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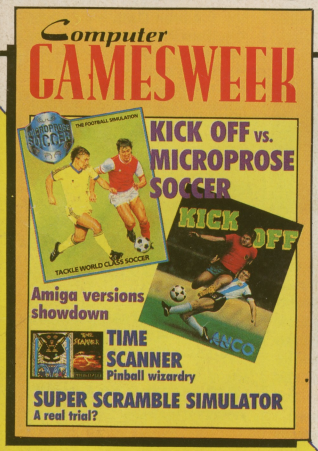

CONSOLE CRAZY!

NEW MACHINES FROM ATARI, NINTENDO, NEC AND SEGA, p2

WORLD'S FIRST COLOUR HAND-HELD

GAMES THIS WEEK

- ANCO KICK-OFF VS. MICROPROSE SOCCER
- TIME SCANNER
- SUPER SCRAMBLE SIMULATOR

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ATARI ST

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NEWS, REVIEWS AND MORE IN *THE* QUALITY WEEKLY!

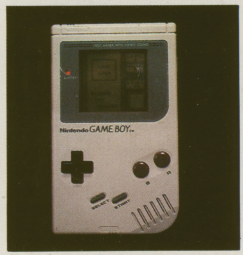
ATARI GAMES MACHINE STEALS THE SHOW

THE Summer Consumer Electronics Show, featuring a foot-numbing 17 football fields of exhibits, was staged in Chicago, covering the $31 billion business of electrical consumer goods and gadgets. A plethora of hi-tech paraphernalia was on display, from the sublime – 8ft. projection wall TVs – to the downright silly – $20,000 in-car stereos.

In the section covering computer games, Nintendo and its licencees dominated by size – 50,000 sq. ft. alone – but Atari Corp stole the show with a new piece of hardware described as "a quantum leap forward". Where have we heard that before? Yet even the cynical were impressed when in a shock move it unveiled the world's first portable colour video game player.

Provisionally named The Atari Portable Colour Entertainment System, this "play anywhere video arcade" is set to challenge Japanese game giant Nintendo head-on, since it too launched its own, technically-inferior, hand-held unit at the same time – the Game Boy.

In a typically bullish statement, Sam Tramiel, president of Atari Corp, criticised Nintendo, saying: "We have not been sitting back watching profits go off-shore to manufacturers who are totally unrealistic about offering consumers value."



Nintendo Game Boy: more compact and cheaper than the Atari portable but with mono screen.

He added: "It would not have done the consumer any good if we had brought out another grey screen which offers only simple, slow, flat graphics . . . people want and deserve more."

Shipping in the U.S. around autumn for "less than $150", against the Game Boy RRP of $80, Atari expects to ship 100,000 units by the end of the year, predicting sales of millions world-wide into the 1990s.

John Cook at the C.E.S. in Chicago

The impressive skyline of the Windy City.

The system is certainly technically impressive, comprising a 3.5in. LCD screen, with 160 by 102 pixels resolution capable of displaying 16 colours from a palette of 4,096. Details of the internal system are still sketchy but it has a system clock running at 16MHz, 64KB of RAM and hardware support including ROM scrolling and scaling. Hands-on witnesses describe it as, "frighteningly fast."

Other features include four-channel sound, an eight-way joypad, two fire buttons, five function buttons and the possibility of linking a number of units for multi-player, interactive games.

The software is on a credit card-sized cartridge which slots into the unit, with the hardware capable of addressing up to 16MB of data at one time.

The unit is powered by six AA size batteries, allowing around five hours play. It can be run indefinitely using an AC adaptor or in a car from the cigarette lighter.

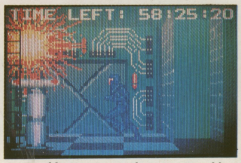
As revealed in *Popular Computing Weekly* last week, the deal involves Epyx, which developed the technology for the system. Epyx is also developing the initial software, with six games, all Epyx titles, available at launch with three more following by the end of 1989. All titles are at present priced at $34.99. The system is not expected to be launched in Europe until 1990.

The Nintendo hand-held offering, the Game Boy with a mono LCD screen was looking lame by comparison, although its more compact styling and lower price, plus the muscle of Nintendo, is still likely to make the unit a winner.

The area devoted to console and console-related products at the show reflects the polarisation of the U.S. market towards console games. The figures tell the story with Nintendo taking a giant 80 percent of the $2.3 billion home video game market.

Nintendo-compatible peripherals were also strongly in evidence, all vying for a share of the 19 million Nintendo owners' dollars. Brodabund was showing U-Force, hardware which allows you to control a game with no physical contact. The Power Glove was another innovative game controller; these two could well be the beginning of the end of joysticks as we know them.

The first of the 16-bit consoles was on display, newly-trimmed for the American consumer. The Sega Megadrive, launched in Japan six months ago, has now arrived Stateside as the Sega Genesis. Priced at "less than $199" with software carts, including both arcade and home format hits such as *Altered Beast* and *Falcon*, at "around $35 to $45", the Genesis is certainly the most technically impressive of the consoles using a 68000 chip as its main controller. Optional add-ons included an adaptor to make the Genesis downwardly-compatible with Master System carts and the TeleGenesis unit, which allows two machines to be linked by telephone.



Impossible Mission on the Atari Portable Colour Entertainment System.

The PC-Engine has been given a facelift by NEC and now appears as the TurboGrafix 16. Again at around $200, the good news is that it will be compatible with existing PC Engine software. An option for this unit will be a CD player which can connect with it, storing up to 550MB of information.

Finally on consoles, both Tended and Nintendo were displaying versions of Nintendo *Tetris*. Now the subject of a major lawsuit and much animosity between the companies, this conflict only adds fuel to the Tetris phenomenon in the U.S.

Non-console hardware and software was, although overshadowed, still much in evidence with all the major U.S. software houses displaying new software. It was obvious, however, that the Atari ST is now all but dead, with strong emphasis on IBM, Macintosh and Amiga.

Of the software of note, a new release from Mindscape, timed to coincide with the movie *Star Trek V – The Final Frontier*, displayed out-

continued on p.5 ▶

This Week

HOTLINES p.8
Duncan Evans takes a break this week. But that will not stop the software news from getting through.

PUZZLE p.8

LETTERS p.11
Ewan Dalton's recent Feedback article on the perils of being a computer retailer has sparked off some bitterness with one reader. Meanwhile another retailer is praised and the 16-bit saga continues – yawn!

USE YOUR HEAD p.13
Kenn Garroch investigates a new cassette deck for C64 owners with loading difficulties.

MASTERING THE SOUND p.15
Sub-£50 samplers are usually sub-standard, but not so with Master Sound for the Atari ST.

GET MORE ORGANISED p.17
John Cook reviews the new deluxe Psion Organisers. The LZ and LZ-64.

COMPUTER GAMESWEEK
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GRAPH BOX p.30
We take a look at an Archimedes A3000 graph-creation package.

CALAMUS p.32
Andrew Banner completes his review of the new professional ST DTP package.

BYTES & PIECES p.43
Get the most from your money. Invest it wisely and reap the benefits of your typing with Investment Comparator for the C64.

TECHNICAL PROBLEMS p.44
Kenn Garroch has some more answers to your technical questions. Maybe your letter will be among those dealt with.

FEEDBACK p.46
Does a computer program ever become the final perfected version?

Five years of FAST work

THE Federation Against Software Theft celebrated its fifth birthday at the House of Commons. Speakers at the occasion heaped praise on FAST and its work. Commenting on the Copyright, Designs and Patents Act 1988, due to take effect on August 1, Eric Forth, Parliamentary Under-Secretary of State for Industry and Consumer Affairs at the Department of Trade and Industry, said that through the efforts of FAST, "this industry probably got more of what it wanted into the Bill than almost any other industry."

In common with several other speakers he emphasised the necessity of EEC-wide legislation to combat software theft: "National legislation is important, but community legislation can be as important or more important."

Boy Hay, FAST operations director, spoke of the "sterling support for the Bill from all parties and both Houses". He thought that the new Act was "an enormous success" but felt it had one major disadvantage in not allowing trading standards officers powers of arrest in cases of trademark infringement.

"Without these powers, trading standards officers are fighting with one arm behind their backs. The police service is overworked with an enormous range of responsibilities and such a move would have helped share the load," he said.

Hay announced the launch of a major awareness campaign aimed at the academic community. The Department of Education and Science has given full support to the campaign and will help with the distribution of campaign leaflets. Hay said that he "preferred the softly-softly approach but if it does not work I will use the big stick."

Bob Hay, FAST operations director (left) and Robin Lawrence, newly-appointed enforcement officer.

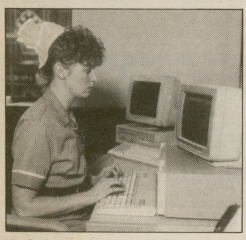
Commenting on police training, he pointed out that in the U.S. "criminals make better and more sophisticated use of computers than the police" and called for more police training: "The courses are few and far between and much too short."

Software piracy costs the U.K. industry an estimated £150 million a year in lost profit and the figure for Europe is four times that. FAST work saves the industry about £30 to £50 million per annum. To consolidate its work, FAST has appointed Robin Lawrence as an enforcement officer to work with Hay. Lawrence, a 29-year-old trading standards officer from Bournemouth, has already worked with FAST in a number of software piracy cases.

Roger Tuckett, chairman of FAST, stressed the need to enforce the legislation and promote public awareness to "win the hearts and minds of the people against software piracy." He reiterated the need to look towards Europe and the single market in 1992.

"Our product is so portable that we cannot afford to ignore European institutions. FAST leads the way in Europe in the effective tackling of software theft. The road to European unity is not a simple one but it is one we are working towards," he said.

Roger Tucket, FAST chairman: he wants to 'win the hearts and minds of the people against piracy.'



"I think this computer is only simulating illness doctor."

Computers train doctors

MEDICAL SCHOOL was never like this. Further to our report on the medical game, *Life & Death – Popular Computing Weekly*, June 8 – there are details of a more serious patient operating program from *Newsbytes*. In the future patients could be diagnosed by doctors trained using patients simulated by a computer.

***Patient Simulator II* is an educational program from a Canadian company, Knowledge House, which will be sold to practising physicians in the U.S. for about £65 per patient. Eleven patient simulations are available with more to follow in the next few months. The software runs on IBM PCs but an Apple Mac version will be produced before the end of 1989.**

Knowledge House has two other medically-orientated simulation programs being developed.

CD-ROM lap-top is announced

THE WORLD'S FIRST CD-ROM lap-top has been launched in Munich, West Germany. The Lotos machine is based round a 80286 microprocessor with 1MB of memory. Data storage is via a 3.5in. floppy disc and a 20MB hard disc, in addition to the 600MB discs used by the CD-ROM unit.

It has an EGA graphics standard screen, similar to the Toshiba 3100. Unlike that machine, however, the Lotos is battery-powered. It retails for about £4,000. A backlit screen, single serial and parallel ports, plus a mouse are all standard options.

VDU glasses

A COMPANY in Florida has developed "computer glasses" to reduce eyestrain. Florida Imports Inc. of Naples, Florida claims that the yellow tinted glasses reduce eyestrain and fatigue by filtering monitor glare and light reflected from computer screens.

IN BRIEF

Virus insurance

THE INSURANCE industry is looking at ways of insuring customers for losses attributed to computer viruses. John Lamberson of Corroon and Black Corporation told listeners at the spring symposium of the Software Publishers' Association that partial coverage for consumers may come from "already-existing data" coverage, *Newsbytes* reports.

