail merge facilities so powerful you can write program-like text and file handling routines. For writers and journos this is a must. Odd on the Amiga as it doesn't use windows – it's really a powerful keyboard-driven text editor.

▲ **Fast**
▲ **Spell checker**
▲ **Powerful mail merger**
▲ **Powerful macros**
▲ **Loads of extras – calculator, word counter. memory editor etc**
▲ **Two file editing**

▼ **Restricted WYSIWYG**
▼ **No windows**
▼ **Command driven – no menus**

VALUE FOR MONEY ★★★★

● KIND WORDS 2

£49.95 • Amiga Centre Scotland • 031-557 4242

A good value budget word processor with spell checker and import of graphics. New version has thesaurus and British dictionary. New fonts and a few extra features included too.

▲ **Good standard word processor**
▲ **Spell checker**
▲ **Mail merger**
▲ **Graphic import**

▼ **Best for occasional user – no sophisticated layouts etc**

VALUE FOR MONEY ★★★★

● EXCELLENCE

£154 • Micro Systems (US) • 0101 407 7900770

Does everything *WordPerfect* does and more (see PC section) – checks your spelling as you type, imports graphics, checks your grammar and offers suggested improvements. For the really serious writer.

▲ **Graphics import**
▲ **Spell checking as you type**
▲ **Mail merging**
▲ **Grammar checker**
▲ **Contents/ index/ footnote generation**
▲ **And everything else**

▼ **Expensive – can you get what you need cheaper?**

VALUE FOR MONEY ★★★★★

PCW

● LOCOSCRIPT 2

£25 • Locomotive • 0306 740606

If you like *LocoScript 1* (which 8256 and 8512 owners get free) you'll love *LocoScript 2* (which 9512 owners get free). Faster than version 1 (but still slow) it can jump to a specified page instead of scrolling through, supports Cyrillic, Greek and mathematical symbols, works with any printer in the world, lets you design up to 16 characters yourself, and offers a range of add-on fonts for the printer. There's even a database add-on available separately, *LocoFile*.

▲ **Faster than version 1**
▲ **Unrivalled printer support**
▲ **Can make 16 design characters**
▲ **Greek, Cyrillic, maths symbols**
▲ **Extra fonts available**
▲ **Database available**

▼ **No word counter**
▼ **Still very slow**
▼ **Can't exchange printer codes**

VALUE FOR MONEY ★★★★★

● PROTEXT

£59.95 • Arnor • 0733 68909

For sheer text and file handling *Protext* beats everything else on the PCW hands down. Fast, flexible and full of features; good spell checker and mail merge facilities so powerful you can write program-like text and file handling routines. For writers and journos this is a must. The word counter is invaluable and block moves are so fast you'll wonder how you ever survived on *LocoScript*.

▲ **Breathtakingly fast**
▲ **Spell checker**
▲ **Powerful mail merger**
▲ **Powerful macros**
▲ **Loads of extras – calculator, word counter, two column printing etc**
▲ **Two file editing**
▲ **Vital if you use any CP/M programs (database/spreadsheet etc)**

▼ **Not good at handling complex layouts**

VALUE FOR MONEY ★★★★★

● MINI OFFICE

£30 • Database • 0625 878888

A five-in-one package, the word processing module doesn't quite rival LocoScript or Protext, but is nevertheless a full-featured and useful program. And you get a database, spreadsheet, comms and graphics module as well. Whatever you do don't buy the more expensive *Mini Office Professional Plus*, which boasts a spell checker and thesaurus: they're both very disappointing.

▲ **Fast, full-featured word processor**
▲ **Very fast word counter**
▲ **Exotic features – auto Roman page numbering, reversed out printing, double height characters**
▲ **Mail merge**
▲ **Database, spreadsheet, graphics and comms utilities included**

▼ **No accents or foreign characters**
▼ **No phrase facility**
▼ **Curiously flimsy feel**
▼ **No interchange of data between spreadsheet and word processor**

VALUE FOR MONEY ★★★★

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● NEWWORD

£70 • NewStar Software • 0245 265017

Very like *WordStar 4* but only ideal if you or those who will use the PCW were trained on that and can't manage anything else. Just possible some businesses would find it useful though not for the individual.

▲ Full featured word processor similar to *WordStar*
▲ Good at conditional merging, nesting and chaining of multiple documents and data files
▲ Very flexible and powerful

▼ Not as good as *LocoScript* or *Protext*

VALUE FOR MONEY ★★

CPC

● PROTEXT

£19.95 tape, £26.95 disk, £39.95 ROM • Arnor • 0733 68909

For sheer text and file handling Protext stands out. It's fast, flexible and full of features; good spell checker and mail merge facilities so powerful you can write program-like text and file handling routines. Get the ROM version – it's a delight to use.

▲ Fast
▲ Spell checker
▲ Powerful mail merger
▲ Powerful macros
▲ Loads of extras – calculator, word counter etc
▲ Two file editing

▼ Maximum 22K file size on disk, 38K on ROM
▼ Not good at handling complex layouts

VALUE FOR MONEY ★★★★★

● MINI OFFICE

£14.95 tape, £19.95 disk • Database • 0625 878888

Not a full featured word processor but nevertheless a very useful program. It is fine for occasional use – letters, the odd essay or article and so on. You get a database, spreadsheet, comms module and graphics utility free but they don't work they work separately from the word processor.

▲ Good basic word processor
▲ Database, spreadsheet, graphics and comms utilities included

▼ No interchange of data possible between spreadsheet/ graphics/ word processor
▼ Not as powerful as *Protext*

VALUE FOR MONEY ★★★

● TASWORD

£19.95 tape, £24.95 disk • Tasman Software • 0532 438301

Special versions for 464, 464D (using disk drive) and 6128 which uses the extra memory to best effect. Latter pair include mail merger. Fairly easy to get to know and it has comprehensive help screens. Screen operations can be slow but can also be customised for greatest speed.

▲ Good printer control handling
▲ Easy to use
▲ Simple mail merger
▲ Good help screens

▼ Can be a bit slow

VALUE FOR MONEY ★★★★★

● BRUNWORD

£30 (6128 disk) £25 (464 disk) • Brunning Software • 0245 252854

Complete package: word processor, spell checker which loads into the extra memory, and card filing program. 40, 80 and 128 column modes and fast screen response. Easy to learn and good value – possibly this has the edge over *Tasword* as the best CPC wp after *Protext*.

▲ Fast screen response
▲ Spell checker with 30,000 dictionary included
▲ Card filer included

VALUE FOR MONEY ★★★★★

C64

● EASY SCRIPT

£50 • mail order houses

Highly regarded word processor, but no longer in production; you'll have to try the mail order places. Get this if you can't get PaperClip

▲ Easy to use and well featured

▼ 40 column only

VALUE FOR MONEY ★★★★

● PAPERCLIP

£50 • mail order houses

In many people's minds, the best of the 8-bit word processors around. Again, you'll have to phone round mail order places to get hold of one, but it'll be well worth it.

▲ Two documents open simultaneously in widows
▲ 40 or 80 column modes
▲ Spell checker
▲ Macros facility

▼ Difficult to find!

SPECTRUM

● TASWORD

£13.90 48K, £19.95 Plus 2, £24.95 Plus 3 • Tasman Software • 0532 438301

Special versions exist for each machine. Easy to get to know and comprehensive help screens. Screen operations slow but can be customised for greatest speed. A versatile and well featured program. This is the only real word processing option for Speccy owners.

▲ Good printer control handling
▲ Easy to use
▲ Simple mail merger
▲ Good help screens

VALUE FOR MONEY ★★★★★

BEEB

● WORDWISE PLUS

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Beeb. Only works in 40 column (with an 80 column preview) but does everything very quickly and intuitively. Can slap print control codes in the middle of a document and hence control any printer if you're prepared to dirty your hands with the manual. Macros also can be set up. Also available on ROM.

▲ Fast and intuitive
▲ Flexible printer control
▲ Good macro facility
▲ Available on ROM

▼ Only 40 column
▼ Must be technical to use printers to fullest

VALUE FOR MONEY ★★★★

● INTERWORD

£56.35 • Computer Concepts • 0442 63933

Part of a series of programs – *Interbase, InterSheet* etc – which work as an integrated suite. Available on ROM, 80 columns, spell checker etc. Easy to use and offers most facilities you'd find on a word processor of this price.

▲ Spell checker
▲ ROM version available
▲ Can link up with other Inter- product to form integrated suite
▲ Easy to use

VALUE FOR MONEY ★★★★

● VIEW 3

£44.95 on ROM • Micro power • 0532 436300

A perfectly usable word processor. Works in 80 columns.

▲ Fast and on ROM
▲ Good usable word processor

▼ Limitation on length of document

VALUE FOR MONEY ★★★★

ARCHIE

● 1ST WORD PLUS

£79.95 +VAT • Acornsoft • 0223 245200

The Archie can use all the BBC word processors thanks to its built-in emulator, and, if you buy a PC emulator, those as well. (It would be best to go for a fast PC program such as *Tasword* or *Topcopy* resident in memory).There's not much choice among Archie word processors, but this port across from the ST version is a good fast and easy to use program. Spell checker included and works in graphics mode giving good graphics capabilities – you can import them into documents easily. Not restricted to a particular printer

▲ Fast and easy to use
▲ Good graphics capabilities
▲ Good spell checker
▲ Multi column printing
▲ Good display

▼ Keystroke sequences get tedious
▼ Have to save files before printing

VALUE FOR MONEY ★★★

QL

● TEXT 87

£45 • Software 87 • 33 Savernake Rd, London NW3 2JU

Probably the best of the word processors you can buy – Quill comes free with the QL of course and is quite adequate for most basic uses. Fast, handles text in columns, has lots of fonts and displays most of them on screen.

▲ Good powerful word processor
▲ Multi column
▲ Much faster than Quill
▲ Good range of fonts

▼ A bit complex to use

VALUE FOR MONEY ★★★★

ATARI 8 BIT

● ATARIWRITER

£37.95 • mail order houses

Good disk-based word processor with plenty of features. You'll have to phone round the places that sell Atari 8 bit software mail order.

▲ Spell checker
▲ Two column printing
▲ Two document editing
▲ Good block handling

● PAPERCLIP

£50 • mail order houses

In many people's minds, the best of the 8-bit word processors around. Again, you'll have to phone round mail order places to get hold of one, but it'll be well worth it.

▲ Two documents open simultaneously in windows
▲ 40 or 80 column modes
▲ Spell checker
▲ Macros facility

▼ Difficult to find!

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4 x 1 7/16	9.96	21.43	38.52
4 x 1 15/16	13.09	28.83	52.13
2 ACROSS			
2 3/4 x 15/16	6.39	13.17	23.04
2 3.4 x 1 7/16	7.61	15.96	28.30
3 1/2 x 15/16	7.13	14.87	26.17
3 1/2 x 1 7/16	9.52	21.70	36.83
3 1/2 x 1 15/16	12.96	28.57	51.78
4 x 15/16	8.04	17.00	30.22
4 x 1 7/16	9.96	21.43	38.52
4 x 1 15/16	12.78	28.09	51.26
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3 1/2 x 1 7/16	8.48	18.04	32.13
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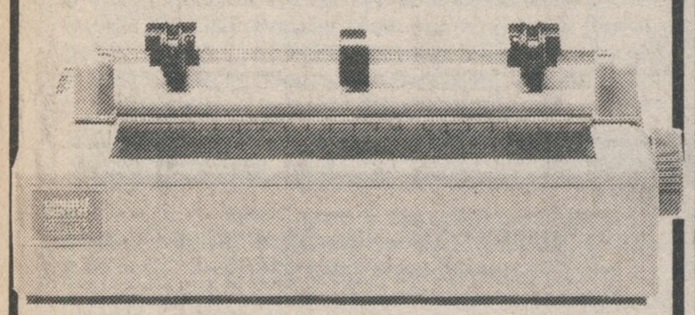
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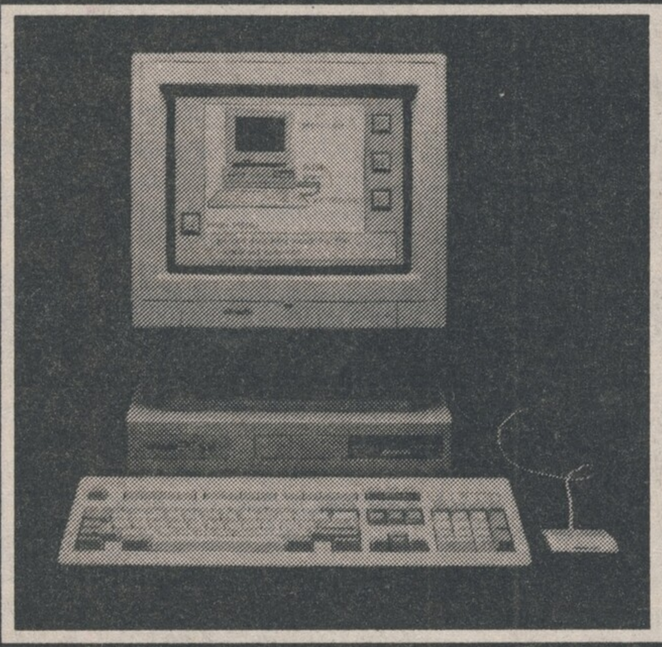
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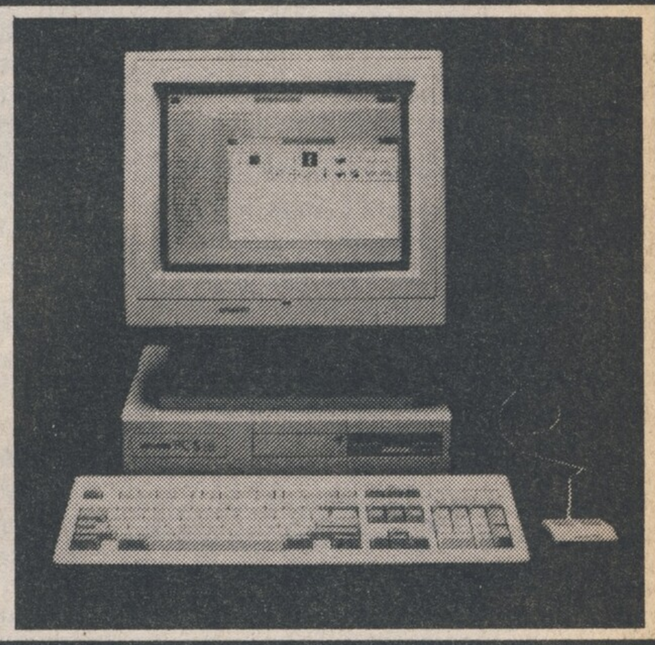
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EURO AT 512K S/D	£675	£805	£890
EURO AT 512K D/D	£765	£895	£980
EURO AT 1MB S/D	£761	£891	£976
EURO AT 1MB D/D	£851	£981	£1066
EURO AT 512K H/D	£975	£1105	£1190
EURO AT 1MB H/D	£1061	£1191	£1276

Schneider Accessories

3.5" External Drive	£72
5.25" External Drive	£99
20Mb External Hard Disk	£269
40Mb External Hard Disk	£379
Monitor Stand	£14

All Schneider PC's & AT's include
Microsoft Works, DOS & Manuals
+ 12 months on-site warranty.

COMMODORE

MODEL	MON	COL	EGA
PC/XT COMPATIBLE			
PC10 III-S/D 640K	£444	£566	£687
PC10 III-D/D 640K	£497	£621	£746
PC10 Bundles inc. Framework, mouse & MPS 1230 Printer			
PC10-D/D	£740	£896	£1013
PC10-HD40MB	£896	£1013	£1130
PC20 III-HD 640K	£631	£749	£868
PC30-286HD 640K	£935	£1052	£1130
AT80286 COMPATIBLE - VGA'S			
PC40-40MB 1 MB	£1291	£1462	
PC40 + TAPE	£1559	£1759	

Includes 12 months on-site warranty

PORTABLES

MAKE	MODEL	PRICE
AMSTRAD + Phone	PPC512S	£360
AMSTRAD + Phone	PPC512D	£467
AMSTRAD + Phone	PPC640S	£445
AMSTRAD + Phone	PPC640D	£552
SHARP	4602	£863
SHARP	4641	£1463
SHARP	5541	£2330
SHARP	7221	£1699
SUPERSPORT	D/D	£977
SUPERSPORT 286	20MB	£2237
SUPERSPORT 286	40MB	£2657
TURBOSPORT 386	40MB	£2797
AKHTER 286-3200	20MB	£1695
SCHNEIDER	PC7640	£1418
SAMSUNG S5200	32MB-AT	£1693
VICTOR V286P	30MB	£2499

AMSTRAD

MODEL	MON	COL	EGA
PCW8256	£310		
PCW8512	£395		
PCW9512	£424		
PC1512SD	£360	£437	
PC1512DD	£437	£513	
PC1640SD	£451	£536	£621
PC1640DD	£512	£597	£682
PC1640HD	£682	£768	£853

	Mono	Col	12"	14"
PC1286SD	£750	£835	£920	£1005
PC1386SD	£1180	£1265	£1351	£1436
PC2086SD +SOFT	£531	£617	£702	£787
PC2086DD + SOFT	£595	£680	£765	£851
PC2086HD + SOFT	£765	£851	£936	£1021
PC2286DD	£851	£936	£1021	£1106
PC2286HD	£1021	£1106	£1191	£1276
PC2386HD	£1702	£1787	£1872	£1957

All genuine models not upgraded in any way

HYUNDAI

Note, Base units only.
Monitors are separate.

Model	Mono	Col	EGA	VGA
SUPER 16-TE PC/XT 640K 10Mhz Metal Case				
Super 16-TE S/D	£361	£361	£455	£511
Super 16-TE D/D	£430	£430	£524	£580
Super 16-TE HD30	£561	£561	£655	£711
286C 8/10MHZ 512K RAM				
286 S/D	£749	£749	£749	£859
286 HD30	£949	£949	£949	£1059
386SX 8/16 Mhz 1MB RAM				
386 S/D	£959	£959	£959	£1069
386 HD30	£1159	£1159	£1159	£1269
386C 8/20 Mhz No Wait States 1MB RAM VGA				
386C S/D	£1279	£1279	£1279	£1279
386C HD40	£1599	£1599	£1599	£1599

SAMSUNG

Model	Mono	CGA	EGA
All the following Systems are without Monitors. Please refer to monitor box.			
PC/XT			
SPC3000/1 S/D	£405	£405	
SPC3000/2 D/D	£473	£474	
SPC3000/3 HD20	£677	£677	
AT80286 10Mhz			
MFC6000/1 S/D	£812	£812	
MFC6000/2 S/D	£1015	£1015	
SPC6500/3 HD20	£1151	£1151	
AT80286 12Mhz 1MB VGA			
SPC6512/1 S/D	£1015	£1015	
SPC6512/3 HD20	£1219	£1219	
SPC6512/4 HD40	£1354	£1354	
AT80386 20Mhz 2MB EGA			
S800 D/D	£1693	£1693	£1693

All Samsung Computers include 12 months
on-site maintenance.

MITAC

Model	Mono	Col	EGA
88 512K	£586		
88 20MB HD	£790		£1102
1000L PS/2	£730	£930	VGA'S
1000L PS/2	£963	£1163	VGA'S
286SL HD20	£1030	£1209	£1332
286SL HD42	£1163	£1342	£1465
286V HD42	£1463	£1663	VGA'S
286V HD102	£1930	£2130	VGA'S
286VE HD42	£1596	£1796	VGA'S
286VE HD10	£2063	£2263	VGA'S
386 HD42	£2330	£2568	VGA'S
386 HD102	£2796	£3130	VGA'S

All MITAC Systems come complete with 12
Months on-site warranty.

VICTOR

MODEL	MON	COL	EGA	VGA
VPCIIC S/D	£949	£1149	£1399	£1449
VPCIIC D/D	£1099	£1299	£1549	£1599
VPCIIC HD30	£1499	£1699	£1949	£1999
V286C S/D	£999		£1299	£1499
V286C D/D	£1499		£1799	£1999
V286C HD30	£1999		£2299	£2499
V286C HD50	£2199		£2499	£2699
V286A HD30	£2099		£2549	£2599
V286A HD50	£2299		£2749	£2799
V286S HD50	£2499		£2949	£2999
V286S HD70	£2699		£3149	£3199
V386S HD50	£3299		£3749	£3799
V386S HD70	£3699		£4149	£4199
V386S HD110	£3899		£4349	£4399
V386S HD230	£5299		£5749	£5799
V386T HD70	£5999		£6449	£6499
V386T HD230	£7699		£8149	£8199
30MB ADD-PAK	£399			

MONITORS

MAKE	12" Mon	14" Mon	14" CGA	14" EGA	Mono VGA	Colour VGA	Multi Sync
PHILIPS	7502 £63	7713 £89	8833 £199	9093 £296	7749 £116	9609 £296	
	7513 £77		9043 £261	9043 £261		9809 £374	
	7913 £81		9053 £296	9053 £296			
SAMSUNG	2573 £76	4573 £85		4531 £299	2611 £85	4531 £299	4551 £397
AMSTRAD	12MD £119		14CD £199		12HRCD £294	14HRCD £383	
AKHTER	ACL12G £60	ACL14G £85	VISION £199	ACL-3 £259	ACL-VM £110	ACL-V £289	ACL-M £355
HITACHI						480 AUTO £358	

Notice: All Samsung Monitors come with
12 Months on-site maintenance

ATARI & AMIGA

MODEL	PRICE
ATARI 520ST-FK + Power Pack	£309
AMIGA 50 + BATMAN Pack	£318
1MB External Disk Drive Amiga	£63
1MB External Disk Drive Atari	£71
42MB External Hard Disk both	£399
Amiga to Scart Monitor Cable	£7.69
Atari to Scart Monitor Cable	£7.69
Amiga Dustcovers	£4.95
Competition Pro Extra Joystick	£10.59
Philips CM8833 Colour/Stereo	£199
Atari SM124 High Res Mono	£115

BITS & PIECES

Model	Price
Akhter Modem V21-V22-V22Bis-V23	£119
Acco-in line 64K Buffer Par	£95
Logitech Serial Mouse + Software	£73
20Mb Hard Card 2 yr Warranty	£189
30Mb Hard Card 2 yr Warranty	£195
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3.5" 720K Floppy Drive	£59
3.5" 1.44Mb Floppy Drive	£69
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Mouse Mats	£4
80 col Printer Muffler	£49
132 Col Printer Muffler	£53
80 col Desktop Printer Stand	£28
132 col Desktop Printer Stand	£32
Screen Filters	Call
Electric A4 Copy Holder	£94

NOVEL NETWORKS

NETWARE 386 V3.0	£4020
NETWARE SFT V2.15	£2596
NETWARE Advanced V2.15	£1660
NETWARE ELS LEV II V2.15	£864
NETWARE ELS LEV I V2.0A	£338
NE1000 Ethernet Card	£185
NE 2000 Ethernet Card	£286
NE/2 Ethernet Card	£286
NE 1000 Compatible	£139
NETWORK Drivers	Call
COMMS Products	Call
BTRIEVE File Management	Call
XTRIEVE File Management	Call
REPORT Generators	Call
XQL Database Management	Call
UPGRADES	Call

POPULAR SOFTWARE

Aldus Pagemaker V3	£450
Xerox Ventura V2	£520
dB Publisher	£275
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Timeworks DTP	£79
Framework III	£325
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Sage Sterling Payroll 2	£129
Sage Sterling Job Costing	£129
Sage Sterling Accountant	£162
Sage Sterling Accountant +	£259
Sage Sterling Fin Controller	£324

Sage Payslips - £28, Statement - £28,
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Wordstar 2000 V3	£245
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STAR FR15 ★	300/56	£379
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STAR LC24-10	200/67	£189
STAR LC24-15	200/67	£319
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STAR XB24-15 ★	240/80	£495
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KXP 1595	288/65	£309
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KXP 1124	192/63	£220
KXP 1540	288/65	£400
LASER PRINTERS		
KXP 4450 ★	11PPM	£1269

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MODEL	SPEED	PRICE
9 PIN DOT MATRIX		
120D PAR	120/25	£102
120D SER	120/25	£119
180E PAR	175/30	£123
180E SER	175/30	£149
MSP15E	160/40	£164
MSP40	240/40	£199
MSP45	240/40	£239
MSP50	300/60	£285
MSP55	300/60	£399
24 PIN DOT MATRIX		
HQP 40	200/65	£259
SWIFT 24	160/60	£245
LASER PRINTERS		
OVERTURE 106	6PPM	£930
OVERTURE 112	12PPM	£1289

EPSON

MAKE	SPEED	PRICE
LX400	180/30	£130
LX850	240/48	£178
FX850	264/54	£351
FX1050	240/48	£293
EX800	300/60	£402
EX1000	300/60	£530
DFX5000	533/400	£1087
LQ400	180/60	£189
LQ550	180/60	£255
LQ850	264/88	£394
LQ1050	264/88	£543
LQ860	290/88	£499
LQ1060	290/88	£639
LQ2550	400/133	£831
TLQ4800	250/83	£1437
SQ850	600/198	£575
SQ2550	600/198	£863

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LASER JET IIP	4PPM	£879
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MODEL	SPEED	PRICE
DM100SPR	200/30	£123
DM105SPR Colour	200/30	£154
DM282	240/40	£216
DM282S	240/40	£245
DM292S 136 col	240/40	£307
DM250	240/60	£402
DM250L 136 col	240/60	£458
DM400 136 col	400/100	£867
DM704 136 col	400/100	£1053
DM309	360/66	£269
DM309L 136 col	360/66	£356
LASER PRINTERS		
PG 306 ★	6PPM	£899
PG 208 ★	8PPM	£1199
PG 303 ★ Postscript	8PPM	£2595

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MODEL	SPEED	PRICE
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CANON LBP8 III	8PPM	£1390
CANON LBP8 IIIT	Dual Bin	£1815
CANON LBP8 IIIR	Duplex	£1923
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CANON IX-31F Scanner Int/face		£113
CANON OCR Software		£304

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MT905	6PPM	£889
SHARP JX-9300	6PPM	£1063
KYOCERA F1000	10PPM	£1459
KYOCERA F1200	10PPM	£2369
KYOCERA F2200S	10PPM	£2569
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BROTHER HL-8e	8PPM	£1369
BROTHER HL-8D	8PPM	£2189
BROTHER HL-8PS	8PPM	£2524
BROTHER HL-8QS	8PPM	£2929

LASER TONERS
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Hyundai-910 10"	216/37	£128
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ACL 135 10"	135/27	£119
ACL 480 10"	480/55	£299
ACL 700 15"	480/55	£399
18 PIN DOT MATRIX PRINTERS		
Hyundai 1810 10"	240/100	£229
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WANTED: Amiga 500, must include at least a modulator, games and manual(s) offer around £250. Tel: Chris (03552) 39613, evenings or all day Sunday.

ATARI ST wanted including software and joystick. Must live near Peterborough. Ring (0733) 43474 after 4.00pm each day. Prepared to pay up to £200.

SUPER ROM for Tandy 100 also spreadsheet for Psion Organiser. Tel: Roger 0702 467881 after 6pm.

WANTED original Apple II+ manual/s in good condition. Tel: 0302 782722.

DOES a football pools forecasting program exist IBM compatible. Contact Chris 0332 383850 ext. 4267 office hours. 0332 559207 home.

EPSON LX80 sheet feed or tractor feed wanted. Phone Oundle 0832 280535.

WANTED PC compatible 5 1/4" disk drive - good working order but must be cheap. 051 606 0644.

WANTED: Role playing games for C64; Might and Magic, Wizardry two and three, Phantasie one, and any other difficult to find American originals. Roland 01 250 1910.

WANTED! Atari 1050 Disk Drive for spares. Also ROM Cartridges for XL/XE, pay cash or software. Dave, 8 Carfield, Skelmersdale, WN8 9DL. Tel: 0695 32818.

SWAP Batman, Barbarian II, Kick Off, Populous, Ballistix, Dungeon Master, Gauntlett II, Street Fighter, & others for D/S external drive or other hardware. Phone Dave 0249 890139.

HAS anyone got Arcade games for sale for MSX machines? Do you want any swaps or tips then write Ian, 6 Naseby Close, Westwood, P'Boro, PE3 7DE.

WANTED Amstrad DDI 3" disc drive complete, good condition, pay up to £60. Phone 061 (Manchester) 338 3923.

WANTED IBM comp PC, CGA, EGA, monitor etc. Will pay postage, carriage - £350 or less. Gordon Mackie, 100 Cartmore Road, L/gelly, Fife, KY5 9NX.

SWAP Miracle Technology WS4000 modem for copy of Director and Tool Kit or second drive for Amiga. Phone 01 550 4416 after 6pm.

ANY games for the MSX on cartridge or CD or tape and CD? Games for the Pioneer MSX computer plus any games or Public Domain demos on Amiga. Contact:- 0322 341648.

WANTED issue 5 of a PCW magazine called "8000 Plus" Phone Phil (0923 775787) after 8pm or weekends.

BOARD games on Amiga wanted. Any bargains to offer a poor beginner. Open to information on other types of games. Tel: 0274 306028.

WANTED CPC Firmware manual (Soft 968). Pay any reasonable price & P & P. Write to:- Colin Barrow, 72 Pladda Avenue, Irvine, Ayrshire, Scotland, KA11 1DE.

HELP! Wanted Amiga A500 Keyboard. Mine is damaged beyond repair. Also top cover, can anyone help? Also Amiga contacts. Tel: 0284 705448.

SWAP C64 lightgun and games for cartridge or joysticks or software including Microprose Soccer (tapes) or W.H.Y. Nick 55, Hawthorn Crescent, Arnold Nottingham, NG5 8BE.

ST adventure swap. Mine - Fish/Kult/Lurking Horror/ Shadowgate/Uninvited/. Yours- Personal Nightmare/Space Quest 3/ Manhunter. Originals! Write Saurav, 8 Wellington Road, London,

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MSX cassette or cartridge based wordprocessor for Toshiba HX10. Reasonable price paid. Tel: 0747 824372 after 6pm.

MODEM wanted for 48K Spectrum. Write Barry Brogan, PO Box 2695, Canberra, ACT 2601, Australia.

ATARI XE, wanted games, cartridges or cassettes, any considered. Please send list, Will pay postage both ways. Phone 0255/553643 evenings.

ANYONE got pokes for CPC disk version of Strider or Rambo III. Please send to Carl Surry, 37 Fairfield Way, Barnet, Herts, EN5 2BQ. Thanks.

AMIGA 3.5-inch external disk drive wanted immediately (720K). Willing to pay up to £45. Also TV modulator wanted. Phone Ackeel on 01-701 0739 after 7pm.

FAULTY printer wanted, most makes considered, any size or condition. Good price paid. Tel: 0633 254656.

CPC disk swap. Have Trivial Pursuit Marsport. Want Tasword 6128. Qualitas, Interface 2, or offers. Please contact Tim Holyoake at: Tythe Farm Cottage, Peatling Magna, LE8 3UP.

WANTED! Guru number spotter seeks and any naff, quirky, or damaged programs to complete collection. Tel South Uist: 376400.

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I can help with spares for Amstrad Commodore Sinclair computers, also TV and Video recorders. Can anyone help new Amiga operator? Ring Paul on 0332 760353.

MIMI 802 help! Erased system disc please phone 0737 823498 ask for Stupid John.

SOMEONE who can video digitise photos, mags etc..... will gladly sound sample anything they want done – write now! To: Neil Mansell, 53 St Marks Road, Canvey Island, Essex, S58 9NJ – don't delay!

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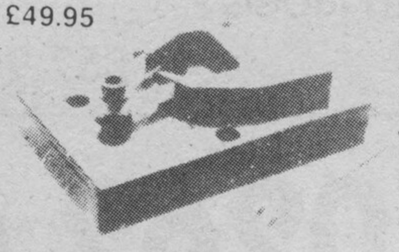
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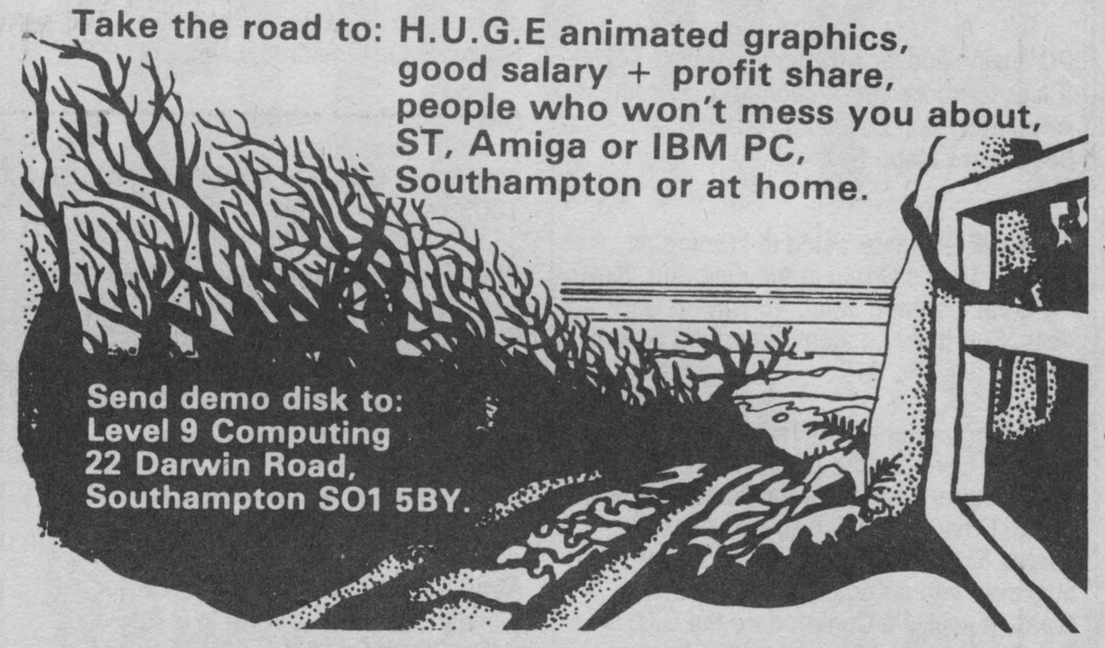
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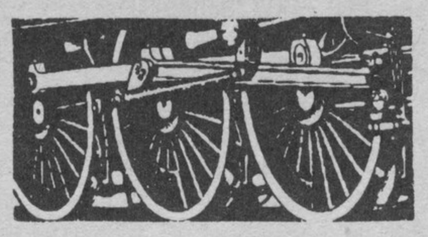
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KENT youth computer group at the Bowen Youth Centre, Kingsnorth Road, Ashford, Kent. All makes of computer. Write to Kris for details.

LAMER? Want to swap software, tips, demos and form a Lamers against Lamers Society? Then contact, Faisal Patel, 73 Track Road, Batley, W. Yorks, WF17 7AB.

LIST the low income ST User Group for students and the unemployed send two blank disks to Marcus, 9 Days Green, Chapel Street Mary, Ipswich, Suffolk IP9 2HZ for details.

NINTENDO contacts wanted for swaps and setting up of User Group! Write to: Ashley Middleton, Amberley, Park Drive, Little Aston Park, Sutton Coldfield, B74 27A, 100% reply.