Lamberson said that most viruses to date have been obvious but the next generation could be more subtle. He thinks that the most effective means of protection would be for software developers to add virus-detecting programs to in-house quality assurance procedures.

Here comes the fax

FORGET the knights on white chargers, a wedding in Virginia, U.S.A. has been saved by a fax machine. The music for the wedding was not found until it was too late to post it. Luckily, the bride was familiar with fax machines, so the sheet music was sent by fax and the wedding went off without a hitch.

Hypercard for PCs

SPINNAKER SOFTWARE has produced a program which will allow PC users access to stacks created for the Apple Hypercard environment. Code-named *Wildcard*, the program runs 40 times faster than the Apple Hypercard and is expected to be available in the autumn for about £70. Wildcard is compiled, not interpreted, so that applications created with it can be invoked without running Wildcard.

TV hackers

A TELEVISION station which employed two journalists who hacked into a rival station's newsroom computer system has agreed to pay the State of Florida £470,000 to avoid prosecution under anti-racketeering law. The two journalists involved – see *Popular Computing Weekly*, February 23 – have been put on probation for five years.

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New summer bundle for C64

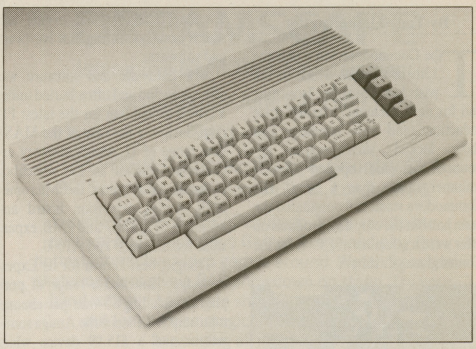
COMMODORE is launching a new sporting summer bundle for its C64 micro at the end of this month. The new pack, known as the Commodore 64 Sporting Brain-box pack, features a blend of sports and trivia quiz games and will retail for £149.99.

A spokesman for Commodore told *Popular Computing Weekly*: "We decided to launch a new summer bundle because of the success of the Olympic Games bundle last year. The Olympic pack was very successful throughout the summer and we stopped it in December only because we ran out of software. The new bundle will run until September, at which stage we intend to introduce a new pack."

He was unable to give further details of the bundle due for release in September, beyond saying that it "will be a very, very strong pack which will be different from the Hollywood Pack."

The Brain-box bundle features games covering cricket, athletics, football and boxing. They are *Ian Botham's Test Match, Daley Thompson's Olympic Challenge, Frank Bruno's Boxing* and *Peter Beardsley's International Soccer*. The four other known games included are *Jeffrey Archer's Not a Penny More, Bob's Full House, Trivial Pursuit* and *Split Personality*.

The Commodore spokesman said the bundle will also include two mystery games and a joystick. He stressed that the Hollywood Pack will continue to be available at the same price.



Coming soon, the Commodore 64 Sporting Brain-box pack will include games such as Daley Thompson's Olympic Challenge and Peter Beardsley's International Soccer.

Robots turn screws loose

A PRISON in California will use robots to serve prisoners. Prisoners at Santa Rita will be served food, laundry and other supplies by computer-controlled service vehicles instead of warders, according to *Newsbytes*.

A high-tech prison with one million square feet of space, Santa Rita has the first installation of an enormous network of robotic service vehicles which opens on July 1 and will serve 3,000 inmates.

The £3.8 million automatic guided vehicle system consists of 11,000ft. of guide path, a controlling computer system and 19 automated power units which carry any of 163 stainless steel carts laden with supplies.

The vehicles are made to withstand vandalism, with special locks, and stop when they detect objects or persons in their path.

The system obviates the need for moving large numbers of prisoners to places such as the mess hall, which reduces the risk of violence and riot. Inmates will stay in small groups in their own housing units. They will not have to leave the units because recreational facilities have been built into the units.

James Jones, president of Apogee Robotics, which implemented the scheme, told *Newsbytes:* "We believe the AGV system will be an important component of future jail construction and operating decisions."

Open day for Spectrums

SCHOOLS using Spectrums in education, SUSI, a group of parents and teachers, is holding a meeting with the title Information technology and primary classrooms on Saturday June 24th at St. Francis school, Teazel Avenue, Bournville, Birmingham.

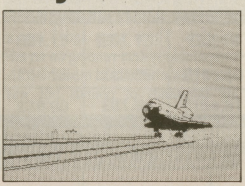
Educational software for all Spectrum machines will be available with demonstrations of versions for various media including Opus Discovery, Microdrives, +3 and +D. Software writers will be on hand for consultation and companies represented will include MGT, Flexibase Software and Teacher's Pet Software.

For further details contact John Coghan on 021 459 5548 or Jeff Callaghan on 021 458 2865.

Beyond the final frontier

A SPACE STATION construction simulator for the PC is available from Hewson. *Space M*A*X* is a game where the player takes the role of project manager on the world's first commercial space station.

Developed by Final Frontier Software in the U.S., the game combines project direction with strategy gaming. The player's assignment is to launch, assemble and operate the space station using limited resources, including space shuttles and heavy lift launch vehicles. Numerous problems, such as fire, sickness, strikes and explosions, confront the player who has to be mindful of his time schedule and budget.



Space M*A*X from Hewson on the PC.

Features for the game include five levels of difficulty and a game save feature. Space M*A*X is due for release in August at £34.95. An Amiga version is being developed.

Hacker tragedy

THE MAN who gave information which led to the arrest of seven hackers – see *Popular Computing Weekly*, March 9 – on charges of spying for the KGB has died.

The body of Karl Koch, a 24-year-old West German, was found in woods near Hanover. Police say he had apparently poured petrol over himself and set it alight. Koch was involved with the ring of hackers suspected of providing the KGB with code words to gain entry into Western research and defence computers.

ATARI'S SHOW STEALER

◀ continued from p.2

standing graphics, as did the Cinemaware *It Came From The Desert*. The Spectrum Holobyte *Vette* promises to be a great driving simulation and anyone allowed a sneak preview of *Tank*, its follow-up to *Falcon*, could predict it has another hit on its hands.

Most original software of the show was *Sim City*, a city simulator from Maxis Inc, on Amiga, Mac and IBM.

English companies were much in evidence, not only displaying, like Elite and Audiogenic, but doing the rounds licensing games into the U.S. Logotron proved it had been getting on with things quietly in the last year, with a major award from the show organisers for *Quadralien* – distributed by Spinnaker in the U.S. – and four other products taken up Stateside, including *Star Ray*, now renamed and re-licensed *Return of Defender* by Epyx.

Above all, Summer CES confirmed that the consoles are coming, with all the repercussions for producers and consumers which will follow.

COMMODORE SHOW REPORT

By Tony Hetherington

The Commodore Show was the 13th in a series which in the past has been the launching pad for new machines, exciting price reductions and new bundles. This show lacked such major announcements and opened with a whimper rather than a bang. The Commodore stand still dominated the main hall but the only new products on offer were a selection of gifts from the Commodore gift shop.

Commodore promotional gifts stand: taking pride of place.

They included Commodore teddy bears, umbrellas, bags, socks, calculators, keyrings and mugs, the kind of goods more at home at an airport. Perhaps the Amiga Air Miles bundle is having a strange effect on Commodore and making it think it is an airline. According to Commodore they form a range of leisure goods it hopes will "enhance your Commodore experience".

For others, the Commodore show experience was largely a collection of bargain basement stands selling cheap software for Amiga, C64 and even the Plus/4; stands offering computing essentials – disc boxes, discs, mouse mats and mouse houses – mixed with a few staged forums and events and stands bravely offering new hardware and software.

New hardware and software was difficult to find and often buried under a crowd scrambling for the latest PD disc. Such was the case of the MAST new range of 11 Amiga memory expansions. Known as the matchbox collection, it features the Micromeg 512K Amiga expansion board and Minimeg 512, 1MB and 2MB expansions for the A500 and A1000.

Trilogic, best-known for its Expert cartridge, launched a range of peripherals including a 5-watt-per-channel mini amp to enhance the Amiga sound output and a £15.99 device which allows two computers to share the same monitor without having to swap leads continually. The Monitor sharer is a small unit housing a SCART in and two SCART out leads and a pushbutton switch to swap between them.

There have been printer guides previously but none so accurate as the Maxafit, which clips on to most printers and either sets up pre-printed forms or company stationery for complete or partial printing and gives you the security that the print will always appear in the correct position. For more details contact Margin Maker on 0784 452677.

The MaxaFit cut sheet alignment accessory being demonstrated.

Hi-Tension showed its Icon paint package and unveiled its *Small Business Manager*. The Icon paint package allows you to create Amiga Workbench screens in 16 colours and define your own program icons. Now you can mimic the professional effects displayed in games such as *Populous* to impress your friends as you click your icons.

The bulk shifters were out in force.

Perhaps of more use is the Small Business Manager which bundles a full invoice, purchase and VAT system into a pulldown Amiga package for £90 plus VAT. The price also includes the creation of your own customised collection of business forms which can be used as a master by a printer. Hi-Tension also offers a small business bundle including an Amiga monitor, Star LC-10 printer and Small Business package for around £900.

Arnor showed an early version of its talking Amiga word processor it hopes to have ready later in the year and which it hopes will help blind Amiga owners. It has features such as speak each key as it is pressed and each word as it is typed and read back current line from start of paragraph; as the cursor is moved it should help users who find the current trend of pull-down menus pointless. Three years ago I saw a comparable system running on an adapted Hewlett-Packard machine costing thousands of pounds but was amazed by the speed of which the blind demonstrator could type. Now this program would create such a system for a fraction of the price. Contact Arnor on 0733 68909 for more information.

Running alongside the show were a series of free seminars dealing with a wide range of subjects presented by the big names in Commodore computing, including Amiga music by Colin Gay, a graphics workshop with Simon Dunstan from Television Graphics and a Games Workshop featuring Jez San, Andrew Braybrook and the Bitmap Brothers. This latter session spilled into the games arcade and a beat-the-author competition.

The games arcade housed machines running the best in C64 and Amiga software, with the biggest crowds gathering round *Microprose Soccer*, Anco *Kick-off* and EA Populous.

Finally, a section of the show was cordoned off for exhibits in the weird and wonderful Amiga Applications competition with £500 worth of Amiga items up for grabs. The finalists included a video studio package, a Cindy doll clothes designer and a fabric designer; the winner was a package which designed a radio-controlled racing duck.

Demonstrating the Amiga for Midi applications.

POPULAR COMMENT

While the American computer and electronic shows draw massive attendances to view the developments, the shows in the U.K. are much less interesting.

Take, for instance, the recent Commodore Show. It has been running for many years but the last one was merely a marketplace for bulk shifters to unload their goods. A computer show used to be a showcase, a place where companies exhibited the latest software and hardware and small groups of companies sold discs and other related products at low prices.

Today, bulk retailers make up the main part of a U.K. show. There are fewer and fewer serious companies present at the 1989 machine-specific shows. Perhaps that is because of lack of interest on the part of the public or perhaps it is because the prices charged for the stands are so great that the smaller companies cannot afford to attend.

Microprose has announced that it will not be attending this year's PC Show. According to a company spokesman, the reason is because the feedback is not worth the massive outlay for a stand. Apparently last year's Microprose stand and simulation equipment cost more than £100,000 for five days trading. It would seem that the PC Show has been out-pricing itself for some time and the large companies are now beginning to realise it.