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SOLIHULL, West Midlands Atari ST User Group meet second Tuesday of every month, other machines also accepted especially ARC's and even Amiga's. Phone 0564 770132 after 6.30 ask for Richard.

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ST contacts wanted if into Agtomation or any other, then write or phone 110% reply, almost. Lee Edwards, 24 Topllan Road, Glan Conwy Clwyd, LL28 5NP tel: 0492 580447.

ST user: Help!, I'm Australian and have just bought an ST (used to own a C64 in Oz) Anyway, I am looking for good contacts and also anyone in Bradford interested in starting a users group. Contact David Marshall, 5 Highfield Road, Five Lane Ends, Bradford, W.Yorks.

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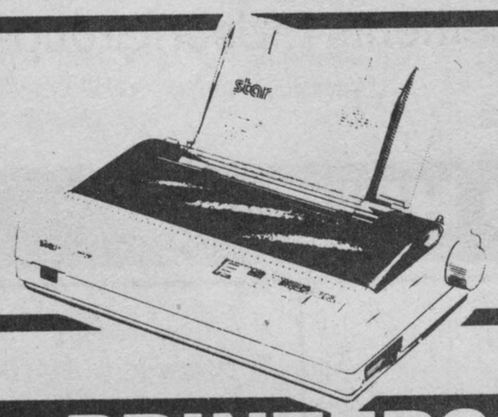
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CD: THE FUTURE OF EDUCATION?

The recent British Educational Technology Show served as the launch pad for Acorn's CD-ROM drive which it promises will revolutionise computing in schools. Andy Storer took it for its first spin.

"Acorn is committed to the future of multimedia in schools," claims Chris Humphries, Acorn's education sector manager. "The powerful combination of RISC technology and CD-ROM will provide exciting and innovative educational uses of the new medium."

Given the public profile of the Archimedes and the BBC A3000 – overpriced machines dominating the educational market – the introduction of a CD-ROM drive for £750 won't appear expensive. For although companies like Hitachi offer such drives for less than £500, Acorn has has worked closely with the Cambridge-based Next Technology Corporation – of the CD-ROM drive – to ensure its new baby is as future-proof as possible.

Capable of storing 550Mb of information – equivalent to 250,000 pages of text, 5,000 photographs, 72 minutes of high quality audio, or a combination of all three – the drive also offers 0.4-second average access times, claimed to be twice as fast as the competition. Besides being compatible with CD discs from other machines using the High Sierrra and ISO9660 formats, it also supports the fledgling CD formats of CD-ROM XA, DVI and CDI, making it an upwardly compatible system. In addition, Next Technology has developed a CD-ROM pressing facility so that user-originated software can be permanently transferred for less than £300.

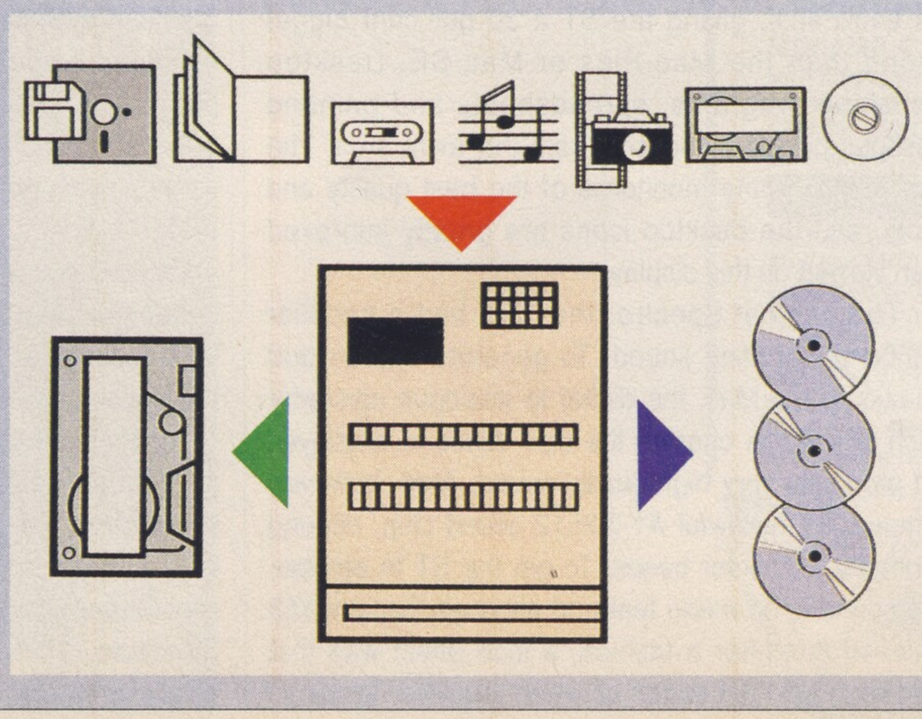
This makes the price seem more reasonable, but the clinching factor is – wait for it – the system's networking capabilities. For the CD filing system used is compatible with Acorn's Econet local area network, and thus enables a single Archimedes CD-ROM to be networked to other Acorn computers to provide access to a central CD-ROM resource bank – a facility not previously available. The SCSI interface used allows up to 20 CD players to be daisy-chained with a single card, providing a central information resource with many different disks available simultaneously. In an ideal Acorn world – perhaps some cathedral-town public school with a six-figure equipment budget – a whole classroom could study history, geography or whatever discipline you care to mention without there being a single book in sight!

Realistically though, the unit will perhaps be something of a lonely soul for the foreseeable future until a mass of educational titles make the journey over to the new format. NERIS, the National Education Resource and Information Service, and Virgin are said to be developing new CD-ROM applications. In the meantime the medium will largely be used for read-only applications as a super-duper hard disk. As such, graphics from the CD-ROM can be imported into software packages such as *Draw* and *Desktop Publisher,* while animation sequences can be generated to accompany audio CDs. Audio can also be processed via sampling and sequencing software to explore sound and musical compositions.

PRESS YOUR OWN CD

Next Technology is offering its 'Pressed For Time' CD-ROM production facility to cater for most types of compact disc, ranging from standard audio discs to discs containing data, text, graphics, sound, speech and video. Although large-scale replication is available, the service offers one-off pressing for as little as £300. Ideal for that truly personalised birthday greeting!

Data can be imported in the form of floppy disk, DAT cassette, 35mm slides, photographs, VHS videotape, Video 8 or microfiche. MS-DOS and Apple Mac file formats.



CD REVOLUTION

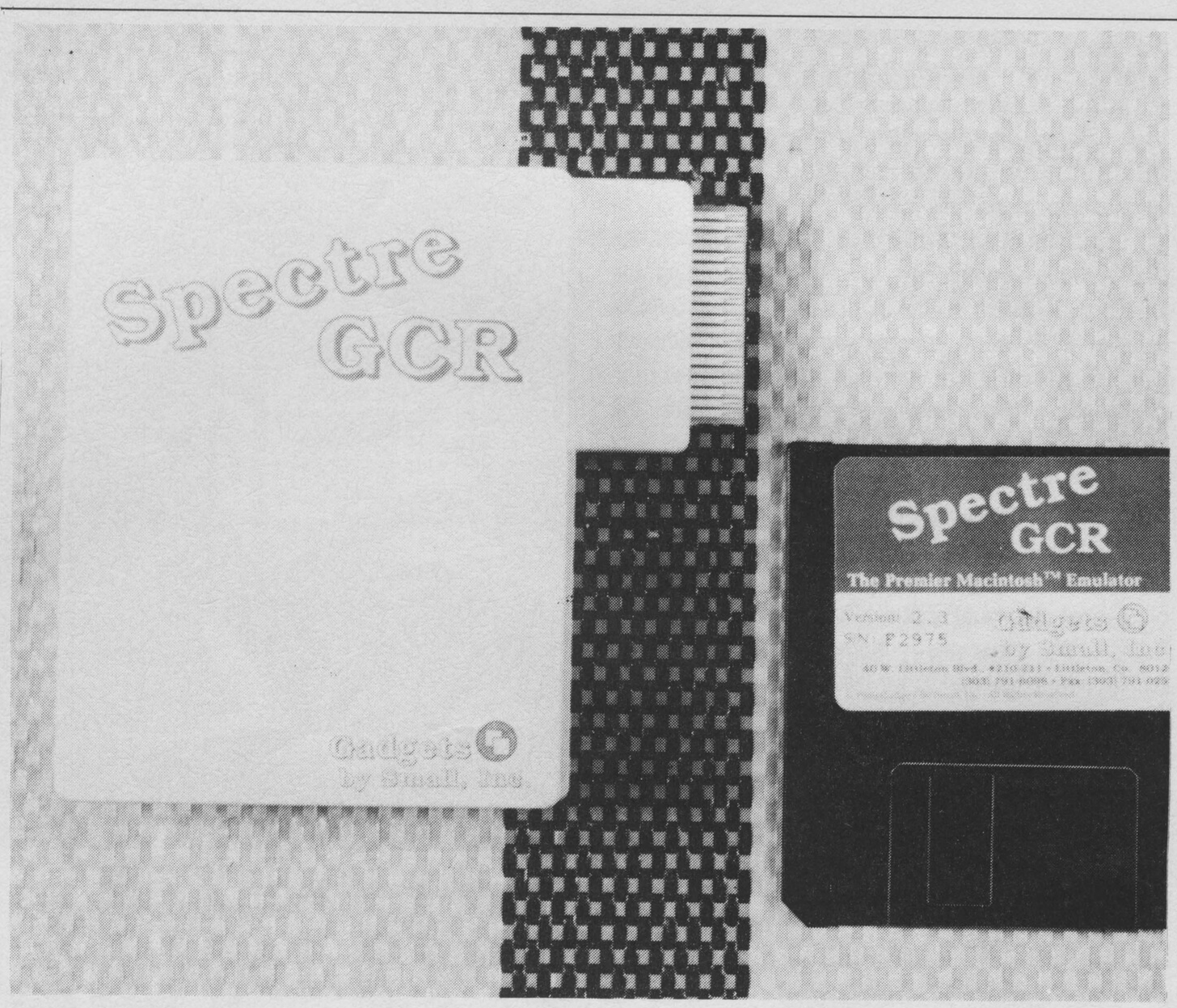
CD sales now total several billion, with more than 50 million players around the world. Information is stored in the form of pits on the disc, representing the binary 0s and 1s of digital data, which are read by laser. With 550Mb of data at their disposal the operative word for educationists will be 'resource'. Expect to see everything from the *Mozart Resource Suite* to *A History of Tropical Rainfall 1924- 1990 Resource Pack III* on a classroom shelf near you soon.

Seriously though, the implications for the way in which subjects are taught is enormous, since the medium opens up the whole area of interactive tutition. Here a student may define his or her own interests and explore them at will in his or her own time. Given Acorn's strength in the education market and some long overdue cash injection from the Government, CD-ROM might just transform those boring old history lessons into exciting adventures. ■

● ***The Acorn CD-ROM drive costs £600, with its SCSI interface an additional £150. The drive comes with utitlity software, clip art images and audio tracks. Acorn dealers will be selling the drive from March, with schools able to buy an A3000 multimedia system for under £2,000.***

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SPECTRE HAUNTS THE MAC

At last true Macintosh emulation is possible on the ST, with a cartridge that can read and write Mac disks directly. Jerry Glenwright sampled the power of the GCR...

Why are so many manufacturers creating hardware-based emulators for the Atari ST? Dozens of devices provide the ST with every kind of mask from PC to Atari 8-bit, and high in that list of look-alike machines is the financially-remote Apple Macintosh. The Mac is a machine which resembles the ST, but has a much more sophisticated user interface and software a universe apart in terms of quality.

Magic Sac was the first Mac emulator which, unfortunately, refused to work properly. Next came Aladdin, a truly excellent emulator which was restricted to the now-dated 64K Apple Mac ROMs. With the advent last year of Spectre 128 from an American company, Gadgets by Small, the way was clear for full emulation using the more up-to-date 128K ROMs. Although good, Spectre's great stumbling block was its inability to read Macintosh disks directly.

The boffins at Macintosh decided it was a good idea to use an unusual method of disk control, involving variable disk rotation speed and a recording method known as group code recording (GCR), as opposed to the ST, Amiga, PC *et al*'s MFM or modified frequency modulated. The former is a very different animal from the latter, and is extremely difficult to emulate without starting from scratch.

The latest product from Gadgets by Small is the Spectre GCR and, you guessed it, the device performs Mac emulation, uses 128K ROMs *and* (and it's a big 'and') enables users to put genuine Mac disks directly into their ST drives and read them with ease. No more complicated procedures involving transferring data and programs via serial cables. That's the biggest selling point, but just how good is Mac emulation on the ST?

PLUG IN

Spectre GCR is housed in a plastic box which affixes to the ST's cartridge port and sits alongside the machine. Two sockets at the rear of the device connect to the disk drives. Power for the Spectre is drawn from the cartridge port, so there's no extra three-pin plug vying for power at your mains outlet.

To emulate a Mac, insert the Spectre into the cartridge port, plug in the drives and boot up the accompanying utility disk. Double click on `SPECTRE.PRG`, press [Return] once and you're prompted for a System/Finder disk. Satisfy this request and you're regaled with the renowned smiling Mac, a 'Welcome to Macintosh' message, and, hey presto, your ST is a Mac Plus. No messing around with serial cables, funny disk formats and the like, but simple, easy-as-a-Mac to boot-up emulation. It really is amazing. Your ST *is* a Mac Plus. Pick up a disk, any disk, and put it in the drive. Moments later, just like the Mac, the disk's icon appears on the desktop. You can run programs, format disks, delete files or perform any operation. The only limitation is your ability to afford expensive Mac software.

SOUND AND VISION

The ST offers a high-res screen resolution of 600 x 400 pixels, giving it a larger screen than the tiny Mac offering. Because most Mac software determines the kind of screen it is running on and changes automatically, almost all programs take advantage of this extra size, giving the ST a 30 per cent bigger screen than the Mac Plus or Mac SE. Desktop publishing programs, spreadsheets and painting packages benefit immensely from this extra area. The Atari monochrome monitor is of the best quality and clarity, and the desktop icons are greatly improved when viewed on this display.

The original Spectre, the 128, had a peculiar method of handling sound. To generate buzzes and squeaks in the Mac, the digital to analogue converter which is used to operate the disk drives is employed and produces very high-quality sound. Atari, however, plumped for the awful AY-3-8512 sound chip, offering archetypal computer beeps. To get the ST to emulate Mac sound is no mean feat and although Spectre 128 achieved this after a fashion, a side effect was that often sound did not switch off when required. To put an end to its continuous droning, users were required to switch it off manually, using the Esc key – an unsatisfactory solution!

There's none of that with the GCR. Sound is as clear as a bell, and all sounds end when they're supposed to, rather than when you've decided you can take no more. There's a considerable amount of public domain software available for the Mac, and one of the more popular programs is the aptly named *SoundMaster.* This enables Mac users to patch digitised sounds into the operating system. So, for example, if you eject a disk from the drive you are played the sound of a person throwing-up. Horrid, but amusing. Switch the machine off, and just before the screen clears the Mac will tell you (in HAL's voice from *2001: A Space Odyssey*) 'My mind is going...', and attempt to delete a System file and the angry Mac will shout (just like John Cleese) 'You silly sod!'. All of these sounds work perfectly and to hilarious effect with the Spectre GCR.

Why do I tell you all this? Partly because these anecdotes demonstrate the remarkable quality of sound provided by Spectre, and partly to tell you just how compatible the Spectre is. Sure, the emulator will run Quark *Xpress*, *MacWrite, MacPaint, Digital Darkroom, CricketGraph* – even *HyperCard,* but that's what you would expect. All those programs are written

to exacting standards and follow strict programming guidelines. PD programmers however, are not known for their kid-glove treatment of the Mac. Delve in and get your hands dirty is their philosophy. And if PD programs such as *SoundMaster* and the various RAM disks, print spoolers and comms programs are compatible, then you can be sure that the Spectre is very good.

SPEED TRIALS

Many emulators, not only those attempting Macintosh emulation, work at a snail's pace. They emulate, but at a cost to speed. But due to the two machines' vaguely similar architecture, and the rather faster processor in the ST, speed of application execution is actually increased by 20 per cent on the Atari. Incredible as it may seem, you can run software intended for the Mac 20 per cent faster and with a 30 per cent larger screen than when running on the original machine. DTP, painting and other programs positively run, not walk, and those used to using Macs in the workplace will really appreciate the extra rate.

Disk drives can pull in data at almost twice the standard ST rate, despite the difficulties performing group code recording and variable drive speed – really quite amazing.

VERDICT

It's precisely because the ST is such a powerful tool that it is used as the basis for so many emulators. Indeed, since the launch of the machine, a multiplicity of journalists have ensured that Mac–ST comparisons have become a cliché of the more down-market hobbyist magazine. But now, with the Spectre GCR, the cliché becomes reality.

Plug in the GCR and your ST is a Mac Plus for slightly more than half the price of the genuine Apple machine. And the emulator will give you access to some of the best DTP, painting, drafting, spreadsheet and word processing programs ever written, and a huge PD base.