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HOTLINES

As the brave and fearless Commander Evans approached the alien scum he stopped and loaded his weapon, a large laser thumper which he salvaged from the crashed enemy ship. Armed to the teeth, the lone figure stalked towards the circular encampment of the invaders. "Crack!" Just a dry twig underfoot – I hope they did not hear it.

A pointed head shot round to the direction of the noise and thought nothing more of it. Breathing heavily, Evans moved forward slowly, making ready a smoke grenade for the initial attack. As he got closer to the circle he pulled the pin from the projectile and lobbed it into the centre of the circle, neatly smacking a large alien squarely on the point of his head. He fell to the ground and was engulfed in the incandescent smoke.

Instantly Evans was running round the circle firing the laser into the coughing and spluttering crowd. Hundreds fell helplessly to the ground, struck by the lethal blast. Many lay injured, most lay motionless – dead.

One remained, hidden from view. As Evans confidently blew his laser, as in the movies, he was jumped and thumped in various and numerous places. As the creature was about to cast the killing blow he was rattled by the noise of footsteps coming towards him and fled, leaving him at the mercy of the oncoming troops.

Adrian Pumphrey moved closer. "Drunk again, Duncan?" he enquired and carried him to hospital.

You have been reading an excerpt from Evans' travels, where, unfortunately, he has fallen unwell and cannot bring you all the latest gossip and software news this week. Do not be disheartened; all is well and you shall not be left with nothing.

Amiga owners might be glad to hear of the *Gunship* conversion. What you might not like is the news about it being exactly the same as the ST version. So why has it taken so long to appear?

The arcade conversion of *Xybots* from Domark is beginning to take shape and is looking very good on the ST. Check next week's issue for a review.

Hewson has announced the intention to launch a new shoot-'em-up for the Amiga in August. The world has scrapped all medium range weapons after the signing of peace treaty but a group of terrorists have captured two and are holding the Western world to ransom. Check the screenshot for a preview of what you have in store.

Budding ST programmers will be pleased to hear of a new development package from CRL. Instinct features an assembler and disassembler with real-time memory editing and a host of other useful features.

Zandor, the evil wizard, has poisoned your beloved father, King of Pacifia. If the antidote is not administered within one day, your dadda will die and evil will reign. That is the plot and here is the picture of *Castle Warrior*, soon to be released on the ST and Amiga from Palace Software.

Finally, there is a new battle strategy game called *Austerlitz* from Case out at the end of June for the Spectrum. Command either Napoleon's French army or the Austro-Russian force against the computer opponent.

Andrew Banner

PUZZLE

By Gordon Lee

Professor Hex had been put in charge of one of the sideshows of the Spring Fair by Mrs Hex. Unfortunately, by the time things had been sorted out the more familiar sideshows had already been bagged by other helpers. There was the tombola, the raffle, hoop-la, roll-a-penny and much more. All that remained by the time they arrived was a table and five dice. They were larger than normal but otherwise were perfectly fair.

"You will have to use your ingenuity and think of something suitable," said Mrs Hex, who was eager to leave her husband to it and take her place on the cake stall with the curate's wife. A little later she wandered over to see how the Professor was faring.

"Ten pence a go," he was announcing. "Throw the dice, score at least two dice with 'ones' on and win back 20 pence."

"Otto!" exclaimed Mrs Hex, "I hope you are not being too generous with the prizes. The idea is to raise money – not give it away."

"No, dear," said the Professor in reply, as he smiled to himself. He knew that although it seemed easy enough to score at least two one-spots with a throw of five dice, the odds were a little less favourable. Can you determine what they are?

SOLUTION TO PUZZLE OF JUNE 8

Solution: As we stated last week it is impossible to produce an equation in which all the terms can be evaluated to result in a single result, as you may have found if you attempted a purely algebraic solution. Using a series of approximations and a little very simple trigonometry, a result can be obtained, the computer doing in seconds what it would take hours to do by hand.

In the diagram – see last week's puzzle page – triangles ABC and EBF are similar. Also triangles DCB and ECF are similar. This means that the ratios of their sides are related so that:

CB/AF = FB/EF and CD/DB = FC/EF

Since we know that EF=7, these expressions can be re-written as:

FB = 7 * CB/AC and FC = 7 * CB/DB

```
100 CB=5:C=1
110 AC=SQR(20*20-CB*CB)
120 FB=7*CB/AC
130 DB=SQR(16*16-CB*CB)
140 FC=7*CB/DB
150 PRINT STR$(CB);"   "FB+FC
160 IF ABS(CB-(FB+FC))<0.00000001 THEN
    PRINT"Number of trials: ";C:END
170 CB=CB*CB/(FB+FC):C=C+1:GOTO 110
```

If we knew the width of the passage (CB) we could find AC and DB by using Pythagoras Theorem and from this the two foregoing expressions would give us FB and FC. Adding these two together would give us the width of the passage, bringing us back to where we began.

This might seem that we are going round in circles but we can use this to our advantage. If we start by making an approximate guess at the value CB we can test the result of our guess by adding FB to FC. If, and only if, this sum is equal to CB does it mean that our guess is correct. If the result is out – and it almost certainly will be – we can adjust our original guess by a proportional amount and repeat the procedure.

The program takes an initial value for CB as 5 (feet) though any other value would do as well. Taking this value, lines 110 and 120 find AC and from it FB, as outlined. Similarly, the value of DB and FC similarly are found – lines 130 and 140.

At each repeat of the calculation the results are printed on to the screen. Line 160 sums FB and FC and compares this value to the current value of CB.

The value of CB is then adjusted by a proportional amount – line 170 – and the process is repeated. Each time the program executes a cycle the successive approximations are brought closer to the target value. The variable C is introduced into this listing to keep count of the number of times the program needs to repeat the cycle.

A result of about 24 would be typical but this will depend on the accuracy of the square root calculation of the computer being used. Because of this, an approximate comparison is made at line 160, otherwise slight inaccuracies may prevent the program terminating.

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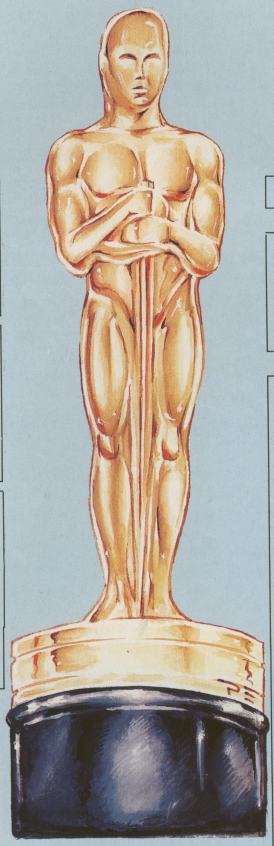

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16-Bit squabbles

This is the letter to end all letters on the ST/Amiga debate. I have a good collection of computer magazines which I have collected in the last two years and not a week passes without someone saying "My computer is better than your computer."

A computer is as good as the software for it. If you want a word processor, what good is a graphics blitter? If you want to play games, what good is an ST? Sorry, all those letters have started to rub off on me.

I used to own an ST until I had a nasty experience with the power pack and a soldering iron, which blew every component in the computer. I now own an Amiga. I think both are great computers with plenty of potential for the future.

Mark Hewstone, Leighton Buzzard, Beds.

POPULAR POSTBAG

The Amiga ST debate should now be coming to an end. Both machines have been on sale for long enough for the fighting to stop. The Amiga has better internals but you would never believe it looking at some software.

The two machines are both swamped with games, many of which are identical on both machines. This is because it is so easy to port the code from an ST to an Amiga and no modification takes place. If the software was written so that it took advantage of the Amiga hardware the difference would be blatantly obvious.

The ST has a better range of personal productivity software, while the Amiga prides itself on the quality of its graphics and sound and so it is used for presentation a good deal.

A computer is only as good as the hardware inside it. Whether it is used or not makes no difference – it is still the same computer and has the same internal hardware.

16K Specs?

I have just started a ZX-81 and ZX Spectrum 16K Club and I thought I would write to ask two things. Do you know any ZX-81 or ZX Spectrum 16K programmers or addresses of software houses which make or still have in stock any ZX-81 or ZX Spectrum 16K games? Is there anybody who makes ZX-81 or ZX Spectrum games or wants to join my club? If so, write to:

R. W. Frosdick,
1 Northolme Close, Grays,
Essex RM16 2NX

You could try dropping a line to the Spectrum Specific Chic Computer Club, at P.O. Box 121, Gerrards Cross, Bucks SL9 9JP. Tel: 0753 884473. Otherwise, if any enlightened readers would care to provide information on this matter, this page is open to you.

STAR LETTER

Service not included

With reference to Ewan Dalton's letter, Spare a thought for the retailer; it has been my bitter experience that giving a shop the benefit of the doubt is tantamount to admitting liability and fault. Although there is no excuse for rudeness, a firm "I know my rights, sonny" is often the only thing to get you a result instead of being fobbed off with a sneer and fairly unsatisfactory result.

Last year I bought an Atari ST (cash) from a Nottingham dealer. It had an intermittent fault which caused the machine to crash and refuse to re-load anything. After several hours the machine would unfreeze and be usable again for an hour or so. Obviously this was not acceptable so I returned the machine, to be told that it would not be accepted without full packaging. That sounded reasonable, so I went home again, a journey of nine miles. Next day I was back at the shop with the offending computer, pristine in its box.

The person who sold the computer looked unhappily at the box; he obviously had not expected me to retain it and was not pleased. When plugged in unfortunately the fault had once more righted itself and I quickly found myself leaving the shop, having been convinced that I needed something costing 'x' pounds to stop power surges as my electricity was obviously unsuitable.

There followed a period of lending the machine to try at other people's houses to check the power surge theory. A week later I was back at the shop explaining that the problem persisted wherever I tried the machine. Rolling their eyes at the ceiling, the 'assistants' plugged in the ST, tried a game and told me to get lost when the fault did not materialise in 30 seconds. I went away feeling that it was all my fault. When I produced the tape I was laughed at. I tried the Citizens' Advice Bureau but apparently as several weeks had passed I could not claim the machine was originally faulty and the only thing the shop was obliged to do was fix it under the guarantee.

The machine was returned again; this time I got them to take it for a check. Slightly less than two months later I was informed I could pick up the computer. Asking what the problem was the answer "We did not find anything" started to annoy me. They had had the machine for seven weeks and not even sent it to Atari on the grounds "They would only plug it in and find it works."

I asked politely for it to be sent and got a stream of abuse accusing them of not knowing their job.

The story went on for another two months and I was never abusive. Eventually they got fed up with me returning in the middle of a busy Saturday afternoon and undermining customer confidence. You see, many customers shopped at the same time and began to recognise me and to ask questions. Five months after the original purchase I walked away with a new, working machine.

As a footnote I would like to add that I was given back my old packaging and the machine re-sold as new. I ran into somebody returning it two weeks later.

W. Ralph, Toton, Nottingham.

Swift delivery

I have just sold my Amiga and bought a PC Engine and a Sega Megadrive both from Mention Technical Services. I do not know why but ever since I have had these two machines I have been glued to the set. One thing which bugs me is why Micromedia is always recommended in your magazine.

At first I ordered from it but my order had not arrived after five weeks. I made repeated telephone calls, on some occasions getting a busy tone every time – on one occasion repeated 67 times within two hours. On the only two occasions I made a connection in both instances I was advised by someone to call later.

I received a letter seven weeks after my original order saying they still had no new stock. By that time I had stopped my cheque.

I would like to praise Mention for such a quick turnround – 14 days – and the machines have worked perfectly.

F. Mirbaghi, London SW15.

It's Showtime

I am writing about the diary dates column, aka Showtime. It used to be a regular column which, while living in the U.K., I always found very useful. Now I live in Germany it is absolutely essential when scheduling my trips to the U.K.

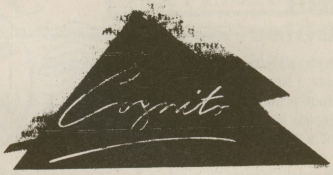
After subscribing to *Popular Computing Weekly* I waited in anticipation to see what shows are lined up for the next few months, only to be disappointed by its absence. The column reappeared briefly under the pseudonym Showtime after *Gamesweek* amalgamated with *Popular Computing Weekly*, only to disappear again.

Bring it back. I am sure many readers would, like me, love to see it again on a regular basis. Surely, the show organisers are only too eager to inform you of any forthcoming exhibitions. On the other hand, throwing together a half-page list and updating it every week would take your staff a few seconds to complete, making it probably the most cost-effective column in the magazine.

Donald Maple, Düsseldorf, West Germany.

You will be glad to note that Showtime was resurrected in last week's issue and it is due to be updated regularly.

"They're holding the robot service vehicle hostage"



Zeppelin Games require Z80 and 6502 programmers to work to the best game plans in the business.

Zeppelin produced the Budget Game of the Year and its full-price sister arm, Cognito, has just released THE soccer name game – KENNY DALGLISH SOCCER MANAGER. On the Atari LX/XE, Zeppelin are unassailable in the UK.

Zeppelin's success has been built on sound relationships with its programming teams. Many coders have gone from unproven enthusiasm to the very top positions at Zeppelin – such is the encouragement and support of a management team who've all been programmers themselves.

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Use your head

If you have had difficulty loading cassette games the Load It Datasette with adjustable head could be a solution. Kenn Garroch gives it a test run.

The Load It Datasette is the first computer cassette recorder I have seen with an adjustable record/playback head and built-in LED meter. Designed for use with Commodore 64 and 128 machines, it resembles the original C2N cassette player with the exception of a small knob and a 10-segment bargraph LED on the top. With modern games using turbo loaders which require accurate positioning of the cassette head, the idea is that the knob and meter will allow the user to adjust the head to suit the particular tape being loaded.

All cassette transport mechanisms have adjustable record/playback heads. Held in by two bolts, one is solidly-attached and the other spring-loaded. The position of the head is usually set by the manufacturer and should be the same in every machine but bumping and banging can move the head out of position and cause the signal being picked up from the tape to be distorted.

Normally there is a small hole in the case of the cassette recorder to allow the head to be adjusted. A small non-ferrous, non-magnetic screwdriver is used to turn the spring-loaded bolt and so set the position, or azimuth, of the head. Older versions of the C2N did not have that hole but it was installed in later models to allow the corrections to be made.

On normal cassette recorders – those which can be used to play music and other tapes besides strictly computer data – the adjustment is made by putting in a good-quality cassette you know has good playback. Press play and wait for some sound to emerge from the speaker. Insert the non-ferrous screwdriver and adjust the position of the head. Turning the bolt in one direction usually makes the sound appear muffled. Turning it the other way should make it sharper. Adjustment should be made so that the sound is at its sharpest.

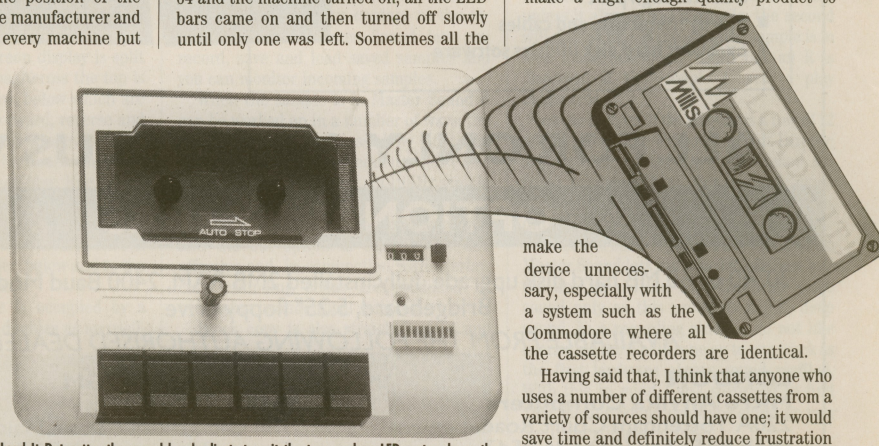
The difficulty with the Commodore cassette recorder is that it is not possible to hear the sound output easily. To circumvent this, the Load It Datasette has a light emitting diode array display. Putting in a cassette and adjusting the little knob changes the position of the head. The effect can be seen by the movement of the LED display. The more bars which are illuminated the sharper the signal.

When the Datasette was plugged into the 64 and the machine turned on, all the LED bars came on and then turned off slowly until only one was left. Sometimes all the bars stayed on for 30 seconds or so and, since there were no instructions, that was a little confusing. Ignoring this, I inserted a tape into the player and pressed SHIFT RUN/STOP and then PLAY. Adjusting the knob appeared to make no difference to the number of bars lit and eventually all of them came on and stayed on, no matter what I did.

After trying again and leaving it running for a time I noticed the bars descend to a level of around six and that by, adjusting the knob, I could just get seven. Re-winding and loading produced a good load with a high-speed load game. The problem seemed to be that there was a good deal of intertia or hysteresis in the sensing circuit. It needed a long look at the signal level to settle down. Once it was adjusted correctly for the tape being loaded it would load with no difficulty.

For anyone who has trouble with cassettes and does not like returning them to a software house more than once or twice, the Load It Datasette is a useful piece of equipment. The only point I would make is that software houses should be able to make a high enough quality product to make the device unnecessary, especially with a system such as the Commodore where all the cassette recorders are identical.

Having said that, I think that anyone who uses a number of different cassettes from a variety of sources should have one; it would save time and definitely reduce frustration levels normally increased by having a game not load properly for the tenth or eleventh time.



Load It Datasette: the record-head adjusts to suit the tape and an LED meter shows the optimum level.

CONTACTS

Product: Load It Datasette.
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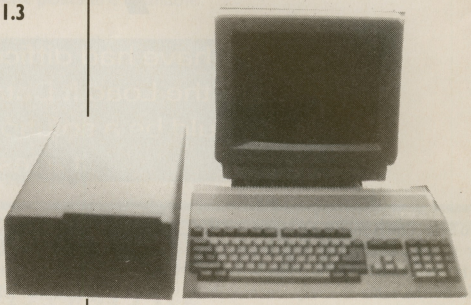

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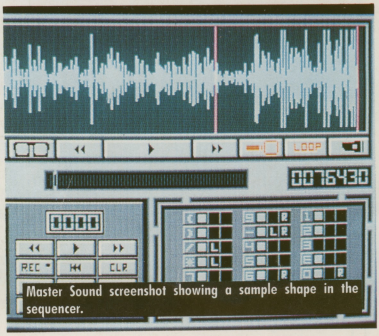
Mastering the sound

Alan Tomkins reviews a new sampler/sequencer package for the Atari ST called Master Sound.



Master Sound screenshot showing a sample shape in the sequencer.

Have you noticed that there seem to be more sound packages being released on the ST than word processors lately? That means that to survive, any new release must either be better or cheaper than those which have gone before. With this in mind let us look at a new sampler/sequencer from Software Horizons, Master Sound. It costs £35 and is in three parts – software, hardware and manual.

The hardware is a grey cartridge 110mm long, 55mm. wide and 23mm. high which plugs straight into the ST cartridge port; a 3.5mm. jack socket takes a lead, not supplied, into a battery-operated radio or cassette player headphone/earpiece socket. Apart from inputting sound the cartridge also acts as an anti-pirate device; you cannot work Master Sound without it.

Once booted, the screen display is split into three main sections. Across the top is the Sample Edit Window, below which are VCR-type controls for forward, reverse and play, plus magnify. In this window are two pink vertical lines which are the edit cursors and a horizontal blue line which displays the sample shape.

Beneath the VCR controls are two boxes which display the cursor positions; between them is a UV meter slider; below and to the left are 25 control boxes.

The right-hand side is occupied by a rectangular box which doubles as an oscilloscope and sequencer. Bringing up the rear of Master Sound is the manual; although of only 16 pages, it is well-illustrated and the tiny text takes you step by step through all the operating instructions.

Let us look at how well it works. The top line of the function boxes sets the sample rate from 05KH to 20KH; 10KH is the preferred rate but if you have a least 1MB or more a rate of 20KH is preferred, as the higher the sample rate the better the sound quality; for those with 520s 30 seconds of 20KH is possible.

Spectrum analyser

The correct volume is set in the oscilloscope and a 34-bar spectrum analyser displays the frequency content of the incoming sample. Master Sound lets you record, save and load saved samples and you can monitor incoming samples.

When the sample is in Master Sound it can be worked on in a number of ways; the sample can be compressed by up to 50 percent; the playback frequency must also be reduced by 50 percent – a 10KHz sample is played back at 5KHz.

The filter provided also works very well and the cut option is easy to use and effective and, in conjunction with overlay, clear sounding echos are produced by overlaying two identical samples.

Block copy is also straightforward and the famous st-st-stutter effect on house records is easy to reproduce; you can also press the space bar in record and test mode to create the same effect. Reverse samples are catered for along with fade in and fade out, together with looping, and you can increase or decrease the pitch by up to half an octave.

Editing is made easy by having a magnification level of 250; this may sound like overkill but I found it very useful.

The sequencer is the ace up the sleeve of Master Sound; you can load up to 18 samples into the ST memory and use samples of 10KHz which are tapped in using the 18 keys of the ST keypad.

In the Sample Data Display each key is assigned three boxes; the first is blank unless it already has a sample; the second will display an L if the assigned sample is in loop mode and in the third box an R is displayed if the sample is set to play backwards.

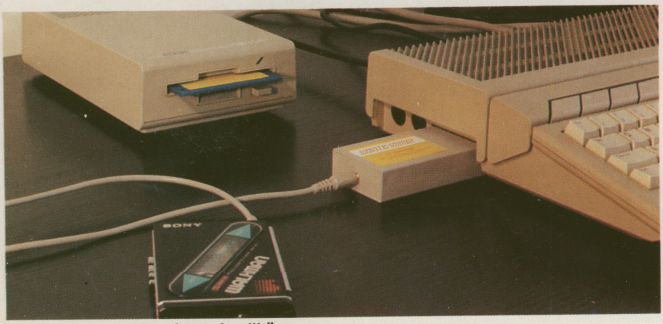
At the bottom of the display is a row of 12 small boxes – the Frequency Shift Display; anyone used to sequencers will soon become accustomed to this one, although getting used to having only one channel is difficult so you need to plan ahead.

Once the basic rhythm track is laid down Master Sound lets you o erdub the bass and top line tune. I like to overdub the same sound only as this produces a full, deep sound. In a recording studio I do not like overlaying the whole tune on to one track as the first laydowns always sound muffled. With this in mind I was surprised to find that Master Sound overdubs stand up very well and still sound fresh.

You can produce your own demonstrations and, being able to change the title screen using *Degas*, you can even change the scrolling message. Playing samples from Basic programs is fairly straightforward, as Atari Basic, HiSoft Basic and STOS Basic are supported.