By way of summarising then, the Spectre GCR is a very high-quality product that deserves absolutely every penny of its less-than-exorbitant asking price. So it is without hesitation that I say – If you can afford it, buy it. ■

TECH SPEC

Offers 30 per cent larger screen than the Mac Plus and Mac SE
Offers 20 per cent increase in speed
Supports A, B and C versions of the latest 128K ROMs
Shipped complete with ROMs
Fully-compatible with Mac format disks. Simply plug them in and go
Has a built-in drive cache for extra speed
Supports both monochrome and colour monitors
Full sound compatibility
Supports Atari mouse
Supports all hard drives
Supports serial and parallel ports
Supports Atari laser and standard dot-matrix printers

TESTING, TESTING

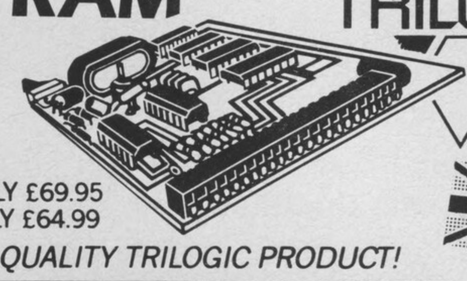
The following programs were tested and found to be fully compatible:
Quark Xpress
Aldus PageMaker
Ready, Set, Go!
Digital Darkroom
HyperCard
CricketGraph
MacWrite
MacPaint
MacDraw
Various versions of System and Finder

EMULATING: THE PRICE

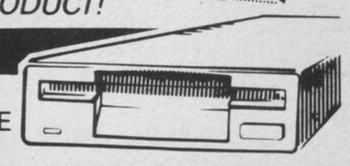
A quick look at the balance sheet shows why Mac emulation is so popular:

Mac Plus	£995.00
Mac HD20	£650.00
VAT	£256.75
TOTAL	£1,891.75
1040STFM	£499.00
Spectre GCR	£379.00
20Mb hard disk	£389.00
SM124 monitor	£130.00
TOTAL	£1,397.00

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HARDWARE

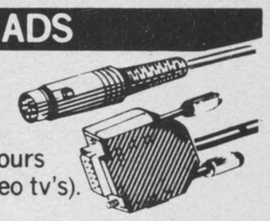
A500 BATMAN PACK	£379.99
A590 HARD DRIVE	£379.99
RAM CHIPS FOR A590 TO GIVE UPTO 2 MEGS	£45.00/512K
PHILIPS CM8833 STEREO COLOUR MONITOR	£244.99 FREE CABLE
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STAR LC10 COLOUR PRINTER	£214.99 FREE CABLE
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REPLACEMENT MOUSE + MOUSE HOLDER & MAT	£29.99

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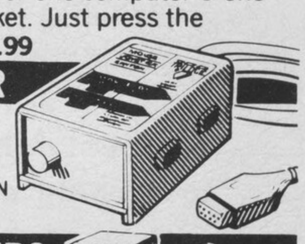
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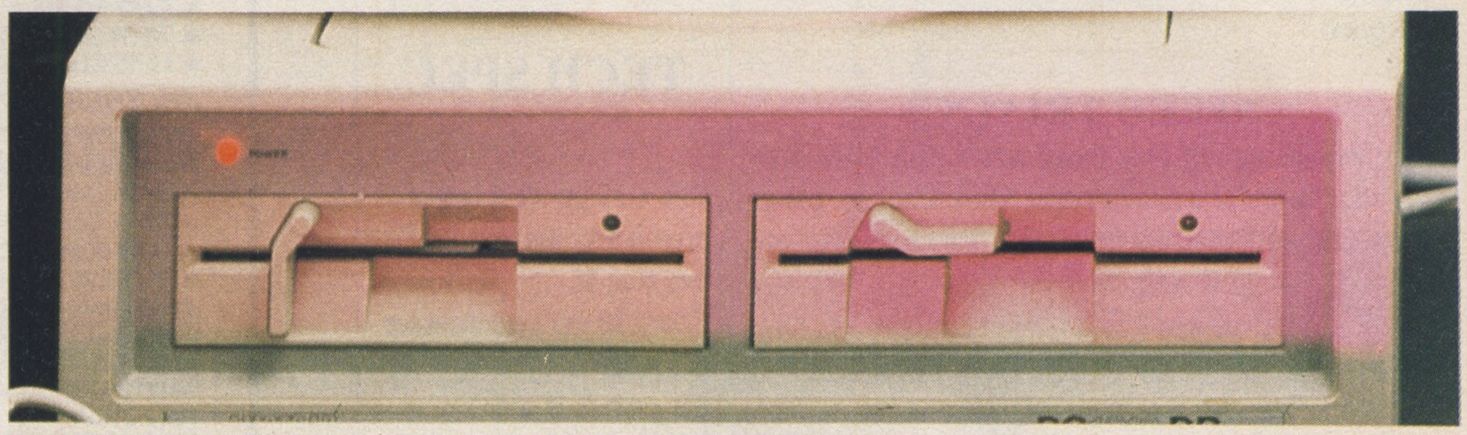
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In the third part of our eight-part series on PC-compatible computers , Mike Hardaker looks at data storage, exploring the world of floppies and hard cards, and examining the options for the future.



Disks are the PC's filing cabinets. When data is not actively being processed by the CPU it is stored on disk, just like putting a paper folder in a filing drawer when you have finished looking at it for the moment.

Most PC disks are 'magnetic media'. This means that they store the computer's data on a magnetic surface not unlike that found on a cassette tape. Disks are much quicker in day-to-day use than tapes, however. Just as it is easier and quicker to find a particular track on an LP record than on an audio cassette – because it is possible to jump tracks almost instantaneously – a given piece of data can be retrieved more quickly from a disk than a computer tape.

The two main types of PC disks are floppy disks and hard disks. Floppy disks are so called because the magnetic layer is placed on a flexible sheet of plastic which is, yes, floppy. This sheet of plastic is sealed in a relatively robust cardboard or plastic case to protect it. Floppy disks (also called diskettes) can be removed from their drives, in the same way that LPs can be taken off a record deck.

Hard disks have a hard platter. This is built into the drive as a permanent feature, allowing the whole device to be built to a stricter, standard than is possible with a floppy disk. For this reason, a hard disk of a given diameter is usually able to hold at least 10 times as much data as a similarly-sized floppy disk. The hard disk is probably the single most desirable extra if you have a basic PC, more useful than a pretty graphics display or a faster CPU. Many programs now require the user to have a hard disk since they cannot fit on to a single floppy, so if you want to run one of these applications a hard disk is an essential. Also, if you are dealing with large amounts of data, floppies are incredibly unwieldy. The article you are reading, typed with a simple word processing package, uses up some 15,000 characters of disk storage – a blockbuster novel could well eat up half a dozen floppies! A hard disk can swallow such documents with ease. Graphics programs also make a hard disk necessary, since many single pictures are bigger than a floppy disk.

Tape *is* used on some PCs, but only for long-term storage, or keeping duplicate copies of data. As tape is so much slower than disk, it is not suitable for day-to-day use, but it does provide a handy (and relatively cheap) way of storing old data for security purposes.

The latest medium of data storage to gain a foothold in the PC world is the optical disk. Various types exist, of which the most common are the WORM (Write Once, Read Many) drive and CD-ROM (Compact Disc Read-Only Memory). At the moment, optical storage is still very expensive and the standards have not yet been fully agreed. It does seem likely to be the medium of the future, however.

1 FLOPPY DISKS

The first PCs in 1981 came with a port for attaching a home cassette recorder and a single floppy disk drive. This took 5.25-inch floppy disks and wrote on only one side of the disk to provide 160K (163,840 characters) of storage. These disk drives did not last long and if you are offered one today you should refuse it. Although other PC users will be able to read files you have written on a 160K disk, you won't be able to read any files which were written to any other format. Since no software is available on 160K disks, the format's limitations are obvious.

The standard disk for the PC and XT is the 5.25-inch double-sided, double-density floppy disk, formatted to provide 360K of data storage. Most software is issued on this format and most PCs can read disks you have written with a 360K drive. For all but a few specialised applications it is still the most useful sort of disk drive you can have.

The PC-AT generally uses special drives which can use high-density, double-sided drives to give 1.2Mb (1,258,291 characters) of storage. Software which can only run on AT-class machines (not the humbler XTs) is often shipped on 1.2Mb disks. These drives can read the lower density 5.25-inch disks, but occasionally have problems writing to them. If you have an AT, but regularly need to transfer data to an XT, it is worth having a 360K drive as well as the 1.2Mb version to make sure your data is not corrupted.

In the past three years, the 3.5-inch disk (as used on the Atari ST, Commodore Amiga and Apple Macintosh) has gradually become a strong second standard in the PC arena. There are two sorts of 3.5-inch disk – the 720K and the 1.44 Mb. 720K disks are the standard on those XTs which use the 3.5-inch form factor (PC-ese for 'size') and 1.44Mb for ATs. 1.44Mb drives can both read and write 720K disks but the opposite is not the case. 3.5-inch drives are the standard for portable PCs because of their smaller size, but are increasingly being seen on desktop machines since IBM embraced them in 1987, and gave up on the 5.25-inch disks.

Every PC must have at least one floppy disk, otherwise you can't get anything in and out of the thing. How many disks you have is a matter of personal preference, but in today's environment a single-floppy PC is not really practical. Any serious PC has at least two disk drives, although only one of these has to be a floppy. For any sensible use at all, two floppies represents the minimum configuration, with a floppy and a hard disk being preferable.

On the whole, 3.5-inch disks are the better bet. They are more resilient than 5.25-inch disks because of their rigid plastic case, and they hold more data. However, some software (particularly the budget sort) is still only available on 5.25-inch. Check this before buying. The ideal PC would have a 1.2Mb drive, a 360K drive and a 1.44Mb 3.5-inch drive, together with a meaty hard disk.

2 HARD DISKS

The first hard disks held 10Mb of data. Now, such items are rare, as Parkinson's Law has ensured that modern software expands to fill the disk available.

The smallest hard disks now seen are 20Mb in size. This is enough for most everyday uses, if you stick to conventional, text-based processing. The next size up is generally 32Mb, which is better. The 32Mb disks score over the 20Mb variety because they use a different, more efficient way of encoding the binary data on the disk platter. This is known as RLL (Run Length Limited) rather than MFM (Modified Frequency Modulation). The acronyms are pretty meaningless but it's worth remembering the letters.

Bigger disks – and 300Mb is by no means unusual now – use yet more standards. These are ESDI (Enhanced Small Device Interface) and SCSI (pronounced 'scuzzy' – Small Computer System Interface). There is little to chose between these two, but SCSI is becoming a stronger standard so is probably a safer bet.

The key thing to look for when buying a hard disk is its speed. Although it is not generally realised, the disk is the most common constraint on a PC's performance – far more than the CPU. A PC with a slow CPU and a fast disk will frequently out-perform one with a quick CPU but a poor disk.

The two ways in which a disk's speed is measured are its access time and its data transfer rate. The

WHEN IS A DISK NOT A DISK?

When it's a credit-card disk, of course. The latest generation of super-small, Filofax-sized PCs don't use conventional disk drives, which are too large. Instead, they use special cards for holding the data. These look like credit cards, but hold up to 1Mb of data. The technology is certainly attractive, but it is pricey (up to £100 per card) and lacking in an accepted standard. The great thing about the floppy disk is that every other PC user has one.

Also new on the scene are 2-inch floppies. Zenith is using these in its new MinisPort, an A4-sized laptop. Although rather charming to look at, these too have yet to establish themselves in any way, so a bit of waiting and seeing probably would not come amiss.

access time tells you how long it takes the read/write head (the equivalent of a record deck's stylus) to reach the data you require. On a 20Mb disk, 65 milliseconds is average, with a higher number being poor. On larger disks, 28ms is establishing itself as a good target speed. The largest disks are very fast – with 18ms not unusual – but they are also very expensive. Data transfer rate – how quickly the data moves from the disk to the CPU – is rarely quoted in advertisements, so you will probably have to go by the access time. However, if you are given a choice of transfer rates remember that the higher, the better.

A 40Mb disk with a 28ms access time will be suitable for the majority of users. This sort of disk provides today's optimum compromise between performance and cost.

HARD CARDS

Hard disks require some further hardware called the hard disk controller. This acts as an interface between the PC and the disk.

Some disks, however, come on the same circuit board as the controller. These are called hard cards and they fit in the PC's expansion slots. They are particularly useful for people who have no space in their computers for a conventional hard disk (which sits in the main chassis like a floppy disk). People who have twin-floppy Amstrads are particularly keen hard card purchasers – the Amstrad PC1512 and PC1640 can hold only two storage devices on the main chassis.

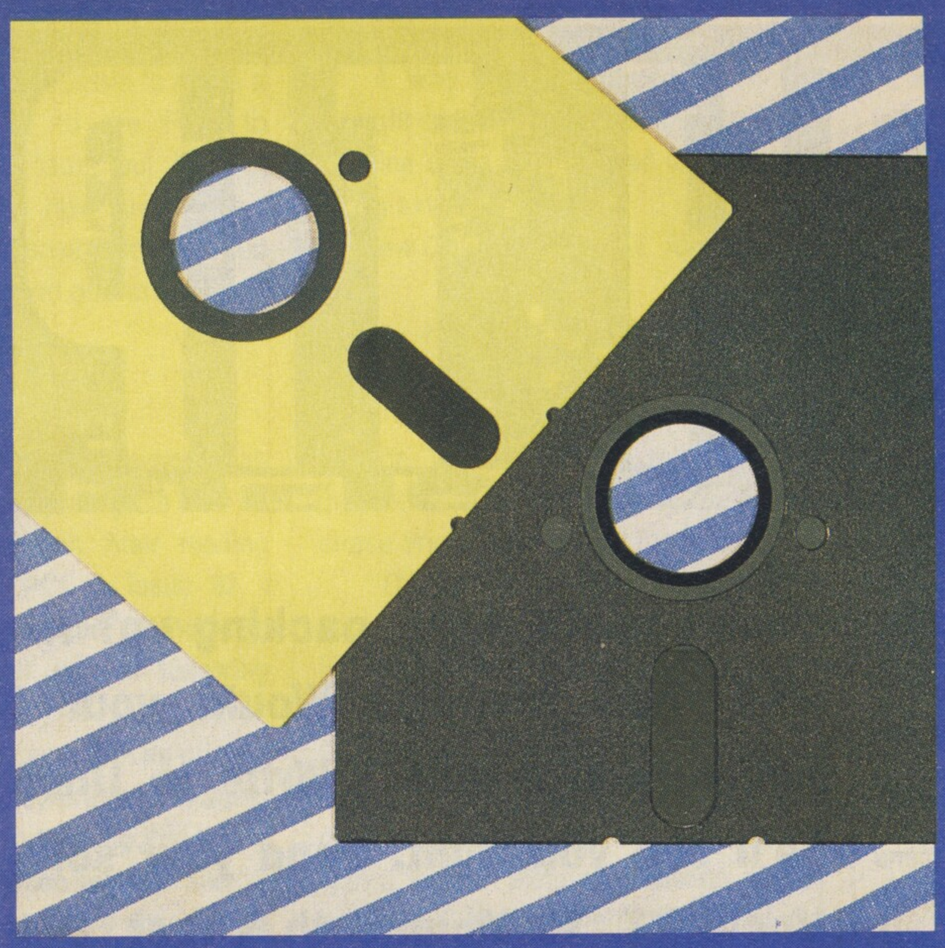
There is no reason why a hard card should be any better or worse than a conventional hard disk. However, some users feel they break down slightly more frequently. If you buy a hard card, the best advice seems to be that you should check you have a rock-solid 12-month guarantee.

OPTICAL STORAGE

CD-ROM (Compact Disc Read-Only Memory) is the booming product in this area. As their name suggests, CD-ROM disks cannot be written to by the user, only read. Therefore, they are primarily a distribution medium for software and large chunks of data. Since a CD-ROM disk holds 400Mb of data, it is ideal for distributing things such as *Encyclopaedia Britannica* and *The Oxford English Dictionary*. Also, CD-ROM is expected to grow in importance as disk-hungry multimedia software involving real-time video expands.

WORM (Write Once, Read Many) drives are slightly different in that you can write data to disks. You can't change it once you've done so, however, so the applications are limited. WORM drives are used by companies who must leave an audit trail of every transaction they perform, since the unerasable nature of the WORM disks ensures data security and integrity. Also, WORM drives are tipped to replace tape as an archiving medium. The WORM disks share tape's advantage of costing little per megabyte, but unlike tapes, the data can be accessed quickly – just as with a conventional disk.

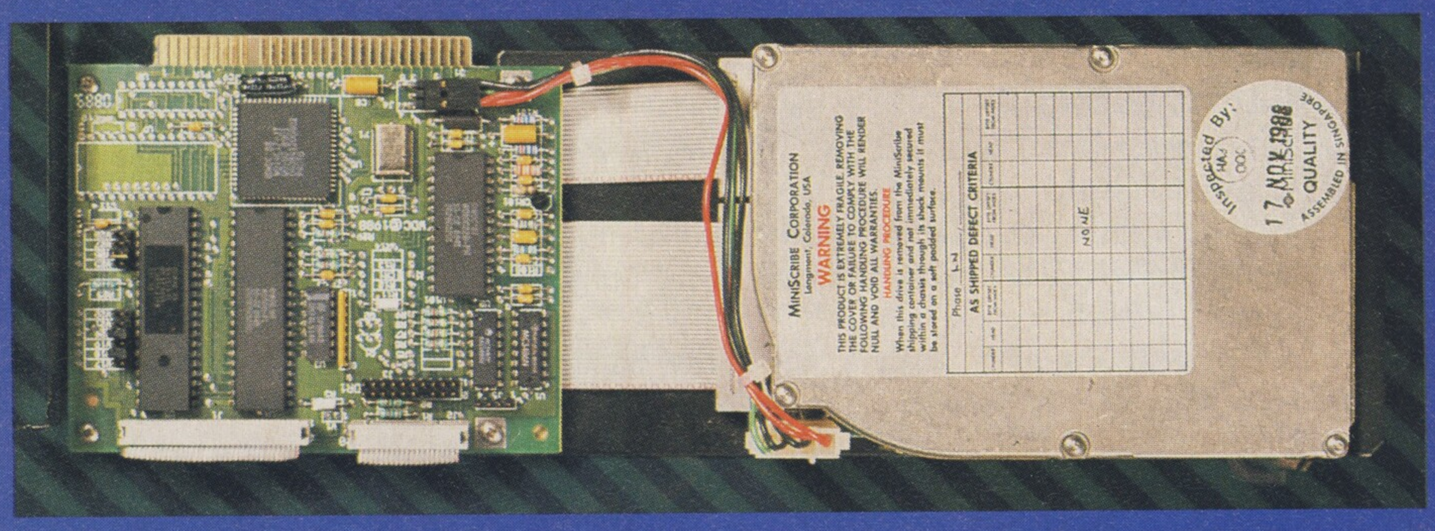
At the moment optical storage is a young technology. This means that it is still very expensive, but also that it has not yet settled down into a standard. The future is expected to bring CDs which can be written to and erased just like a magnetic disk. This may or may not happen, but it probably makes sense to wait for a while and see if it does. ■



1 *The first PC floppy disks were 5.35-inch disks holding 160K. The current standard is till the 5.25-inch disk, but these can now hold 360K (the 'double density' disks) or a massive 1.2 Mb (so-called 'high density disks'. From high-street retailers, floppies are comparatively expensive – buying a minimum of ten at a time from a mail-order outlet can save pounds.*



Taking over from the 5.25-inch floppy disk is the increasingly-popular 3.5-inch disk. It is smaller and more resilient than its predecessor. 3.5-inch disks come with either 720K or 1.44 Mb of capacity (the one labelled HD in our picture is one of the larger capacity disks). Astute Amiga, ST or Mac owners may notice that these look the same as their floppy disks. This is because they are the same.



2 *This is a hard card, but it shows all the elements of a hard disk in one neat package. The disk drive itself can be seen to the right. This is completely sealed in so you'll just have to take our word for it that there is a disk in there. The disk is linked via a strip of ribbon cable to the controller circuitry. On a conventional hard disk, the disk drive and the controller circutry are mounted in separate parts of the computer – the hard card keeps them in one place.*

PC DISKS: THE HARD CHOICE

TECH TIPS



TIP Psion of the times

In answer to Andrew Button wishing to connect his Psion Organiser to his Commodore Amiga. The folowing is a setup that I use:

1. In the Psion comms/setup menu set: baud=9600, parity=none, bits=8, stop=1, hand=all, protocol=XMODEM, echo=local, width=none, timeout=none, REOL=<LF>, REOF=<SUB>, RTRN=#<HT>, TEOL=<LF>, TEOF=none, TTRN=<HT>#

2. Run Amiga PD program Comm (on Fish disk 71) and configure using the menu to select checksum mode.

3. Psion to Amiga: use Psion transmit option and Amiga XMODEM receive option.

4. Amiga to Psion: use Psion receive option and Amiga transmit option.

This method will only transfer text files i.e. OPL program source and data files. Files such as diaries are stored in a compressed and coded form, and they don't make a lot of sense if transferred.

When editing on the Amiga, make sure that spurious blank lines are removed from the end of the file otherwise when re-transmitted to the Psion, lots of dummy records (data files) or blank lines will be appended.

Steven Lomas, Bath, Avon

Does your PC keep packing up? Is your Amiga less than friendly? Would your ST try the patience of a saint? Write to Uncle Tech Tip, he'll see you right. Send your sorry stories to Uncle TT, 30 Monmouth Street, Bath BA1 2AP. There's a prize for the most pitiful tale

HELP! XEcellent!

I have a Panasonic KXP1081, and I also have a Spectrum computer and an Atari 130XE. I use the printer on the Spectrum via a Ramprint interface, but the Spectrum is old and my question is this: can I use the printer on the 130XE utilizing a similar cable like the one you recommended to A Oliver in *Express* issue 62? I know it was a different computer and printer than mine, but I remain hopeful.

William Jack, Airdrie, Lanarkshire.

The Panasonic KXP1081 is an incredibly popular dot matrix printer which, due to its standard parallel interface port, can be connected to a variety of home and small business microcomputers. Unfortunately, the Atari 130XE – as with many early home machines – has no parallel port but rather, uses a hybrid serial affair ensuring that you have to purchase printers offered by Atari.

To counter this and therefore fill a niche in the market, many third-party hardware suppliers market an interface which plugs into the serial port and enables you to connect any parallel printer.

One of the best of these parallel interfaces is the Atari 850 interface. Costing £55, it will enable you to make full use of the KXP1081. Contact current distributor Computerhouse on 01-731 1276. The device has the added advantage of providing a proper RS232 serial port too. You'll be able to connect FAX, modems and the like.

HELP! ST trio

1. Will it do any harm to leave a colour television and an Atari SM125 monochrome monitor plugged into my 520STFM at the same time.

2. Does anyone make a lead to run an Amstrad mono monitor with a Spectrum +2a?

3. Using *1st Word Plus* on an ST with two drives, how can I run the program on drive A: and keep the files on drive B:?

Allen Suddell, Grays, Essex.

1. Absolutely no harm whatsoever can come to your machine or either device by leaving them both plugged into the ST. You will, however, have to remove the monitor cable before a picture will appear on the television. But the TV lead does not need to be removed in order that the monitor can be used.
2. No – unless anyone out there knows differently. Hang on, isn't that a cliche of the rather poorer-quality TV program?
3. Simply run the program from a disk inserted in the A: drive, select Open File from the File menu and when presented with a standard GEM file selection window, click once in the portion containing the current drive and directory path.

You will then be presented with a blinking cursor. Press the escape key and type in `B:\*.*`, don't press return but move the mouse pointer to the Close icon in the corner of the file list window and click once.

You will now be provided with a list of the files and directories on the B: drive. Select the file you wish to open or create a new file in the usual way. Saving the document will automatically take place on drive B:.

HELP! Big hard 'un

When will your magazine do a feature on hard drives for most of the popular micros? If not in the forseeable future, I wonder if you can answer some of the following queries. I'm relatively new to these devices, and I am saving up for an Amiga hard drive.

1. What's the difference between a partitioned hard drive and one that isn't?

2. Do hard drives have start-up sequence scripts like ordinary disks when auto booting?

3. Do they all contain sockets for internal memory expansion like the Commodore A590?

Thus far I have been advised to look out for two drives: the 40-meg Vortex drive and the 40-meg Triangle offering. Which one if either, would you recommend if you were looking at reliability, speed and expandibility?

Simon Lee, Crumpsall, Manchester

A thousand and one Technical editors up and down the country smirk smugly when asked a question like your opener. The answer, of course, is that as long-term, loyal readers will testify, we did do a definitive feature detailing hard drives and those available for all the popular micros (in fact all micros) way back in issue 22.

Just in case you've only recently discovered the best weekly read on the newsstands, a copy will be shipped directly to your door upon receipt of 75p – need I tell you that the sum includes postage and packing – at our Somerton back-issues address (*Express* Back Issues, The Old Barn, Somerton, Somerset).

Meanwhile, because you're desperate for answers, and because it will take a few days to rush your handsomely-tooled back issue to you, here are answers to the questions in your letter.

1. Unlike floppies, hard drives can store a truly-enormous amount of data and programs. If you just bunged information onto the hard drive willy nilly, however, you'd soon end up with so many files you wouldn't be able to find anything.

In order to combat this undesirable situation, the hard drive can be split up into a series of small chunks which appear to the user to be drives in their own right. For example, you may have a 20Mb hard drive broken into one 10Mb partition named and referenced C: and two 5Mb partitions named D: and E:.

All of these drives are known as logical drives – as opposed to physical drives – and can be accessed individually and treated as though they were three completely separate devices. Of course, partitioning isn't permanent, and you can re-assign space at any time by re-partitioning the drive.

2. They do indeed, and you can design these so that particular programs are run upon booting, installing print spoolers, RAM disks and the like.

3. No, this feature depends upon the individual drive, the manufacturer, the model, but mainly – as with most things – upon the price. With hard drives, the old adage about paying for what you get certainly applies.

I would plump for the Vortex drive. Quality construction and excellent pricing make this device stand out above the inflexible disk crowds at the computer store.

HELP! Sinclair Amiga

I have recently acquired a Sinclair S-12mm mono monitor. Could you please advise me if it is possible to connect this model of monitor to my Amiga A500 and if so, how do I go about it?

Peter Hand, Sale, Cheshire.

The Sinclair S-12 is a monitor aimed firmly at the IBM PC compatibles market I'm afraid, and as such, cannot be con-

I'm afraid, and as such, cannot be connected to Commodore's Amiga computer. Nice try Pete, but it simply won't work.

HELP! Portable link

I have a Cambridge Z88 portable computer, which is quite satisfactory for my everyday computing requirements. The problem is that there is a limited amount of memory on the unexpanded computer and this very quickly gets used up.

Also, I would ike to save files on disk to safeguard against battery failure. Now I am aware that there are standard packages for the Z88 PC link and Z88 BBC link (I have also seen an Amiga Z88 link) but I have not come across a similar package for a Z88 Spectrum link (well, fancy that! – Uncle TT), do you know if one exists? If not, how can I go about making one?

I have a 48K Spectrum with an Interface 1 and a Disciple interface with disk drive. Can you let me know how the RS232 serial cable is wired to allow communication. Please, could you also print a sample program for both computers.

Can you please advise me on the use of rechargeable batteries on the Cambridge Z88. I have read somewhere that the voltage these give is not suitable for my machine, but it seems a litle strange that the designers of the Z88 portable didn't take this into consideration. What do you think?
David M. Turvey, Enfield, Middlesex.

As far as I know, there is not a single manufacturer or supplier of a link to connect the Z88 and Sinclair Spectrum. I guess the logic is that if you can afford the Z88, you probably own a machine slightly more upmarket than the Spectrum.

However, as you have an RS232 port, all is not lost. You need to make a cable to connect the two machines – but then you know that already – and here's how to do it...

Acquire two connectors one for the Spectrum end, one for the Z88. I must confess a lapse of memory, and I cannot remember the type of connector built into the Interface 1. No matter. Maplin is an excellent supplier of all things connector-ish and can be contacted on 01-748 0926.

Solder these connectors to a length of cable with the following connections: 2 to 3, 3 to 2, 4 and 5 together at each end and 6, 8 and 20 together at each end. In order to transmit files, you're going to need some communications software for both machines. Probably the best source for this would be the reader classifieds in Shopping Express. You could try an advert yourself – for free!

Although the rechargeable batteries situation may seem strange to you, in fact it is one which applies to many portable computers. The Amstrad PPC portable PC is an example. There simply isn't enough muscle in nickel cadmium batteries to successfully drive those machines. It is possible to make a slight circuit change to the PPC to enable it to use ni-cads, but I'm not about to tell anyone how to do it – I don't want to be responsible for wrecked machines and breached guarantees.

HELP! PC OAP

I have recently become the owner of an old IBM PC model 5150, complete with an IBM 5151 mono monitor. After reading *Express'* article on PCs in issue 62, I decided to put pen to paper in the hope that you could clear up the following queries for me:

1. The machine came with its original monochrome display-printer adapter board. Am I correct in thinking that this is in fact a Hercules video adapter and as such, will work with software specifying a need for Hercules?

2. Could my monochrome monitor cope with CGA and EGA if I fitted the appropriate graphics adapter? If the answer is yes, am I right in believing I could run the software requiring CGA/EGA with the colour signals being displayed in one of 16 shades of green?

3. The disk controller card has a 37-pin female D-type connector out of the back of the machine. Is this there in case you want to connect an external drive?

4. Why does 64K of memory consist of eight chips on the system board and yet nine chips are required to make 64K on my extension card?
Andrew Collis, Edginswell, Torquay.

1. No. Hercules is a high resolution video adapter card developed by a third-party widget manufacturer. In order to provide your computer with Hercules graphics capabilities, you must purchase and plug in one of these cards.

The video adapter as standard in your machine is known as MDA, and it is the basic text-only display present in all PCs.

2. Yes and no. With a CGA card installed in your machine, the monochrome monitor will provide you with a 'colour' picture consisting of grey scales. EGA is a different kettle of display standards altogether, and requires an EGA-compatible monitor in order to display anything.

3. Yes. Although the more usual method employed to connect a second drive is to run a second cable – twisted, in order to distinguish between the two drives – from the 34-way pin connector on the card to the drive.

4. Aha, that lovely old chestnut! Although only eight chips are necessary to create 64K of RAM, the ninth is used by the PC as a parity check to guarantee the validity of data coming from memory. ■

HELP! ST internals

I own an Atari 520STM with a third-party 1Mb drive and an Atari SF354 0.5Mb drive. Can you tell me if it is possible to replace the drive mechanism of the Atari drive with one of the many 1Mb internal-replacement drives advertised for the 520STFM?

If this is possible, which make of drive unit should I buy? I have seen drives advertised from NEC, Citizen, Epson and others, and I am concerned about how protected software will operate with these different units.
Andrew Bradbury, Fearnhead, Warrington.

Perfectly possible I should think, alhough the SF354 case may require a modicum of re-modelling in order to create an outlet for the disk eject button of a replacement mechanism.

One of the best replacement-drive mechanisms is that marketed by Evesham Micros. The device costs a very reasonable £79.95 and is of quality construction. Contact Evesham on 0386

HELP! Monitor mayhem with just a smidgen of cheek!

I've got lots of monitor questions:

1. Is RGB output as sharp as SCART?

2. Out of RGB, composite and TTL, which of these offers better clarity?

3. There are a few monitors in my price range: Commodore 10845, Phillips CM8833 and the Sony KV TV/monitor. Which is the best?

4. How do I get stereo from my STE?

5. When does the light gun for the STE come out?

6. Has the Cruiser joystick got autofire?

7. Is the Philips 8CM852PRO any improvement to the 10845?

8. What is the 1084P?

9. My Multiface is incompatible with my STE. What should I do?

10. How can I make an autofire circuit for a joystick?

11. Is the Datel copier any competition to Blitz Turbo?

12. Are you handsome?
Geoffrey Chan, Surrey

Phew! A bumper crop of questions there, kids.

1. RGB means red, green, blue and is the raw, unmodulated, un-tampered-with signal emanating from your computer, other user's computers and devices that produce displays in general. Scart is just a form of proprietory-electronics connector and the two have nothing in common.

What may be confusing you is that TVs occasionally come with Scart sockets attached, enabling you to plug your computer in to that rather than via the co-axial connector. This is usual when composite signals are accepted by the TV – the Scart connector is incidental and could be DIN, D-plug or any one of a thousand others. So, to answer your question – RGB is sharper.

2. Almost the same question as the last. Composite and RGB are display methods involving red, green and blue with various sync and luminance signals in the former, and raw red, green and blue in the latter.

What is more, TTL means Transistor Transistor Logic and it is the correct (or at least one way) of describing digital 5V level electronics. You're confused because some monitors are TTL while others are analogue (i.e. of varying voltage), right?

Of the first two, RGB offers greater clarity because there is no mixing of the signals. Indeed Composite is, as its name suggests, a homogenised collection of signals, which, while better than TV signals, are not as good as RGB.

3. The cheapest. I've used the Commodore and it is fine but perhaps it would be nice to have the combined Sony monitor and TV? Only you can answer that.

4. By taking signals from the sound pins of the monitor outlet (full pin-out specs are at the back of the STE manual) and feeding them into a standard domestic stereo amplifier such as your Ghetto.

5. Who knows?

6. No.

7. In price, probably.

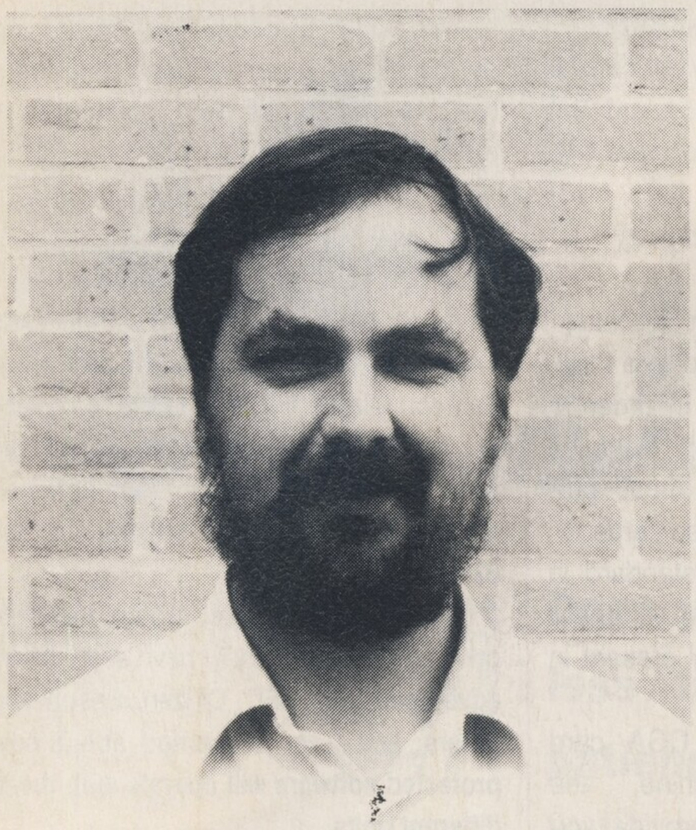
8. I've absolutely no idea!

9. Write to Romantic Robot explaining the problem. These guys are good guys, and good guys resolve their customers' problems. If there are enough sufferers, then no doubt Romanic Robot will upgrade the Multiface to take into account changes in the STE.

10. By tying down one of the fire buttons to the earth lead in the joystick of your choice. If you want this circuit mode to be switchable, then include a switch in-line between the fire buton and earth.

11. I should say it's the next logical progression for these devices. Any device that emanates from manufacturer B yet purports to be able to perform the same operation as that of manufacturer A and at a different price, can be deemed to be competition.