At this price level my first thought was what had been omitted but I was surprised to find that all the functions normally found

continued on page 17 ▶



Master Sound cartridge plugged into a Sony Walkman.

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Mastering the sound

◀ *continued from page 15*

in samplers costing up to £100 are included. There is no trade-off in sound quality – it is better than Pro Sound. The reason is that Master Sound is written by Ferry Rawasi, who wrote Pro Sound and AMS on the Amiga; the hardware is by Two Bit which also worked on AMS.

The one-channel sequencer works well and the support of three Basics must be a plus; the only thing I disliked was that Midi is not supported but any upgrades should correct that.

I would have liked to have seen four channels for the use of home recording four-track cassette recorders but whoever heard of a stereo sampler on the ST? Software Horizons has a winner in Master Sound, the best quality sampler/sequencer on the ST for less than £100. □

CONTACTS

Product: Master Sound
Price: £35
Supplier: Software Horizons, 5 Oakley Mews, London N20 9QH
Tel: 01-446 9146

Even more Organised

Are the new Psion Organiser LZ and LZ-64 models with larger screens, more memory and extra applications software worth their luxury price tags? John Cook finds out.

In any one of dozens of business meetings in the last two years I get out the Organiser to enter some information or find an address. By the incredulous stares I might as well have slapped a wet kipper on the table.

There are raised eyebrows. "You really use that thing, do you?" I can put appointments into it and weeks later I will be reminded of that commitment up to an hour beforehand. Which, if most of your business is in central London, allows you to arrive just in time.

So what can a hardened Organiser user say about the new LZ and LZ-64 versions, now priced at £149.95 and £189.95 respectively. Now I am accustomed to my LZ how could I ever go back to my XP?

The main and most obvious improvement is the display. From a chunky 16-cell by two line display you now have 20 by four lines. I never thought of 16 by 2 as chunky before but now it looks odd. The extra space means bigger menus – no more scrolling down file cards to find the whole of an address; and, very sensibly, on the main menu, top right, is a clock. How many times have I previously turned on, only to press T to get the time?

There are more substantial changes. The Notepad facility is selectable from the main menu; you can now make notes on the Organiser then sort them alphabetically, number them, make calculations – in a limited fashion – search through them and then save everything for later musing.

Strangely enough, I had started using a file on the memory drive of my XP for notes just before I upgraded; it is limited and it is much easier now.

The Diary has been upgraded to produce a graphic display of the days ahead for, Psion says, efficient appointment planning. That is correct, too.

Multiple files are now allowed and you can cross-reference, sort and search through them, with wildcard options if necessary. To bring home the point about 1992 and all that you can have your Organiser communicate in French, German or English; dialling codes and world time for 400 cities in 150 countries have been stored internally. This might sound flash but the function is genuinely useful when you are overseas.

To list other improvements, the Clock now has a stopwatch and a timer; stats functions have been added to the Calculator; Password protection can now be added to many files and a few more functions have been added to the on-board programming language, OPL.

The only problem might be the price. Old-style CMs and XPs have now been reduced to £80 and £110 respectively. The LZ and LZ-64 – with 64K RAM rather than 32K – cost more but you have to think of it as comparable to buying a bottom-of-the-range car or a Ghia. The same basic functions are there in the CM; it is just more comfortable having an LZ.

The acid test is will I return my LZ and revert to my trusty, battered XP? Call me fickle. Call me a cad and a bounder but all my old tiles are compatible with the new. Any offers for a second-hand Organiser? □

LZ64: key features are a four-line 80-character screen, 64K of internal RAM and 64K of in-built software.

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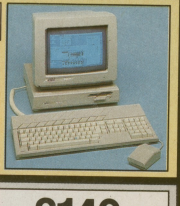

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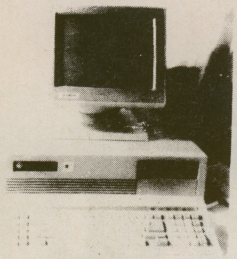

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But don't just take it from us, Crash magazine's verdict was:

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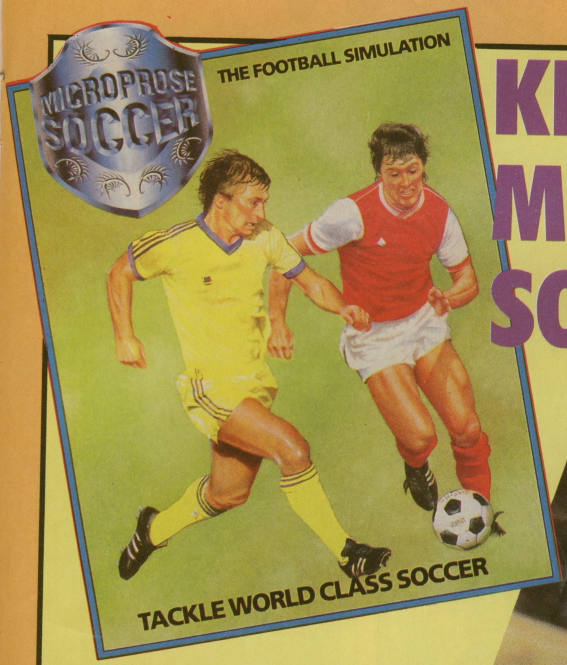
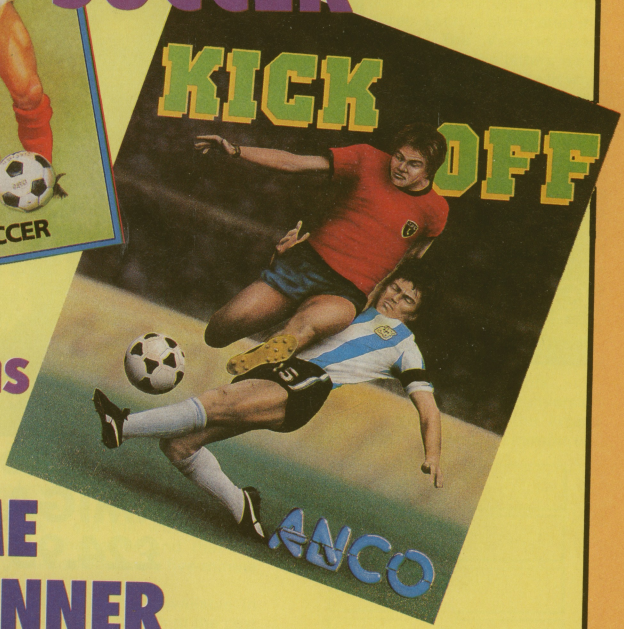


KICK OFF vs. MICROPROSE SOCCER



Amiga versions showdown

TIME SCANNER
Pinball wizardry

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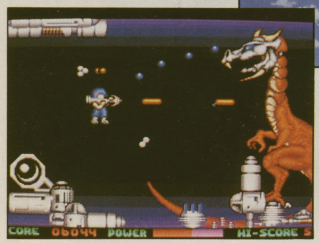

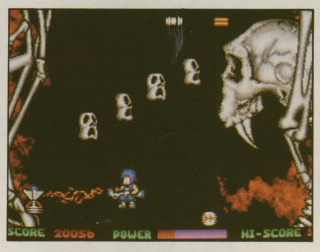

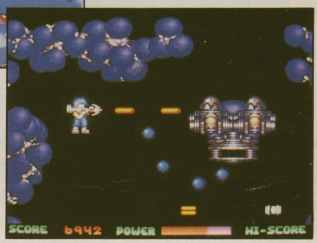

Amiga Screenshots

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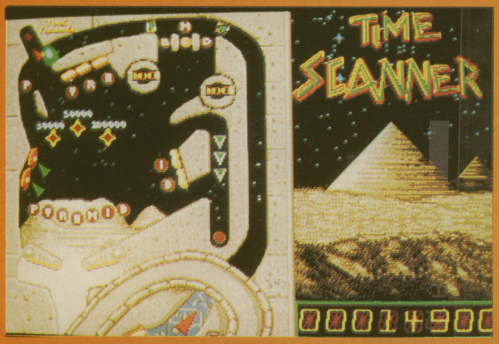

● Load Time Scanner and flip your way back to ancient Egypt.

FAX BOX

Program: Time Scanner
Version: ST
Price: £19.99
Supplier: Activision
Reviewer: Andrew Banner

RELEASE DATES

ST: Out now
Amiga: Out now
C64: Late June
Spectrum: Late June
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Back in the mists of time, the pinball machine whirred and pinged, its flippers alive from the constant pressing of its buttons by the human player. Bang! Bang! Ping! as it clocked another 2,000. As the ball slips narrowly through the unsuspecting flippers the human player curses and pulls back the plunger to launch the final ball into the play area, only to see it lost down the left gutter into the internal workings of the machine.

The pinball machine has been a common sight in amusement arcades for many years. Today, many pinball games are neglected for the more sophisticated arcade coin-ops but there are still pinball wizards who spend their money solely on pinball.

Then there is the electronic video pinball game. *Time Scanner.* After its debut in the arcades some time ago, many people tried it and most left with smiling faces. Today, as I walk through the amusement arcades along the promenade I see the wizards have returned to the tables and that the video game has become a five-minute wonder.

Time Scanner is now available in your bedroom at a fraction of the cost of the arcade machine but is it as much fun as its coin-op counterpart or should you visit your local arcade and pump tenpence pieces into your favourite table?

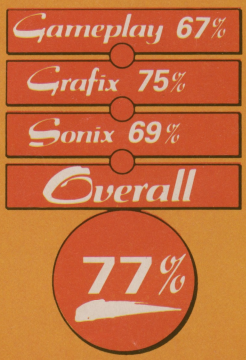
Time scanner consists of four pinball games which transport you through time, with each being situated in different locations. The "table" occupies slightly more than half the screen, with the remaining portion being wasted on a pretty picture with a small portion being occupied by the score.

The game begins with the Volcano stage and if you manage to hit the green ball into the correct channels of the table you will be transported to another location and another time.

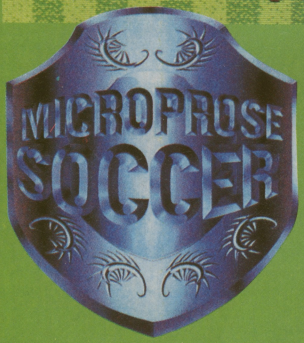
There are two other stages which are readily accessible, the Ruins and the Saqqarah stages – try saying that if you are drunk. The fourth and final stage can by accessed only by completing the first three. Each is completed in a different way. The Volcano stage needs to have all of the letters which spell the word "volcano" to be lit while the Ruins stage is far more complicated.

The conversion of Time Scanner is very accurate. The graphics are very good and mimic the arcade version well. My only complaint is the gross waste of the screen area. The sounds will never be capable of blowing your mind but they are adequate. In terms of play, Time Scanner will not hold your attention for too long but just long enough to complete it. To me, anything which claims to be pinball is authentic only if it has physical flippers, bouncers, large chromium balls and needs a tenpence piece to get it to work.

Time Scanner is a close conversion but unless you enjoyed the arcade game you will not be too enamoured.



● Soccer: why is the goalie doing a penguin impersonation?



The spotlights glare, the crowd roars – this is the big one. These are the top football games on the ultimate home computer, in a clash of the titans with no holds barred. Let the contest between the Anco *Kick Off* and *Microprose Soccer* on the Amiga start, and may the best team win.

Although this review is based on the Amiga versions, references to the ST versions will be made as they were released first although, in the case of Microprose, only by a matter of days. Both programs have plenty of features, both in provision of contests and in allowing the playing conditions and skill levels to be customised.