12. Only my adoring Techtippers can answer that one...



• *Howard Fisher*

LOCOMOTIVE POWER

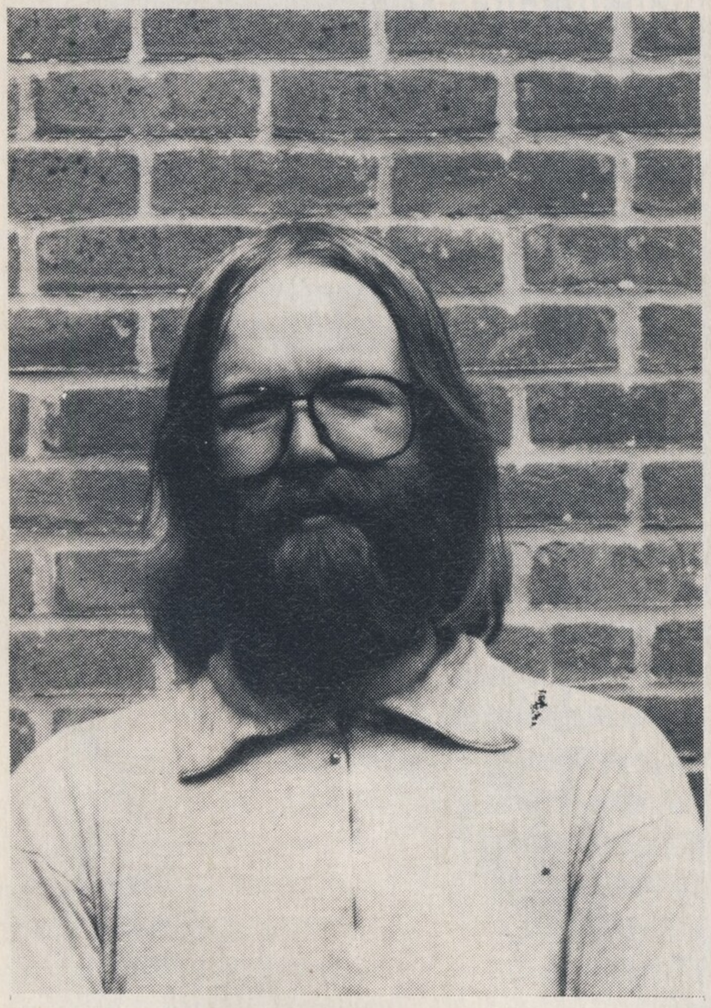
Locomotive Software started out in a back room in Dorking , and now produces the UK's biggest selling word processor. Raj Chatterjee went to find out how Locomotive got up steam...

Being a software company in the consumer market in the Eighties was a volatile proposition. They came and went like England cricket captains, often earning spectacular profits before disappearing with equally spectacular debts. But if sheer numbers are anything to go by, one outfit, started in a back bedroom in Dorking in 1983, has outdone all the big-name games houses – by writing budget software for a machine described as a dodo when it came out in 1985.

The company is Locomotive; its most famous creation is *LocoScript*. By virtue of this software being bundled with Alan Sugar's PCW, 'the word processor for less than a typewriter', more than 1.3 million people are familiar with the clear opening menu-cum-directory. That is a user base almost as large as the population of Northern Ireland.

The software has become the favourite of just about every journo, literary hack and home letter-writer in the country. Such is its fame that as well as the Jeffrey Archers and Johnny Speights of this world, even the caddish writer played by Trevor Eve in a BBC drama series, *A Sense of Guilt*, has *LocoScript* chugging away in his study. And *LocoScript* is marching steadily eastwards, armed with Urdu, Arabic and Farsi versions in addition to the Greek and Cyrillic versions that come as standard on version 2. The PCW is the machine to be seen with in what used to be called the Eastern bloc, and even Boris Yeltsin, the Soviet reformist, is said to be putting together his autobiography on his Amstrad.

Yet Locomotive remains a small company – just 25 employees, many of them working purely on the administrative side, coping with the massive mail-outs that will be required when the PC version of *LocoScript* hits the market in a couple of weeks' time.



• *Richard Clayton*

THE STORY BEGINS

The story began in 1983. Richard Clayton and Chris Hall were writing a BASIC interpreter for an Acorn man, Howard Fisher – subsequently to become their marketing manager. The BASIC interpreter was to become Mallard and the company Locomotive – not because of any latent train-spotting tendencies in either of the founders, but because the steam train conjured up images of speed combined with undoubted graceful elegance.

Amstrad was thinking about a cheap 6502 home computer bundle at the time, and approached Clayton and Hall over a problem with the design, which by that time was well advanced. Roland Perry, in charge of rescuing the development, had been given several quotes for the job by well-known names in the computer world, all of them far too high. Clayton and Hall took on the job and not only rescued the project, but along with MEJ Electronics, produced the hardware, did the overall firmware structures and wrote the BASIC interpreter (an adaptation of the original, first written in the back room in Dorking). And they finished the task in time and under budget.

That machine was the CPC 464, and the original ROMs are still being shipped today. The secret of success was in a drastic decision that Locomotive made early on: to ditch the 6502s Amstrad had bought in and base the machine on the Z80 chip instead.

"Amstrad agreed it was the right move, even though it meant throwing away the 6502s, because of the end result – getting the project done to specification, on time and within budget. This sort of pragmatic approach suits Amstrad's style very well," comments Fisher.

Another factor that speeded things up was that the BASIC interpreter with the CPC was based on that already written by Clayton and Hall. And the CPC continues to sell well in virtually its original form...

WORD GETS ROUND

In 1985 Alan Sugar had the idea of bringing out a word processing system. He'd seen similar machines selling in tens of thousands in Japan on one of his frequent trips there, and was convinced the same thing could work in Britain. The price he had in mind was £299 – around a thousand pounds less than the cost of assembling a word processing system from scratch at the time.

Through its contacts with Locomotive, Amstrad knew that the company was capable of producing a good word processing package that could be used by someone completely unfamiliar with computers. The software half of Data Recall, linked to MEJ and subsequently to provide many of Locomotive's early employees, had produced arguably the first disk-based word processor in Britain in 1976 – the Data Recall Diamond, on the now-obsolete 8-inch floppy disks.

The brief Locomotive was given for the word processing software remains a secret, thought Fisher admits it was brief, even as briefs go. It is generally though that Alan Sugar demanded, without further elaboration, something that 'could write letters'. Well, Locomotive produced that and more.

The influence of the company on Amstrad was felt again. The planned machine had 128K of RAM: not enough, Locomotive felt. RAM was cheap in the early Eighties and the machine was expanded to 256K.

Richard Clayton, the architect of *LocoScript*, wanted to produce a system that was as foolproof as possible; something that didn't depend – as did *WordStar,* the 'standard' of the time – on memorizing lists of arcane keystrokes. The first thing the user would see would be, logically, the list of files on the disk, rather than an unfriendly prompt. The whole system was to be menu-driven, but would provide keystroke shortcuts to give the developing expert ways of circumventing the slow-but-sure pop-ups. ➤

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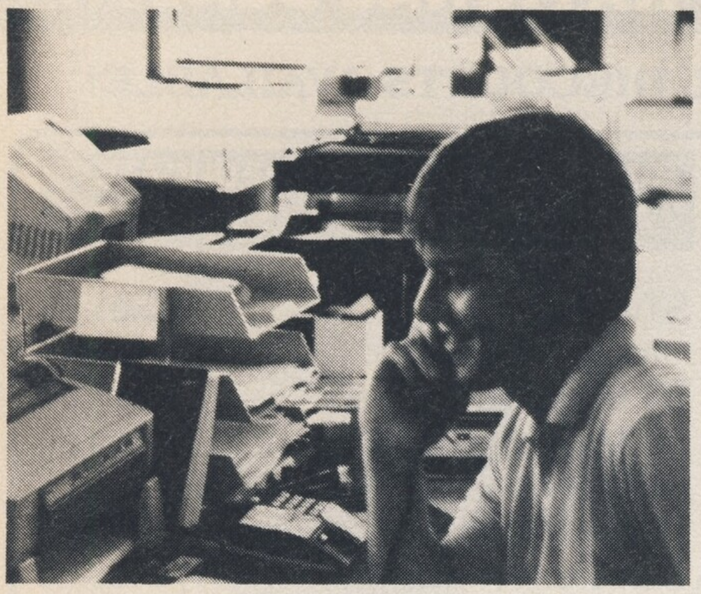
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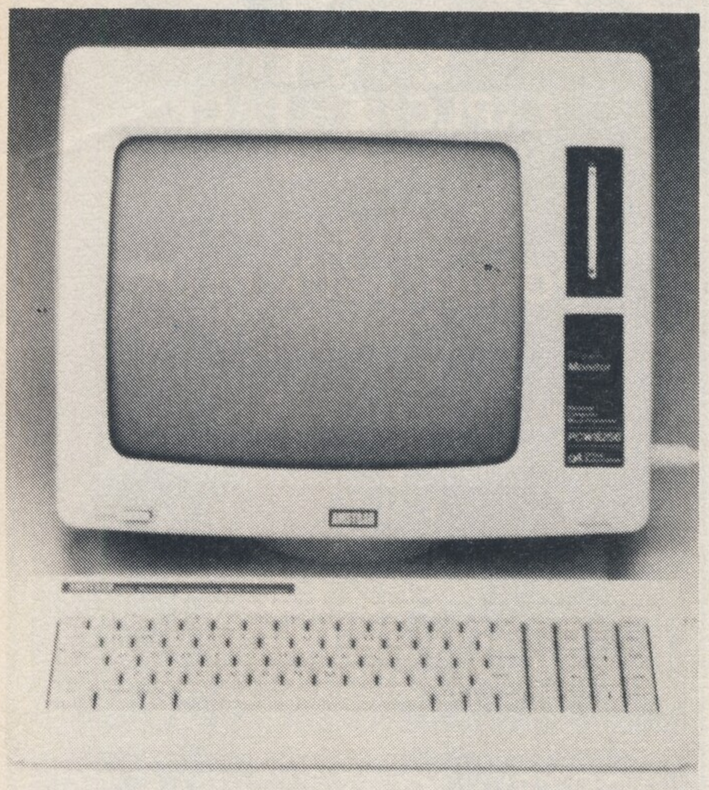
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• ***Lcocomotive's telephone support is one of its strong points***



• ***The springboard of Locomotive's success: the Amstrad PCW***

"We wanted to make it quite clear to the user what was going on all the time," says Clayton. "That's why when *LocoScript* scrolls, it goes a line at a time, instead of jumping up in paragraphs. Jerky movement like that just makes you lose your place."

Similarly, when text is cut or copied, *LocoScript* makes it quite clear what's happening by marking out all the text in reversed-out lettering and removing it or copying it smoothly, rather than at a stroke, so that the user can see what's going on – and stop things in mid-stream if they're going wrong, instead of being presented with an irreversible *fait accompli*.

This emphasis on showing what's happening stage by stage makes *LocoScript* undeniably slow, and has led to criticism of the program by some 'experts' in favour of faster, less friendly word processors. But Clayton is unrepentant: "We know that most users are just confused by things that happen suddenly".

And, as Howard Fisher points out, the *LocoScript* system is one that has been adopted by hitherto command-driven programs. *WordPerfect* is just one example of a mainstream word processor that is adopting a *LocoScript*-like standard with keyboard shortcuts in its latest incarnation, version 5.1.

The usual complaint of the computer journos being shown *LocoScript* on the PCW was 'yes, I'd quite like it, but I can't think of anyone else who would'. Just to remind you, there are now 1.3 million anyone elses who did.

GOING IT ALONE

Despite the success of *LocoScript 1* it was clear that some people found it had niggling shortcomings – particularly the speed, ability to work with other printers, and handling of layouts. Locomotive – spurred on by its success in marketing *LocoMail* and *LocoSpell,* two *LocoScript* add-ons that Amstrad's efforts at marketing had encouraged the company to take over and do itself – made a big decision: to design and market a bigger, better successor itself.

The result was *LocoScript 2*, a program that, by PC standards, offered functions unheard of at the £20 price tag: Greek and Cyrillic, mathematical and scientific symbols, printer support for just about any machine ever released, and faster and smoother operation than version 1. Why the modest asking price?

"We wanted to make money, of course," says Fisher, "but without exploiting the users. The competition to *LocoScript* at the time all cost about £70 so we wanted to make something that was such a good buy people would have no reason for buying otherwise. Hence the £20 tag.

"We wanted to bring word processing to the person buying software out of taxed income, not just businesses – though 40 per cent of our sales go to businesses now."

Locomotive's innovative approach to writing support software ensured entry into lucrative markets most companies had dismissed as too esoteric to bother about. The Cyrillic and Greek capability is one example: the machine has made itself an essential for translators and students, and has given Locomotive a head start into the exploding Eastern bloc market. Again, the Arabic, Urdu and Farsi versions of *LocoScript 2* are proving very popular in the so-called 'minority' markets of the Middle East: it is sobering to consider that the population of Pakistan alone is 80 million, far greater than the UK's 55 million.

Another illustration of its ability to capitalise on 'trivial' markets is its highly successful range of add-ons such as *LocoKey* (a program that lets you configure the keyboard to make any key produce any character) and *LocoChar* (a set of alternative printer fonts to the standard dot-matrix pattern). They even work in Cyrillic and Greek – another of those 'unimportant' details that actually do matter to users.

NOT DEAD, NOT EVEN RESTING

The trickle of major new software for the PCW is almost dried up these days – apart from Locomotive. 'A significant new add-on to *LocoScript*' is promised for later this year. The logical successor to the company's successful 50,000 selling database add-on, *LocoFile,* would be a spreadsheet.

LocoSpread? Fisher won't give any clues; Locomotive never announces a product until it is working and ready to demo, unlike some big companies you could name – part of its cautious approach to marketing.

Another reason for its success is its attitude to customer support. Written technical enquiries are dealt with unfailingly, as are telephone queries, by a real person rather than a recorded message in Santa Barbera – though the company isn't desperately keen to encourage people who can't be bothered to read the manual to get free tuition over the phone!

Locomotive's latest venture is the PC version of *LocoScript* – mainly because of demand. There are thousands of writers who want, for example, to use a portable PC, but don't want to leave their familiar environment on the PCW at home; or business upgraders who also want to retain that comfy *LocoScript* upbringing.

"There are two reactions to PC *LocoScript*," says Fisher. "One says, 'you're mad; there are already a million PC word processors'. The other says, 'why didn't you do it two years ago?' ". Whatever, if Locomotive captures just 10 per cent of the PCW upgraders, then *LocoScript PC* would become the biggest selling word processor in the UK.

But the fact that they didn't plunge into the PC market two years ago, reckons Fisher, is a demonstration of the philosophy that has made the company so successful; caution and care in an age when so many companies have plunged headlong into abject failure.

"We could have borrowed money two years ago to finance *LocoScript PC*, but it would have been a big risk. We prefer to go one step at a time, when the time is right."

This company philosophy has worked wonders in the PCW market, one of the steadiest and most cautious of all the home computer sectors: sales have increased continuously and steadily since day one back in Richard Clayton's back room, and turnover was £1.3 million last year. When *LocoScript PC* comes out it will be interesting to see how the 25-person outfit from Dorking compares with the big boys of the PC world – the WordPerfect Corps, the WordStars and the Microsofts. But Locomotive's careful and cautious approach doesn't seem likely to go far wrong. ■

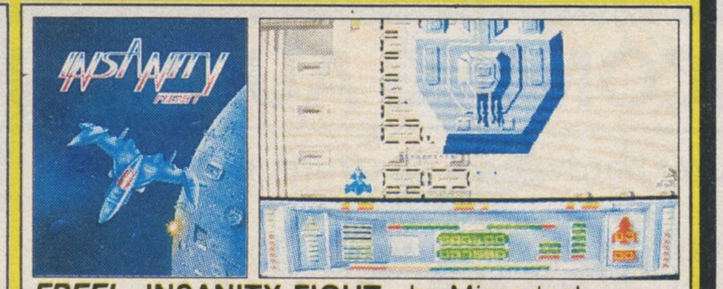
STEAMING THROUGH THE OPPOSITION

Locomotive's *LocoScript* has sold more than 1.3 million units — arguably making the company the UK's most successful business software house. With add-ons such as *LocoMail* and *LocoSpell,* and an upgrade to the original selling for as little as £20, the opposition had a tough time. After the 50,000 selling database, *LocoFile,* can we expect to see a *LocoSpread* on the cards? Whatever, with turnover running at over £1.3 million last year, the company is now setting its sights on the PC market.

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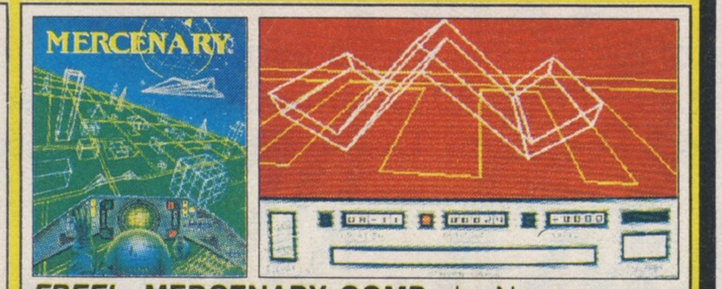
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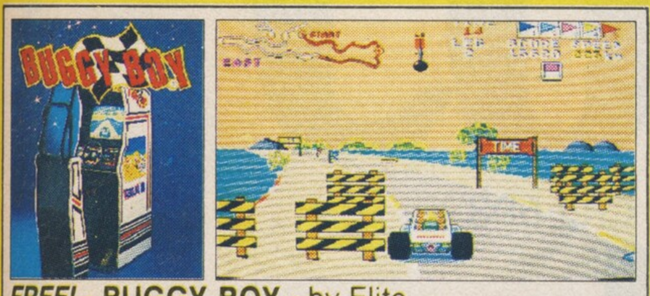
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■Publish...

Thank you for giving me the chance to reply to the comparison between *Fleet Street Publisher 3* and *Calamus* (*Express* 63)

I fully understand that in a comparison the marking is the independent, subjective opinion of the writer. However in this comparison the marks – ticks or crosses – seemed to be at odds with the related copy in each comparison field.