Let us look first at Kick Off, the surprising challenger to the pre-match favourite. You can practise skills or penalties, play in a single game, play in a league and set the match duration. On the latter, the time can be set from 10 to 90 minutes. That said, the default value of 10 minutes is perfect.

When playing a single game you can play against a friend, or the computer, with five skill levels to suit all abilities – even yours. On International level, the players move like a supercharged Gary Lineker and it will take two weeks of practice before you can claim to be competent. After playing the ST version for two months we are still developing new skills and strategies.

One of the greatest attractions of Kick Off is playing in the league. It consists of eight teams of different ability, any of which can be played by a friend or the computer. A season consists of 14 matches, features an attractive league table conforming to F.A. laws, and can be saved after each game.

Microprose Soccer appears to offer a great deal more playing options but one of them has been so poorly thought-out as to make it useless. First decide whether you want to play American indoor soccer or the real thing outside and make the correct decision or you will have to re-boot.

The outdoor stuff offers an international challenge, World Cup tournament, a soccer league or a two-player friendly, and a control panel and name bank.

The control panel allows the player selection mode to be toggled between auto and manual. There are three settings to banana shots, match lengths of two to 12 minutes in two-minute increments, action replays and in-game music to be toggled on or off.

The name bank lets you enter up to 14 names which can be used in all the tournaments and events, thus allowing 14 friends to compete in the World Cup. The international challenge consists of playing against progressively better computer teams while the friendly is a one-off.

The so-called soccer league keeps tally only of each team's win differential and does not even draw out the correct teams – you have to select them manually. So much for a league; you have to run the entire thing on paper and it can be done using the two-player friendly option, thus making it a farce.

The World Cup tournament is the real multi-player event and works well with up to 14 human players scattered around six groups of four teams. Though the tables are presented simply they are shown over a digitised picture of a football game and this attractive concept is used in other

● Soccer: cut a swathe down the pitch leaving defenders scattered in your wake.

FAX BOX

Program: Kick Off/Microprose Soccer
Version: Amiga
Price: £19.95/£24.95
Supplier: Anco/Microprose
Reviewer: Duncan Evans

RELEASE DATES

Amiga: Out now
ST: Out now
Microprose Soccer only
Spectrum: Out now
C64: Out now
CPC: Out now

places throughout the game. If you end up controlling Cameroon do not expect as easy a time as playing Brazil.

One aspect which is not forgiveable is the terrible music but I have never heard a Microprose game with good music. For the indoor season expect a very American approach, with teams from the States and six-a-side games but exactly the same contests – just with different names.

So to the games and an area where Kick Off easily outstrips Soccer. In Kick Off there are 12 different referees who have a marked effect on the game as, unlike Soccer, they can penalise fouls with yellow and red cards, award free kicks and, most exciting, penalties.

You can play 4-2-4, 4-3-3, 4-4-2 or 5-3-2 formations and if you win the toss decide whether to play up or down the pitch in the first half. Formations can be changed at half-time.

On the pitch Soccer has more attractive graphics – just – but they are not to scale and even though the Kick Off players are smaller the pitch is larger – it takes less time to run across or down the pitch.

On the Amiga, Soccer could be described as plodding, while the ST version is unbearably slow and the game appalling. Amiga Kick Off, on the other hand is blisteringly fast, ever so slightly more so on the ST, and can have unlimited numbers of players on-screen at once. It slows slightly when that is the case, but at least you know it is an 11-aside game, unlike Soccer, which never seems to have more than seven players on-screen at once.

The full screen scrolling is slow and slightly juddering –more so on the diagonals – in Soccer but is fast and smooth in Kick Off.

Despite the much-vaunted Soccer banana shots and overhead kicks, Kick Off offers far more variety – and realism, since the ball sticks like glue to your foot in Soccer – in that the players will bend the ball; there are headers, chips are implemented fabulously and the ball can go into the net in a number of exciting ways – even from corners which can be played in nine different ways and off the post/crossbar.

The control in Soccer is virtually automatic, teamplay limited, and the shot selection irritating. Kick Off is more natural, is more difficult to master, and lets you pass the ball like Glen Hoddle or hoof it like Wimbledon.

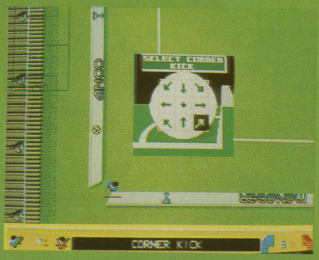
The sonics are much the same on both sides but those of Kick Off are more realistic and also have a sampled 'Penalty'.

While Microprose Soccer has first division gloss it has distinctly third division gameplay on the Amiga and just gets blown away by the utter brilliance of Kick Off, which has the proper options and the best gameplay seen in any football game.

● Kick Off: choose an attacking format and you could be left defenceless...

RESULTS TABLE

Feature	Kick Off	Soccer
Options	90%	88%
Match features	93%	74%
Graphics	85%	90%
Speed and scrolling	95%	65%
Sonix	80%	77%
Gameplay	95%	62%
Overall	94%	70%



● Kick Off: another penalty-box tussle – it'll end in tears.

Adventure Bridge

Although I have been writing this column for several years, I admit that I take time from playing adventures to look at other types of games. Although the hands are a little shaky with age, and holding a joystick becomes more difficult, I still retain delusions of being an arcade ace.

The only difficulty is that I find most of the arcade games nowadays are dull fare after the first flush of alien-bashing is past. Even so, I have been kept awake into the small hours by some superb games recently.

One of the non-adventures which has been keeping me awake is the Activision **Millenium 2.2**. It is a very sophisticated version of another of my favourite types of computer pastime, the management game. In M2.2, it is your job to rebuild the human race from a mere handful of survivors on the Moon.

Starting with only a bunch of batteries for power, slowly you build stocks of weapons and spaceships. You will need weapons to defend yourself against the warring Martians and spacecraft to mine the Solar System for essential raw materials and to set up colonies.

Although the programming and graphics are utterly superlative – even though I managed to crash the thing twice, so save as often as you can – the addictiveness is derived from your attempts to find the correct balance between the husbandry of your precious stocks and expanding at a steady rate. The manual, so one of the authors at Software Studios in Activision tells me, is deliberately skimpy so, like an adventure game, most things are left for you to discover.

Let met give you a few tips. After a certain amount of time has passed you will be threatened with extinction by the Martians if you send up any craft; they are scare tactics and must not deter you, as you reach for the stars – or rather planets – to get anywhere. Sooner or later, Moon Base will be attacked. If you do nothing, you will lose vital equipment and a number of your much-needed population. So building a fighter must be high on your agenda. Equally, you must build high-powered energy systems; you will not get far with torch batteries.

Also high on your list of building properties must be Probes; thankfully fairly cheap in terms of raw materials and time, they are essential in gathering information about which parts of the Solar System you can exploit. At the start, do not worry about the planets and satellites near to Earth and the Moon, as the Martians will blast any Probe into its constituent parts. Although colonies must be established as soon as possible to get a good supply of raw materials flowing back to your base on the Moon, there is only one which is vital to further progress and I shall not tell you which it is.

The asteroids are rich in raw materials, which can be plundered for short-term stocks. To mine them you must use Grazers. Just two or three should suffice and you must use them in fast rotation. Forget them for ferrying material to and from the colonies, however, although eventually the Asteroids will be picked clean and then you can use the Grazers in support of the Carracks, which have huge holds.

Any spare production time must be taken with Probe-building, Energy units are usually the first thing to be zapped in raids on your colonies, so it is a good idea to get a good stock of them built, just in case.

It will not take you long to discover all these things for yourself; to get further is not, unfortunately, a matter of logical deduction and its there that the program falls down.

Deus ex Machina is Latin for God from a machine and describes an unconvincing twist to a plot to boost a story in the proper direction. Millenium has DEMs at every major point in the program. Rack your brains as hard as you might you will not find the answer to a problem until the program suddenly announces an "important discovery in the sands of Mars" or an "ancient artefact uncovered on Callisto". This is all very atmospheric, but what it boils down to is that you have to sit and wait for the next DEM to turn up.

It also means that once you have completed the game there is no incentive to play again; despite the superficial appearance of subtleness and depth of gameplay it soon becomes clear that there is only one solution. The final solution is signalled well before the end and although the end-screen is beautifully done and brought tears to my eyes, nevertheless I was disappointed that the game was solved in a few hours and holds no more interest after the solution.

That should not deter you; the game is well-designed with beautiful graphics and adequate sound. There is even a not-too-bad arcade sequence, though the alien craft seem to sit there, cooing "Shoot me, shoot me", and dealing with them is a doddle – even for me.

Tony Bridge

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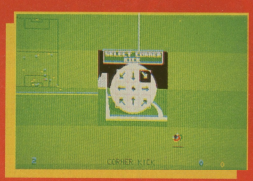

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Man and machine pit themselves against the craziest terrain in a test not only of skill and bravery but a challenge to your sanity as, once again, things slip from your grasp and the computer informs you that your rider is chewing the grass.

The **Super Scramble Simulator** allows you to pit yourself against 15 simulated tracks of fiendish design. Grouped in clusters of three, each section has an overall theme. You start with the dirt sections as you traverse hills so steep that Hannibal and his elephants would have walked round them. Following the hills are the upright tree stumps and mud slides – not an easy task for a dedicated biker but for a humble joystick jockey such as myself the task was almost impossible. Plenty of time and effort has gone into the programming of the sound and graphics but the gameplay is sadly lacking.

You have limited control over your bike, which leads to immeasurable amounts of frustration as the program demands that you exert more mastery than you have. Moving the joystick from side to side allows you to control your speed, while an up-and-down movement combined with the fire button allows you to change gear from neutral to third and vice versa.

A wheelie is possible – and in some sections of the track demanded – but it is very difficult to maintain. There is a small display in the middle of the screen which shows your position on the track in relation to the obstacles.

● **Oh no, here comes the section every hardened dirt-biker dreads – 'attack of the killer tree-stumps'.**

Sideways movement is shown on this display, thus allowing you to align yourself with the obstacles encountered.

The first section of dirt track is simple to master once you realise that travelling too fast will result in a skid and travelling too slow will result in a stall, both of which cause time penalties. All this leaves you to do is ensure that for the hills you drop to a low gear.

Things become a little more exciting in the other two dirt sections. There you find tree stumps which must be negotiated on your back wheel and hillsides which look as if they have felt the brunt of a volcanic eruption. Oddly enough I was unable to drive the bike up the face of a lava-encrusted hill on two wheels but the program was content to allow me to bounce my bike up the hill on my front wheel.

Further attempts at this particular hazard revealed that you are required to hold your speed to within a set of parameters so small that anything more than a twitch on the joystick stalled the bike and caused you to crash because of excessive speeds.

That is my complaint about this program; when something goes wrong the action freezes and a message pops up saying too fast, too slow and so on.

● **Try a bunny-hop and you're likely to end up chewing the handlebar.**

The program does not inform you that things are starting to go astray and there is no change in the attitude of your biker or the controls; the action just freezes leaving you to guess where you went wrong.

FAX BOX

Program: Super Scramble Simulator
Version: C64
Price: £9.99/14.99
Supplier: Gremlin
Reviewer: Adrian Pumphrey

RELEASE DATES

ST: End of June
Amiga: End of June
C64: Out now
Spectrum: Out now
Amstrad: Out now

Gameplay 27%
Grafix 73%
Sonix 86%
Overall
46%

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Graph box

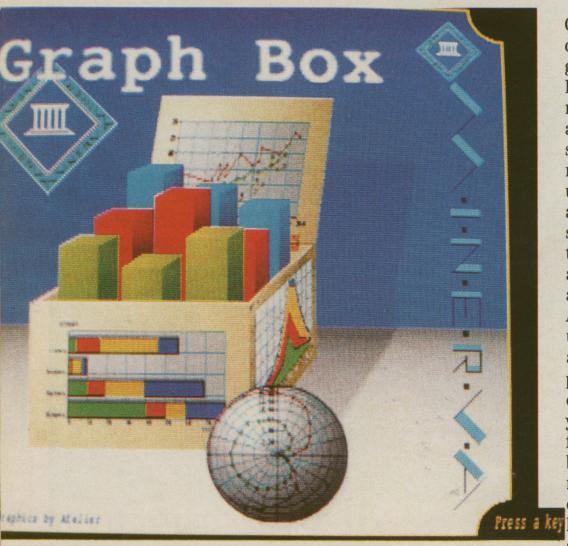
Kenn Garroch reviews a graph display and creation package utilising RISC OS on the Archimedes A3000.

There are lies, damn lies and statistics, so it is said. One way of separating the latter from the former is by means of a graph. After all, a list of numbers could mean almost anything unless it is presented in the correct way. The only disadvantage with producing graphs is the fiddly work involved. Anyone with the slightest mathematical experience will probably have encountered the difficulties of scaling the data and drawing and redrawing it to fit on a sheet of graph paper.

Fortunately this is where the computer comes in – as usual. It can take all the sweat and tears out of the process and produce a stunning representation of the data.

Graph Box is in two parts; the first is the graph display program which can draw 21 types of graph in full colour from pies and lines to stacked bars and 3D surfaces – see specifications. Data can be derived from a number of sources and the format of files is fairly flexible, known as CSV or Comma Separated Values. Any program able to produce data separated by commas or spaces or tabs will work, since the program takes a good guess at interpreting it.

Of the 21 types there are basically three data formats used by Graph Box. X and Y charts such as line, scatter, Y only charts such as bar, stacked and cumulative area, and pie, angle and radius charts, such as polar charts, and X, Y and Z charts such as bubble, and surface charts.



Graph Box: first part is a graph display program which can draw up to 21 in full colour, the second a data entry program.

The other half of Graph Box is a data entry program called Graph Edit. Typing in the numbers is easy and resembles a spreadsheet in many ways. Columns are treated as different data sets, with the first three being taken as X, Y and Z or X and Y or Y only. Any number of columns can be set up allowing easy comparison of different sets of data. A year's sales figures for computers can be compared to nervous breakdowns and correlations seen on a graph. This would be a matter of entering 12 values in one column and 12 in another. Each of the rows can be renamed, in this case as months and the axes named. Saving the file and reloading it into Graph Box and then selecting 3D Bar Chart produces the required graph.

For more mathematical analyses there is the possibility of changing the scales for logarithmic squared, or a user-defined function such as ASN – Arc sine.

In use there were two things which could have been included. First, pie charts tended to disappear from the screen with no way I could see of getting them back or shrinking the output. The lack of enlargement and shrinkage of the whole display applies to all the graphs; it would have been a valuable extra. Another pleasant extra would have been to allow columns or data sets to be exchanged, i.e., swap around the axes.

Graph types produced

Scatter, Scatter with error bars, Line, Line with error bars, Bubble, Polar Scatter, Polar line, Stacked Area, Cumulative Area, Bar, 3D Bar, Stacked bar, Percentage Bar, Horizontal Bar, Horizontal 3D Bar, Horizontal Percentage Bar, Pie, Surface, Wire Surface.

The manual could have included more details on the file storage format. In practice, this was fairly easy to find – by *TYPEing or DUMPing the file. Using Graph Box with other applications such as Basic could have been made easier with this information and, considering the high price, I would have expected those extras to have been included.

The manual is small at 36 pages but it stresses that the best way to get to know the package is through experiment. There are 15 demonstration data sets which cover almost every graph type. The biggest problem with using the package is that the temptation to use a pretty display is sometimes too much – it is also pretty meaningless.

When drawing graphs it is important to use a display which conveys the message contained in the data. To do so you must know what you are doing. Graph Box allows the user to display pretty graphs and it is easy to use if rather expensive. No matter how boring it may be – and it is – you need to learn a little about the basics of graphs to make sensible use of them. □

CONTACTS

Product: Graph Box
Price: £79.95
Supplier: Minerva Software, 69 Sidwell Street, Exeter, Devon EX4 6PH. Tel: 0392 437756.

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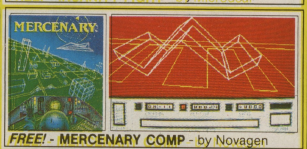

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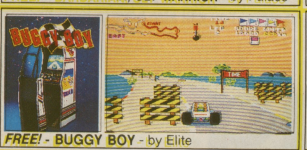

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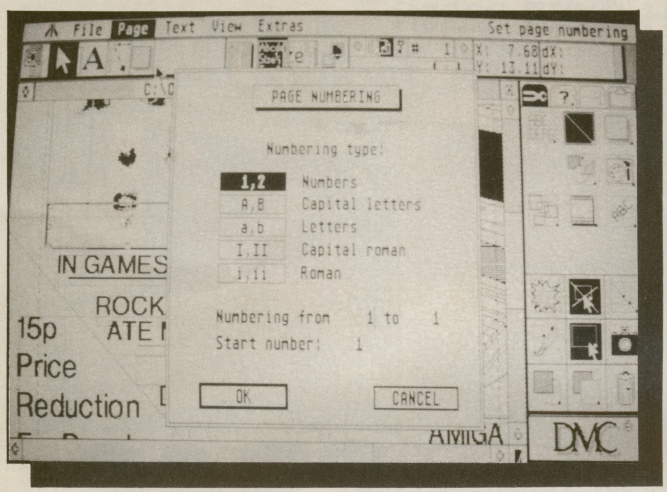


◀ Calamus allows for automatic page numbering in a variety of styles.

you can create a series of pages which are held in memory. They can all be worked on together and global changes can be made. The pages can be defined as being left- and right-hand or just single sheets. Calamus allows for the gutter margins on left and right pages to be different.

Overflowed text can be channelled from text frame to text frame and flow lines can be displayed which show to where the text is being moved.

Calamus is an incredibly fast and sophisticated piece of software. For £399 plus VAT it will not appeal to home users but if you have a small business which produces promotional leaflets you could save a small fortune, it will run on a single double-sided drive 1MB ST, although you will be limited as to the amount of pages you can create and store. You will also have to limit the use

Publishing professionally

Andrew Banner continues his test of the new Calamus ST publishing package.

Calamus was first shown in the U.K. at the PC Show at Earls Court in 1988. There it attracted a good deal of attention and interest but potential buyers were told that the software was running into problems with U.K. machines and so it was unlikely that we would see it for some time. *Calamus* is now available for a hefty price but how good is this professional package?

Calamus contains many features missing from other ST packages. One of the most useful is the ability to group frames and then move or modify them as a group instead of having to move or change each one separately.

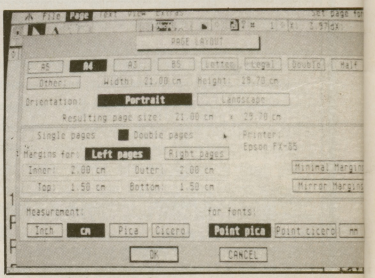
There are many types of frames available in Calamus. The most common is the standard text frame but there are frames for angled text, lines, raster graphics and others. Each frame will hold only what it is designed to hold and the type of frame is shown in the top left corner in the form of a descriptive icon.

One noticeable difference between Calamus and other ST DTP programs is the speed. Calamus updates its screen display like lightning, no matter what is on it.

Another noticeable difference is in the quality of the screen display and printer output. No matter what the size of the text, whether it is 10 point or 110 point the curves and diagonals are so smooth. Output even on a 9-pin dot matrix printer is exceptional. With a printing quality of 240 x 160 dpi the resolution is outstanding.

Calamus has the facilities for importing text in a number of formats, including its own, *1st Word, MS Write, Word Perfect* and ASCII. Calamus will also import a variety of pictures. It will accept its own format as well as STAD, *Degas Elite,* IMG files, and IFF and Degas blocks. In addition to being able to import artwork you can scan directly into the software using the three supplied drivers for two Hawk scanners and a Silver Reed model which is no longer available in the U.K. No other drivers are currently available.

Calamus is a document-based package;



Designing the basic page format.

of different typestyles as they will eat valuable memory.

Calamus gets my vote as being the best DTP package I have seen. It includes all the features you would expect from a professional program and really fits in well with the Signa range of professional software.

CONTACTS

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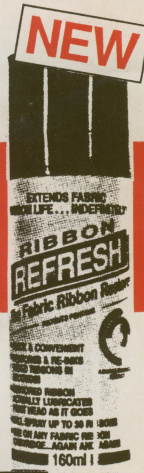

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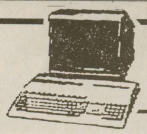

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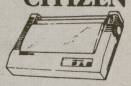

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Investment comparator – C64

J. Consadine

Do life policies pay better than a building society for investments? Check it with this Investment Comparator.

A life assurance salesman attempted to persuade me to increase payments on my policies so that I would receive extra benefits and bonus payments on my retirement, assuming I live that long.

The terms looked very attractive but it occured to me that I could invest my money elsewhere, i.e. savings bank, building society. The problem was how do they compare, since the insurance salesman quoted only maturity value after, say, 20 years?

That prompted me to write a program which would show the result of investing regular savings at a known interest rate over any number of years.

It, therefore, became possible to project the effect of saving any sum over many years without laborious compound calculations by hand.

Mathematical purists will, no doubt, wish to refine the calculation but it is sufficiently accurate for comparison purposes. □

```
10 REM **********************
15 REM
20 REM INVESTMENT PROJECTOR
25 REM
30 REM      J.CONSADINE
35 REM        MARCH 89
40 REM
45 REM **********************
100 DIMB(100)
110 PRINTCHR$(147):POKE53280,10:POKE53281,2
115 PRINT"                                        "
120 PRINT"        ** INVESTMENT PROJECTOR **  "
125 PRINT"                                        "
130 PRINT"   THE RESULT OF REGULAR MONTHLY SAVINGS"
135 PRINT" MAY BE CALCULATED BY TYPING IN THE"
140 PRINT" APPROPRIATE FIGURES WHEN PROMPTED BY"
145 PRINT" THE COMPUTER."
150 PRINT"                PRESS ANY KEY TO CONTINUE"
200 GETA$:IFA$=""THEN200
210 PRINTCHR$(147)
220 INPUT" MONTHLY PAYMENT    ";P
230 INPUT" NUMBER OF YEARS PAYING IN    ";Y
240 INPUT" CURRENT RATE OF INTEREST (6,9 ETC)    ";R
250 PRINT
260 FORX=1TO40:PRINT"*";:NEXT:PRINT
270 FORN=0TOY:B(N)=0:NEXT:REM**ZERO ARRAY
280 S=12*P
290 PRINT"  ANNUAL SAVINGS DEPOSITED=";
300 PRINT"     £";S
310 A=S/2:REM**AVE ANNUAL SAVINGS
320 REM**CALC ANNUAL BANK BALANCE
330 FORN=1TOY
340 B(N)=S+(A*R/100)+B(N-1)+(B(N-1)*R/100)
350 NEXTN:T=S*Y
360 PRINT" TOTAL INVESTED OVER";Y;"YEARS= £";T
390 IA=(INT((B(Y)-T)*100))/100
400 PRINT" INTEREST ACCRUED=              £";IA
420 B(Y)=(INT(B(Y)*100))/100
430 PRINT" BANK BALANCE AFTER";Y;"YEARS=  £";B(Y)
440 PRINT"        ANOTHER CALCULATION (Y/N)""
450 GETA$:IFA$="Y"THEN210
460 IFA$="N"THENSTOP
470 GOTO450
```

KENN GARROCH

Write to Kenn Garroch at:
Popular Computing Weekly, Focus Magazines, Greencoat House, Francis Street, London SW1P 1DG.