In several cases where FSP/3 was marked down, the copy seemed to indicate a draw and in one particular area, Ease Of Use, *Fleet Street* appeared to be on top.

There are also some points in the article that I would like to correct:

WYSIWYG: The release version of FSP/3 will contain Ufonts (UltraScript outline fonts). These fonts are used for output and, optionally, for full WYSIWYG screen display.

Use of this option does NOT require the UltraScript PostScript emulator as Mirrorsoft has licensed the font scaling routines from Imagen who produce UltraScript. The current bitmap fonts may also be used as a faster alternative on screen.

Fonts: FSP/3 includes Times, Helvetica and Courier Ufonts typefaces, each in four typestyles – Roman, Bold, Italic and Bold Italic. The Lucida typeface family will be available in the FSP Deluxe upgrade which features the full UltraScript program. Additional font outlines packs can be added for the cost of £50-60 per family.

Import: As *Fleet Street* features PostScript compatibilty we have added the Import Encapsulated PostScript option. Users will be able to merge PostScript files into a FSP page. GEM vector graphics are also supported.

We will of course send you a copy of the complete program and manual when it is finally released.

Jon Norledge, FSP Product Manager, Mirrorsoft Ltd.

■...and be damned

I would just like to take this opportunity to explain to Future Publishing in general, and Jerry Glenwright in particular, the differences between two words - 'review' and 'preview'.

A 'review' is an assessment of a finished product that usually comes in a shiny shrink-wrapped box with a bound type-set manual, one or more disks with printed labels, and a little card marked 'Registration Details'.

A 'preview' on the other hand, is an assessment of an unfinished product that usually comes in a brown envelope, with a loose-leaf bundle of photo-copied instructions, one or more disks with handwritten labels, and a letter asking the recipient to make a note of any bugs that need fixing.

I point out these seemingly obvious differences only because you seem not to be aware of their significance, for how else could you have printed your premature comparison of *Calamus* and *Fleet Street Publisher 3* in *ST Format*, and then rehashed it in shorter form, for NCE?

The version of *Fleet Street* that I have at the moment is considerably more advanced and full-featured than you 'review' suggests – and I received it before Christmas. Not only does it have outline fonts displayed on screen, but is also does not require Ultrascript to produce print quality every bit as good as, if not better than, *Calamus*.

Mirrorsoft tells me that the program will not be finished for at least another month, so can you please explain why you could not contain yourselves until then? Not only have you done both Mirrorsoft and potential purchasers of the package a disservice by jumping the gun, but you have also severely damaged your credibility.

Calamus may be a superb program, but as it is a full £260 more expensive (the £399 price you have been quoting is ex VAT) and does not offer PostScript compatibility. I feel that *Fleet Street* is a good deal more competitive than you suggest. I look forward to a proper review when you have received the final version.

W Haycraft, Camden Town, London

So, the truth is out: that I am a spotty-faced callow youth of 30-odd who spent the Eighties sending thousands of reviews to press in total ignorance of the difference between advance and finished products.

Thank goodness I have people like William Haycraft to put me straight. I live in hope that next week he will enlighten Future Publishing and myself on the difference between the two phrases 'constructive criticism' and 'patronising sarcasm', then perhaps both he and I can stop practising the latter.

Readers do, of course, deserve an explanation.

As far as I have been able to establish, the contention that *Fleet Street* Publisher came to us as some sort of unsolicited plain-wrapper package is an ill-informed one. Jerry actually went to Mirrorsoft in November to be guided through a hands-on assessment of the product, as well as taking away a copy for further examination.

Had I thought for one moment that this version of FSP differed significantly from the proposed finished article, I would either have decided not to publish at all, or to run it clearly flagged as an early preview.

I am, of course, more than happy to print Jon's response to our review. But I have also asked him to reflect on how it came about that a journalist was demonstrated software now said to have been far from completion, and yet he came away with the impression that he was in a position to review what he had seen for two magazines.

Wherever it originated – and I am sure we both recognise it as an entirely honest mistake – this breakdown in communication has resulted in 'a disservice' to *Express* as well as all the other parties concerned, and you may be sure that I am far from content with it.

To the most important consideration – accurately informing *Express* readers. We will reconsider a finished version of *Fleet Street Publisher 3* as and when we see it, and revise our published opinion as necessary.

■Back to the 80s

I found the 'Exit the Eighties' article in Express 61 very interesting and agree with many of these industry dudes. Ian Andrew of Incentive sums it up: "It's all so bloody serious these days." The man is dead right and we, the purchasers, are suffering because of it.

Flicking through my disks, I am sad

■Manual solution to the piracy problem

I commiserate with Z Dabbas and all those other programmers whose software is 'ripped off'. You will never stop unathorised copies of software being passed around, because it is only human nature not to say no when one is being offered something for nothing. However, having obtained a pirate copy it is another matter to run the program in the proper manner without a copy of the manual.

About two years ago I wrote to FAST suggesting that if manuals were printed in a certain standard way, it would make them easier to read at the computer but very expensive to photocopy. At the same time, making them available at a price commensurate with the actual software would mean some extra return on their original outlay. FAST never bothered to reply. Acorn Computers, and some other companies, have concluded that at least some return can be realized by making manuals available at a price. You will find that having obtained a free copy of a software programme, most computer fans would pay up to £25 for a copy of the manual, thereby reconciling their conscience-smitten minds.

I agree with Z Dabbas - does the Z stand for 'Zapped'? - that a back-up should be allowed and this can be built in to the protection. However, even these are a source for the highly skilled, inventive, enquiring minds of the hackers to delve into and to break the coding apertaining to that program.

Finally, I am very glad to see realized a suggestion I made in 1984 to a now-defunct computer magazine for the inclusion of a free ad to readers. This can only bring you more readers, as it is so very interesting. Keep up the good work.

Peter Hughes, Bristol, Avon

I wonder if that's the reason the magazine you speak of is now defunct?

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to discover that I actually enjoy playing 1983 text-only adventures on my old Dragon more than I do playing a 1989 mega-bucks film tie-in. And the soaring price of software...

I appreciate that all these big software houses, with their licence agreements, are bound to have hefty overheads, but back in the early days, when we were kids, the small, independent software houses were slinging hundreds of titles out for a couple of quid each.

OK, so a fair number of those were crap, but you could fill a couple of tape racks with games to show off to your buddies for the same price as one game today and there was a large enough selection of software to be able to find good stuff.

For instance, check the releases by Ultimate. And what about Salamander software - some of the best adventure software of all time? And these small companies, between them, were releasing games at a hell of a rate, with far more software per month than the Zimmer-wielding, big-time outfits of today can come up with.

Pulling the old crystal ball from the filing cabinet, I see that unless the leisure software industry brings back the attitudes of the early '80s they will all slide under the carpets of the, in my opinion, more deserving PD and shareware authors - and I'll never be able to afford even a second-hand Porsche by releasing a BASIC, text-only adventure.

Zennan Green, Kingussie, Inverness-shire

Virus perversion

The computer virus has been with us for quite some time now and the letters pages of many magazines have been filled with rage and fury towards the authors of these programs.

I don't believe that these authors write them for a joke or even because they're evil and love to see people suffer, I believe that the virus writer does it for the fame and publicity his/her work will receive as it spreads itself around the globe. It's a little like planting a bomb on the underground and watching the television news with a kind of twisted pride that it's the bomb you planted.

The virus writer also gets a kick out of reading the problem pages. It could be their work that caused the user's problem and the answer to the letter may well mention the virus' name.

I'm not angry at the fact that my Amiga has had the Lamer Exterminator copying itself onto nearly everything I've got, despite the time it took to check my collection of 80 or so disks. What does bother me, though, is the fact that I've had to put up with programs failing and files mysteriously getting corrupted for the last six months or so. I blamed the computer and spent some time thinking the machine was faulty.

What I'd like all you virus writers to do is to stop and think of the misery you're causing to thousands of users. Your programming talents could just as easily be turned to writing useful programs instead of destructive ones and you would gain respect for the work you do instead of contempt.

David Carter, Woking, Surrey

I suspect you may be right, in which case:

a) You've just given the authors of Lamer Exterminator another fix;

b) They don't give a damn about the misery they cause, so there's not much point in appealing to their non-existent better natures.

Intellectual exercises for delicate consciences

I am new to computing and, therefore, my opinions may be a little half-baked. Nevertheless, I'd like to pass on a few comments about hacking.

While I, too, am against all forms of piracy, forgery and illegal copying, I am nagged by the feeling that I need to qualify that principle by adding that it seems to be all right as long as nobody makes any money out of it.

I mean, one cannot help but admire the guy who forged all those masterpieces and fooled the experts a few years back just for fun. If I had the expertise to produce a copy of a banknote I would be proud of my ability, notwithstanding the fact that to do so would still be a crime.

In an effort to combat the piracy of commercial products like watches, perfume, recorded music etc, we are told not to buy anything 'dodgy' in the hope that pirates will become extinct if they cannot sell their stuff. Fair enough, but what if the pirates give their wares away?

I confess to being in possession of half a dozen pirate copies of popular computer games, for which I paid nowt and, as far as I am aware, their antecedents cost nowt either. The cracker proudly announces his pen name in the titles and, presumably, does it for kicks.

What I am getting at is the fact that however resolutely I, and many more like me, refuse to accept such freebies, it will not have the slightest effect on those who crack for fun. It's a case of: 'Ta very much' when faced with the choice between a product costing £25 or a freebie.

I do not defend the pirate, for he is a menace. I defend people like me, with shaky principles, thin wallets and delicate consciences.

Brian Douglas, Morecambe, Lancs

The distribution of pirate software without money changing hands may be a partial salve to the conscience of the cracker – he or she can at least claim not to be a mercenary – but I cannot see that it changes the moral position of the recipient.

This whole area seem to be impossible to discuss without resorting to analogy, so let me put a case right now. If someone offered you a 'hot' wrist-watch but decided to give it to you without asking for any money, would it be any less stolen than if you had paid for it? Of course not!

'Aha,' you are already saying to yourself, 'but when a wrist-watch is stolen, the rightful owner is down on the transaction by one wrist-watch. When I go home with a pirate game copy in my pocket, the programmers and their associates are no worse off than before. How can I be doing anything wrong?'.

What the people involved in producing and selling the software would argue is that piracy is depriving them of something that they would otherwise have, that is the money which would be spent over the counter on those games if they were not being dished out down the pub or in the playground.

Creative people regard games (and all other copyright work) as their 'intellectual property', and the law agrees with them on this matter.

You may argue that you would never have bought the game anyway, so that in fact no-one is being deprived of your money. Again, this does not exactly leave you on the moral high ground. Apart from the purely legal aspects, software publishers will feel that piracy hurts them in another way – that it cheapens the public perception of the value of their work.

If the market were suddenly flooded with, let us say 5p Mars bars, then people would soon start thinking that 20p or so for a Twix was bit of a rip-off.

Piracy conceptually devalues work in much the same way, and if the games are being given away this actually works even more to the detriment of the genuine supplier than if they are being sold at half price.

If you don't want something enough to pay for it, the honest course is to do without it. A game is not one of life's essentials; it is not as if someone has cornered all the salt in the world and has priced it beyond your means so that you are obliged to steal some in order to live.

If you feel that software is over-priced, you can get that message across by simply not buying it – it is not a justification for going further and 'stealing' the program any more than the opinion that a tin of beans is overpriced acts as an excuse for shop-lifting it. If you think that piracy is wrong, stop acting as an accomplice for it!

Speccy appeal

Would you, if you could, please publish more details about The Speccy Sector (letters, *Express* 62)

A Cox, St Clears, Dyfed

You can contact Owen Brown at the following: 1 Roxwell Road, Chelmsford, Essex CM1 2LY.

Against the law?

Could you please give me information with regard to keeping records on my computer and the Data Protection Act.

My wife helps run a Cub Scout group and I want to keep a record of the boys in the group on my computer. The data held is for group use only and contains information that would normally be kept in a card file system.

The record shows: Name and date of birth; Address and telephone number; School; Investment date; Date of transfer to Scouts; Awards - ie any badges earned within the group, such as swimming, homehelp, etc; The group the boy is in.

Am I breaking the law by keeping the above data on a computer file? I asked at the local Police Station and was told by an officer that he thought I would not have any problems, as my records do not contain information that is harmful or expresses an opinion on any of the persons named in the record.

However, another police officer tells me that the records contravene the Data Protection Act and should be erased.

The problem may seem minor, but I would appreciate your comments on how I stand. Am I breaking the law or not?

K Taylor, Grimsby, South Humberside

A tricky little blighter is Johnny Data Protection Act.

The opinion of our in-house DPA cognoscenti is that you are probably exempt provided that the boys and their parents agree to your keeping the files. However, these exemptions are a somewhat grey zone.

Get yourself copies of the explanatory leaflets that accompany the Act from: The Data Protection Registrar, Springfield House, Water Lane, Wilmslow, Cheshire SK9 5AX (Tel: 0625 535777). If you get anywhere near as lost as I did in this literature, contact the Registrar again and put the details of your case direct for a precise answer.

Assuming that your files are quite legal, you should in any case take precautions to ensure their security. Your cubs and their parents deserve not to be hassled even by someone as relatively harmless as a freelance woggle salesman, and there are far more unsavoury characters than that who might wish to access the names, addresses and other details you hold.

Your data should be safely locked away, or secure behind a proper password system.■

520ST-FM SUPER PACK



The Atari Super Pack is ideal for you if you want to get off to a flying start with the best in entertainment software. The Pack includes a 520ST-FM with ½Mb RAM, a built-in 1Mb disk drive, over £450 of top games and a joystick. If you buy the Super Pack at Silica Shop, we will add our own ST Starter Kit (worth over £200), Free Of Charge. Return the coupon for details.

1Mb DISK DRIVE £450 OF SOFTWARE

ARCADE GAMES

Arkanoid II	Imagine	£19.95
Beyond The Ice Palace	Elite	£19.95
Black Lamp	Firebird	£19.95
Buggy Boy	Elite	£19.95
Chopper X	Mastertronic	£9.99
Ikari Warriors	Elite	£14.95
Marble Madness	Electronic Arts	£24.95
Quadralien	Logotron	£19.95
Ranarama	Hewson Consultants	£19.95
Return To Genesis	Firebird	£19.95
Roadwars	Melbourne House	£19.95
Starquake	Mandarin	£19.95
Test Drive	Electronic Arts	£24.95
Thrust	Firebird	£9.95
Thundercats	Elite	£19.95
Wizball	Ocean	£19.95
Xenon	Melbourne House	£19.95
Zynaps	Hewson Consultants	£19.99

SPORTS SIMULATIONS

Eddie Edwards Super Ski	Elite	£19.95
Seconds Out	Tynesoft	£19.95
Summer Olympiad '88	Tynesoft	£19.95

PRODUCTIVITY SOFTWARE

Organiser	Triangle Publishing	£49.95

JOYSTICK

Atari CX40 Joystick	Atari Corp	£4.99

FREE ATARI BUNDLE VALUE: £458.97

£399
INCLUDING VAT

With SM124 mono monitor: £498 INC VAT
With SC1224 colour monitor: £698 INC VAT

1040ST-FM PROFESSIONAL PACK

NOW WITH TV MODULATOR

For the serious home user and the small business, we are pleased to announce a new package based around the 1040ST-FM. The 1040ST-FM has 1Mbyte RAM and a 1Mbyte built-in disk drive. In addition, the 1040ST-FM now comes with a TV modulator built-in. (The previously available 1040ST-F was designed for use with a monitor only and did not come with a modulator.) This modulator allows the 1040ST-F to be plugged directly into any domestic TV set, and comes complete with a lead to allow you to do so. The new 'Professional Pack' from Silica includes the new 1040ST-FM with modulator plus four high quality software packages including a spreadsheet, database, word processor and programming language. This 'Professional Pack' software will enable you to get straight down to business with your new computer. In addition to this software (worth £384.84), if you buy the Professional Pack from Silica Shop, you will also receive the Silica ST Starter Kit (worth over £200), Free Of Charge. Return the coupon for further information.



£499
INCLUDING VAT

With SM124 mono monitor: ..... £598 INC VAT
With SC1224 colour monitor: ... £798 INC VAT

ATARI 1040ST-FM	(Computer)	£499.99
VIP PROFESSIONAL	(Spreadsheet)	£149.95
MICROSOFT WRITE	(Word Processor)	£149.95
SUPERBASE PERSONAL	(Database)	£59.95
BASIC DISK & MANUAL	(Language)	£24.98

NORMAL RRP: £884.82
LESS DISCOUNT: -£385.82
PROFESSIONAL PACK PRICE: £499.00

2Mb & 4Mb MEGA ST

The MEGA ST computers are styled as as lightweight keyboard with a separate CPU, connected by a coiled telephone style cable. There are two versions of the MEGA ST, one with 2Mbytes of RAM and the other with 4Mbytes. Each version has a 1Mbyte double sided disk drive built-in to the CPU unit. The MEGA ST's do not come with modulator built-in and must therefore be used with a monitor. With every MEGA ST purchased, we will add the 'Professional Pack' software (worth £384.83) detailed above, plus the Silica ST Starter Kit (worth over £200) both Free Of Charge. Return the coupon for further details.



2Mb MEGA ST
£899 INC VAT
+mono monitor = £998
+colour monitor = £1198

4Mb MEGA ST
£1199 INC VAT
+mono monitor = £1298
+colour monitor = £1498

DTP PageStream £149 +VAT =£171.35

Desktop Publishing (DTP) is one of the fastest growing applications for personal computers. We are pleased to announce a powerful low cost package for the Atari ST called PageStream. PageStream costs only £149 (+VAT=£171.35) and, because it works with an Atari 1040ST and a Seikosha SP-180AI printer, you can be up and running with a complete system for less than £1000. Some of the features of PageStream are listed to the right. If you would like further information on this program, complete and return the coupon below, ticking the 'DTP' box in the corner.

* TEXT-FLOW AROUND GRAPHICS
* ROTATION OF TEXT & GRAPHICS
* SLANT OR TWIST ANY OBJECT
* POSTSCRIPT COMPATIBLE
* TAG FUNCTION
* AUTO/MANUAL KERNING & HYPHENATION
* GROUPING OF OBJECTS

DO YOU OWN AN ATARI ST?

If you already own an Atari ST computer and would like to be registered on our mailing list as an ST user, let us know. We will be pleased to send you copies of our price lists and newsletters FREE OF CHARGE as they become available. Complete the coupon and return it to our Sidcup branch and begin experiencing a specialist ST service that is second to none.

SILICA SHOP:

SIDCUP (& Mail Order) **01-309 1111**
1-4 The Mews, Hatherley Road, Sidcup, Kent, DA14 4DX
OPEN: *MON-SAT 9am - 5.30pm* ***LATE NIGHT:*** *FRIDAY 9am - 7pm*

LONDON **01-580 4000**
52 Tottenham Court Road, London, W1P 0BA
OPEN: *MON-SAT 9.30am - 6.00pm* ***LATE NIGHT:*** *NONE*

LONDON ..... **01-629 1234 ext 3914**
Selfridges (1st floor), Oxford Street, London, W1A 1AB
OPEN: *MON-SAT 9am - 6.00pm* ***LATE NIGHT:*** *THURSDAY 9am - 8pm*

ATARI ST

ST COMPUTERS

The range of Atari ST computers offers something for everyone. From the games enthusiast who wants the challenge of the very best in arcade action, to the businessman who wants to make financial forecasts or faultless presentations. The ST offers high quality graphics, sound and speed for the gamer, whilst providing a fast, user friendly and affordable solution to business. The ST is now firmly established in the home environment and boasts a wealth of users in education, local government, television, and a variety of different businesses. Software for the range stretches to cover applications as diverse as ENTERTAINMENT, ACCOUNTS, ART, COMMUNICATIONS, COMPUTER AIDED DESIGN, DATABASES, DESKTOP PUBLISHING, EDUCATION, MUSIC, PROGRAMMING, SPREADSHEETS, WORD PROCESSING and more. For a full list of the software available, as well as details of the ST range, complete and return the coupon below.

All prices correct at the time of going to press. E&OE.

520ST-FM EXPLORER PACK
WITH BUILT-IN 1Mb DISK DRIVE



The value for money offered by the Atari ST range is reflected in the Explorer Pack featuring the 520ST-FM computer with 512K RAM. The 520ST-FM computer now comes with a built-in 1 Mb double sided disk drive as well as a free mouse controller and a built-in TV modulator. The new 520ST-FM Explorer Pack includes the 520ST-FM computer, the arcade game Ranarama, a tutorial program and some useful desktop accessories. In addition, if you buy the Explorer Pack from Silica, we will give you the Silica ST Starter Kit worth over £200, FREE OF CHARGE. Return the coupon for details of our Starter Kit and of the full ST range.

£260

ONLY £2.51 PER WEEK
RETURN COUPON FOR DETAILS

+VAT= £299

+ SM124 mono monitor: £398 INC VAT
+ SC1224 colour monitor: £598 INC VAT

WHY SILICA SHOP?

Before you decide when to buy your new Atari ST computer, we suggest you consider very carefully WHERE you buy it. There are MANY companies who can offer you a computer, a few peripherals and the top ten selling titles. There are FEWER companies who can offer a wide range of products for your computer and expert advice and help when you need it. There is ONLY ONE company who can provide the largest range of Atari ST related products in the UK, a full time Atari ST specialist technical helpline and in-depth after sales support, including free newsletters and brochures delivered to your door for as long as you require after you purchase your computer. That one company is Silica Shop. We have been established in the home computer field for ten years with an annual turnover in excess of £8 million and can now claim to meet our customers requirements with an accuracy and understanding which is second to none. But don't just take our word for it. Complete and return the coupon below for our latest literature and begin to experience the Silica Shop specialist Atari service.

SILICA STARTER KIT: Worth over £200, FREE with every Atari ST computer bought from Silica.

PROFESSIONAL PACK: Free business software with 1040ST-FM and MEGA ST's bought from Silica.

DEDICATED SERVICING: 7 full-time Atari trained staff with years of experience on Atari servicing.

THE FULL STOCK RANGE: All of your Atari requirements from one place.

AFTER SALES SUPPORT: The staff at Silica are dedicated to help you get the best from your ST.

FREE CATALOGUES: Mailed direct to your home as soon as we print them, featuring offers as well as all of the new releases.

FREE OVERNIGHT DELIVERY: On all hardware orders shipped within the UK mainland.

PRICE MATCH PROMISE: We will match competitors on a 'same product same price' basis.

FREE TECHNICAL HELPLINE: Full time team of Atari technical experts always at your service.

FREE SILICA STARTER KIT WORTH OVER £200

WITH EVERY ST - RETURN COUPON FOR DETAILS

ALL PRICES QUOTED INCLUDE FREE UK DELIVERY

To: Slica Shop Ltd, NCE 0290 _1–4 The Mews, Hatherley Road, Sidcup, Kent, DA14 4DX

PLEASE SEND FREE LITERATURE ON THE ATARI ST

Mr/Mrs/Ms: ..... Initials: ..... Surname: .....

Address: .....

.....

.....

..... Postcode: .....

NCE 0290

Do you already own a computer
If so, which one do you own? .....

DTP ☐

COMPUTER CHAOS

A selection of computers which perpetrate disasters from the copious annals of Mel Croucher

WELLINGTON , NEW ZEALAND

Victoria University student grants are computerised, in order to pay by direct credit into students' accounts – administered by the University Bank.

A single human error at the Bank of New Zealand central computer results in a weeny change in programming. 4,700 students are debited a total of A$2,000,000 instead of being credited.

Computers at the students' bank then automatically honour the debits, resulting in overdrafts. This happens even though a Bank of New Zealand operator spots a conflict in the program instructions, but assumes that "students are always in debt, so I just hit the button!"
(The Dominion)

STOCKHOLM, SWEDEN

There is an epidemic of stealing pleasure boats, so a law is passed to register all sailing and motor boats, with a computer database financed by a modest boating tax.

The epidemic turns into a plague, due to Sweden's public information laws concerning computer data access. Thieves can dial up any boat registration number along with the legal owner's name, address and national ID code, allowing them to impersonate the owner when stealing and selling a boat.
(Dagens Nyheter)

NORTH TYNESIDE

After six months of computerised monitoring at a cost of haif a million pounds, the results of the probation service experiment in electronic tagging of criminals is made known.

Ankle bracelets give off radio signals that are monitoured by computers via home telephone links, to ensure that those on probation obey curfews and part-time house arrest.

When all the cases are checked, 55 per cent of criminals have either absconded or are in custody after being nicked for further crimes. Meanwhile, one elctronic tag is found strapped to a radio-controlled toy car, and another is happily confused wrapped up in an electric blanket.
(BBC Radio-4)

LONG ISLAND, NEW YORK

24 pay-phones along the Long Island Expressway are linked to the network billing system. Due to programming error, the computer believes they are free-phones.

State police become suspicious several days later when they arrive to investigate an unrelated shooting incident only to discover long queues of would-be telephone users lined up all along the Expressway.

One queue consists of fifteen Pakistani men waiting to phone home. Estimates of the unrecovered costs of the phone calls run to hundreds of thousands of dollars.
(San Francisco Chronicle)

NO COMMENT

"Correction: because of the simplicity of a computer programme (sic) logic, the Labour Party's successful candidate in the London South West seat of the European elections was incorrectly printed on Monday as Ms A J Tournoutack instead of Ms A J Pollack. This is because the computer had been programmed to automatically change the work 'Poll' into 'Turnout'."
(Tuesday Guardian)

"Correction: the Labour Party's successful candidate in the London South West seat of the European elections was incorrectly printed on Tuesday as Ms A J Tournoutack..."
(Wednesday Guardian)

NEXT WEEK

PCs: THE STORY CONTINUES
Our series on PC-compatibles continues with a look at displays and keyboards

ON THE MOVE
The definitive *Express* guide to choosing the best software for your portable

VERRAN AC DATA LINK
An electrifying alternative to local area networks

PLUS

• The Shopping Express guide to buying a PC – 50 top models reviewed
• Tech Tips: technical advice with the human touch
• Letters: The best debate outside of Parliament

WITH

A column for your machine. Expert correspondents on ST, PC, Amiga, C64, Spectrum, Archimedes, BBC, MSX, QL, PCW, XE and CPC

AND

Six pages of up-to-the-minute news

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TO THE NEWSAGENT: Please deliver to me / reserve for me (delete as applicable)
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ANNOUNCING THE NEXT GENERATION OF PBP GAMES

STEVE JACKSON'S

GLADIATORS

OF THE ROMAN EMPIRE

Your opponent falls!
He's badly wounded!
He can't continue!
Yes! HABET!

He holds his finger up
in a plea for mercy!
The choice is yours.
Spare his life?
Or finish him off?
What would YOU do?



In this fast-moving interactive telephone game from Steve Jackson, creator of FIST, YOU control your gladiator in a kill-or-be-killed battle to the death. Your opponent? You may fight the infamous Spartacus (controlled by the computer), whom you will find to be a difficult opponent. You may fight another caller. Or, if you chose to create a Match-Up Code, you may even fight a friend who has arranged to call in at the same time! Your instructions – which body area you wish to attack and which you will defend – will be carried out faithfully by your gladiator. And you will HEAR the moans, the screams and the roar of the crowd as sword meets flesh! The game couldn't be simpler to understand. First choose your gladiator from an authentic list of real gladiators from history. Then enter the arena....

FIGHT YOUR FRIENDS TO THE DEATH!
USE MATCH-UP CODES!

If you wish to fight a friend through the *Gladiators of the Roman Empire* computer, you must first of all:

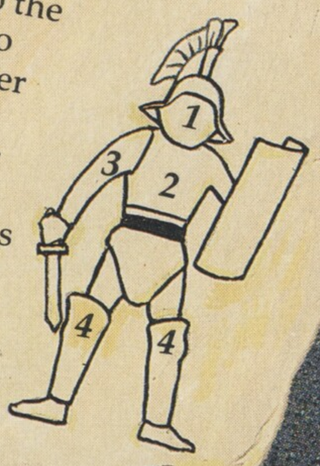
- Decide a 4-figure *Match-Up Code* between you. A number you will both remember.
- Arrange to dial in at the same time.

As you enter the game, you can enter your Match-Up Code. If you do so, you will ONLY fight an opponent with the same Code.

So settle your differences in the noble way in a battle to the death in the arena!

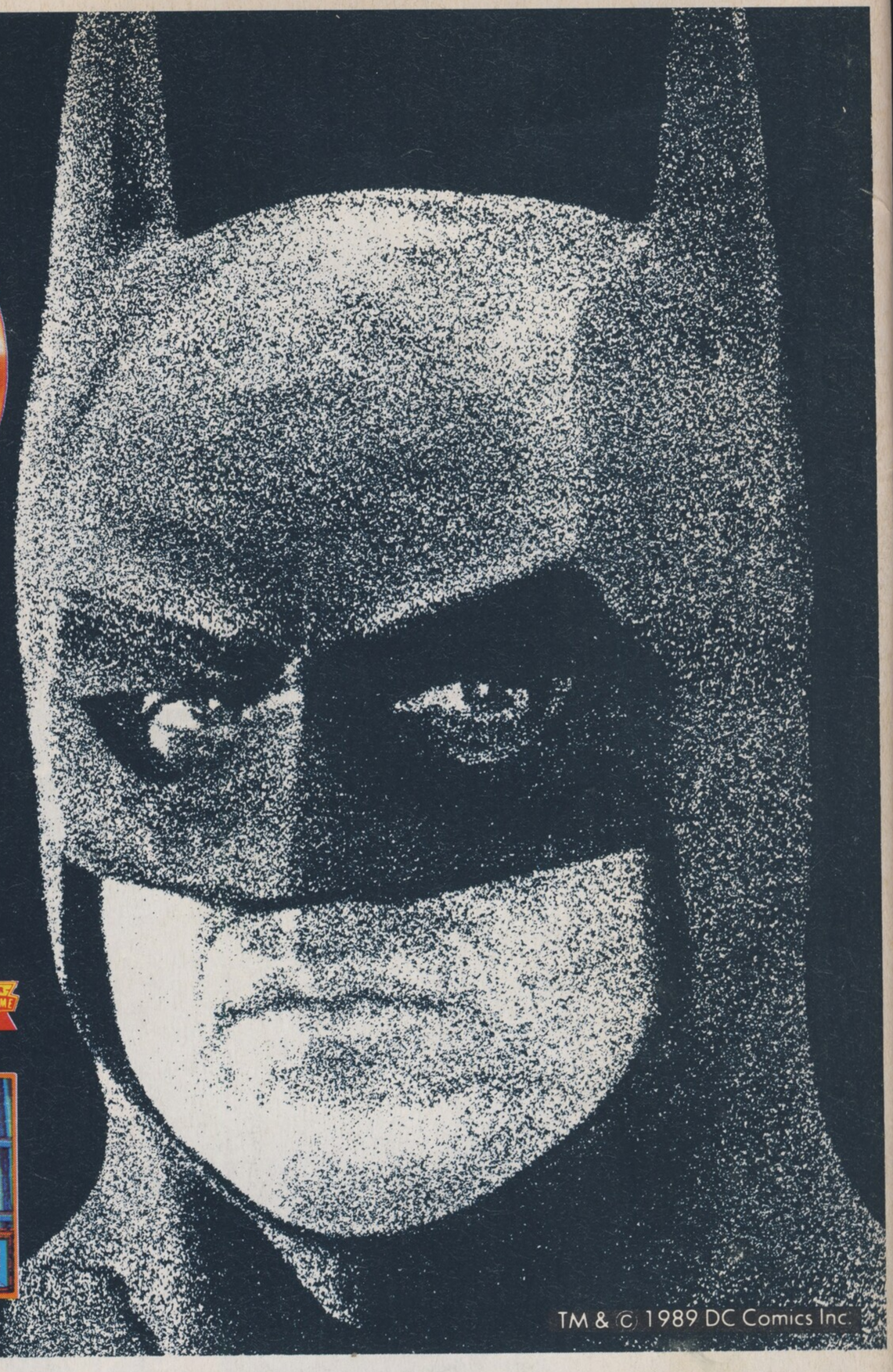
COMBAT SYSTEM

Dial in two numbers from 1-4 each combat round to represent where you will attack and defend. 1-2-3-4 equals Head-Body-Arms-Legs. The computer does the rest. Listen to the commentary to find out whether your attack was successful. Hint: The area you choose to defend is not the only area you guard. You will also defend one of the two adjacent areas as well.



0898-800-891

Calls charged at 25p per minute cheap, and 38p per minute other times. Computerdial Ltd, 7 Leapale Road, Guildford



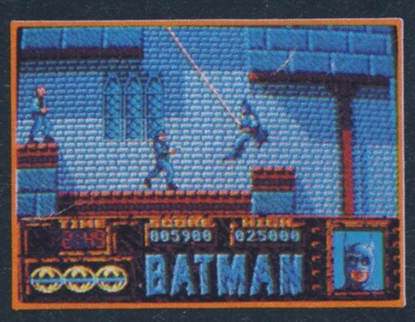
BATMAN™

BATMAN is a shadow in the darkness, as elusive as a dream. High above the seamy streets of GOTHAM, he is a criminal's nightmare. The only hope for a desperate city – BATMAN.

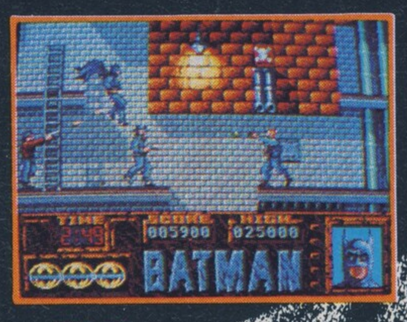
"Go with a smile and get this extravaganza (probably better than the film!) What a game! .., another excellent movie tie-in from Ocean." Crash

"One of the year's best C64 games! THE Film tie-in for quality, presentation and slickness. A wonderful package with an incredible atmosphere to match." ZZap

"a faithful, supremely well executed and generally wazzy film conversion as you could ever hope to see" Your Sinclair







SPECTRUM, COMMODORE, AMSTRAD: £9.99 AMIGA: £24.99 ATARI ST: £19.99

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THE LONGEST RUNNING NO 1

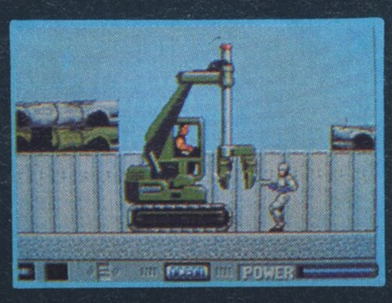
ROBOCOP™

THE HOTTEST COIN-OP NOW FOR YOUR HOME MICRO

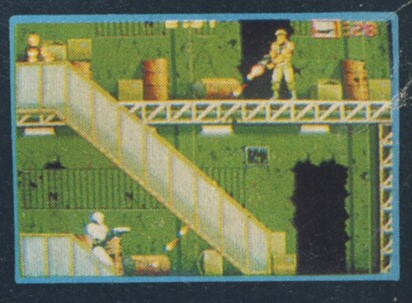
GAME OF THE MONTH C+VG

"This is definitely the best film tie-in to date, and is an utterly superb game in its own right – don't miss it."

PART MAN... PART MACHINE ALL COP... ROBOCOP







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