6502 vs. 6510

P. Andrews of Manchester writes:

Could you tell me what the differences are between the 6510 as used in the Commodore 64 and the 6502 as used in the old BBC? Can I replace the microprocessor in my 64 with a standard 6502?

A To a great extent, the microprocessors are identical but the 6510 has a few extras not found on the 6502. The Commodore 64 has access to more than 64K of memory, when you include the RAM and the ROM. Its address bus, like that of the 6502, is only 16 bits and so can address directly only 64K – 65,536 bytes – of memory. To get at the other sections of memory the 6510 has extra pins which control overlays – sections of ROM and RAM occupy the same positions in memory but are switched in and out by the extra controls. This is a built-in I/O port with the data direction register at memory location 0 and the port at location 1.

Apart from the overlay capabilities, the 6502 and 6510 are more or less the same. The 6510 is an upgrade of the 6502 and has an almost identical instruction set. The differences come into play with the undocumented instructions. When a microprocessor is designed, each instruction number is used to tell the microprocessor to perform a particular command. The instruction set has many variations but nowhere near the total of 256 which are possible. Because of this there are some unused instruction numbers which, if fed to the microprocessor, generally cause it to do something undocumented, usually a mixture of other instructions. What they do depends on the manufacturer. Only the documented instructions are guaranteed to work on any particular microprocessor.

Substituting a 6502 for a 6510 is not possible because the extra pins required for the I/O port are not found on the 6502, so the chip pin-outs are incompatible.

BBC start-up switches

Yvette Swan of Tunbridge Wells writes:

Could you tell me how to use the wire links on my BBC micro keyboard to allow the start-up options to be selected when the machine is switched on? I have access to a soldering iron and am not afraid of getting my hands dirty.

A You need to fit a dual in line package switch instead of setting individual links. This allows the options to be altered to suit your needs. You can get the switch from almost any electronics supplier – try Maplin on 0702 554161, order code XX27E Octal SPST DIL switch. Solder it in as shown in the diagram. You will have to remove the keyboard to perform the operation but this is fairly easy, although care should be taken when re-connecting the keyboard connector.

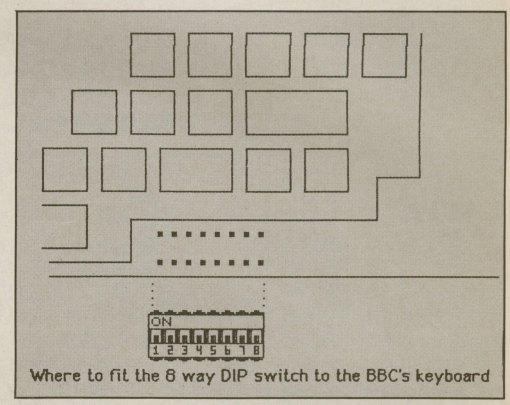
The possible settings are shown in the table. Take care with those which alter the disc system speed, as this can change the operation of the drives drastically. If you want to see what the link settings do without installing them, *FX 255 X can be used to set them up. The normal value is all bits set, i.e., all links unmade – mode 7, shift break as normal and standard Shugart disc drive times. To set the start-up mode to 0 and keep shift break and the standard disc drive settings use *FX 255 248 and then press break.

Link No.	*Usage*
0	Used with links 1 and 2 to set the switch on screen mode
1	Used with 0 and 2, e.g., 100 sets mode 4
2	See 0 and 1
3	If made then auto-execute shift break on switch on
4	Use with link 5 to set the disc drive timings
5	See table below
6	Not used
7	Not used

Possible link settings

Disc drive links 4/5		*Step*	*Settle*	*Load*
0	0	24	20	64
0	1	6	50	32
1	0	6	16	0
1	1	4	16	0

Disc link settings



Where to fit the 8 way DIP switch to the BBC's keyboard

ST external boot

David Powell of Caterham, Surrey writes:

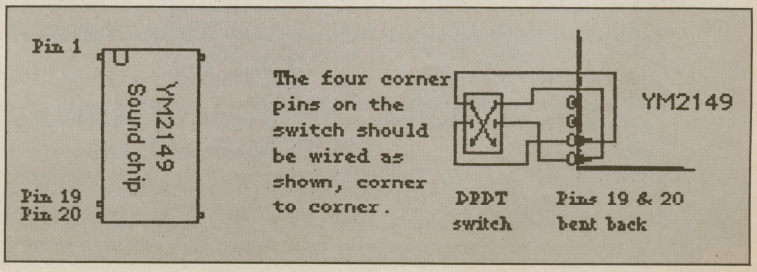
I own one of the older Atari 520STFMs with the single drive built-in. I have since bought a double external drive for it. I believe there is a way to fool the machine into using the external drive as the main one. I am, of course, talking about a wire-swapping manouvre and not one of the software utilities available.

A Judging by the number of times I have included this particular 'fix' it must be one of the most popular things to appear. As I said last time, the solution appeared in the August 18-24, 1988 issue and was supplied by A Bradshaw of Chorley, Lancs who writes:

"I have read twice in your magazine of people asking how to use auto-running programs on 1MB discs when their STFMs always boot up on the built-in half-megabyte drive.

"Pins 19 and 20 on the VM2149 sound chip control the drives; switching them over switches the boot drive. I have enclosed a drawing showing how to put in a switch which allows either drive to be drive A.

"Fitting the switch means desoldering the two pins and soldering four wires, one wire to each of the pins, and a wire to each of the holes from where the pins came. These four wires are then taken out of the ST via the mouse/joystick port and attached to a Double Pole Double Throw switch. Anyone who wants the switch fitted but has little experience of soldering should get someone who is capable to do it for them."



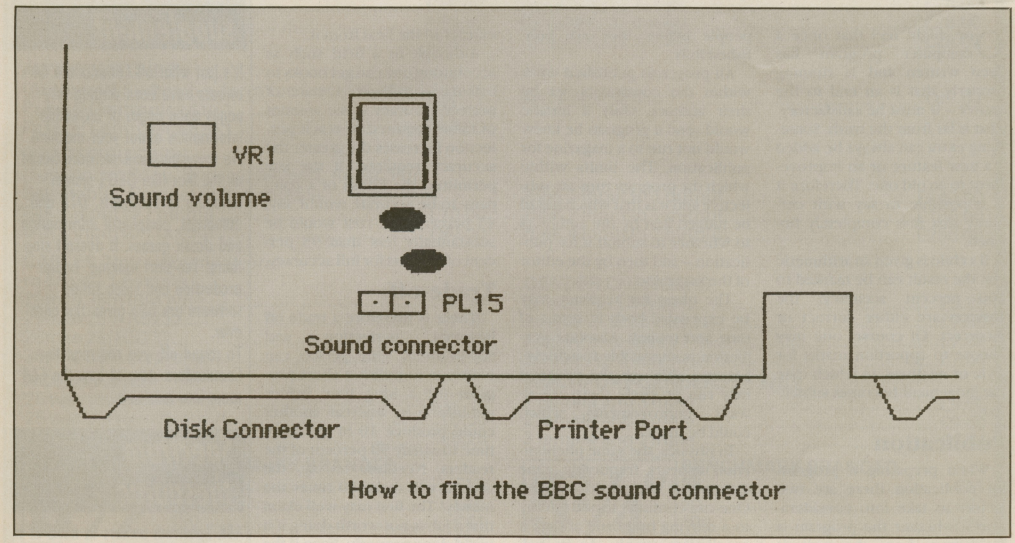
BBC external speaker

James Farrell of Dublin writes:

Q With reference to the BBC Micro model B, how do I attach an external speaker? The built-in one is rather small and I want to use something a little larger. Also is it possible to connect to my hi-fi?

A **Connecting an external speaker is reasonably straightforward. If you remove the top of the machine and move the keyboard out of the way – unbolt it and move it towards the front of the machine – you will be able to see where the internal speaker is connected, as in the diagram. All you need to do is unplug this and connect another, larger, speaker. So far as I can tell the impedance of the speaker should be 8Ω, which causes a slight problem when trying to connect to a hi-fi. Most hi-fi amplifier inputs are rated at about 1KΩ and connecting an 8Ω output to them would cause some distortion.**

Without designing a special impedance changing amplifier circuit, connecting to an amplifier is not easy but the volume of the built-in circuit can be adjusted by turning VR1 – see diagram again; anti-clockwise should make it louder.



How to find the BBC sound connector

Amiga offer

Ian Potts of Cool Soft, 2 Little Woburn Close, Hendra Vale, Launceston, Cornwall writes:

Q I refer to the letter from Osma Nazlivatan entitled Amiga Devpac in the May 25 issue. I have produced a program, as an in-house utility, which reads in IFF graphics files into a list of images which can then be saved out for inclusion into games programs. I also have routines which load these files into games and can turn them into backdrops, bobs and sprites. I use the program for putting graphics into all my Amiga programs and I believe that this is the kind of utility for which Nazlivatan is looking.

The program is called *The Designer* and is available from me for £10. For this you get the disc with the program, source code for routines to load the graphics files and display them, post and packaging.

With regard to programming the Amiga through the operating system or by 'hitting the hardware', I program the OS exclusively in assembler, using Devpac, and feel that I know the machine almost inside out. I find that the OS is very fast and provides a superb range of routines which cover every aspect of the Amiga which is unrivalled in other computers. The OS is not difficult to program; the main problem is that the manuals are aimed at C programmers and have a habit of omitting vital facts.

A **Thank you for the offer. I am still of the opinion that you need to 'hit the hardware' to get the absolute best from a computer. The Amiga is no exception and although it is possible, and fairly easy, to get at everything through the operating system – try the back of the ROM Kernal Exec Manual for help with machine code – there is always the overhead of having to follow the rules.**

Writing machine code which runs as rapidly as possible is more a matter of breaking rules, or at least bending them. As with all computer problems and solutions, it is a matter of trading off one advantage against another.

How to sprite on ST

David Evans of Dulwich, London writes:

Q I have an Atari 520STFM and have become an experienced assembler programmer in the last year or so. I would like advice about writing a sprite routine. I would like advice about the way the background for the sprites is saved. Is it better to save the background and then place the sprite on to the screen or is it better to re-draw the whole screen every time and then place the sprites on top of it? The second seems slower in theory but has the attraction that I do not have to go to the trouble of working out which section of the screen to save. The first method should be faster, since there is less information being manipulated.

A **Of the two, the first method is more usual, i.e., saving the background. There are times when the second method makes sense. For instance, if you are changing the background every time the screen is updated, e.g., for a vertical scroll, you may as well not bother saving the area over-written by the sprites.**

The ST built-in sprite routines use the method of saving the background and then putting the sprite on to the screen. When the sprite is moved the background is replaced and the background of the new sprite position is saved. If you are using static screens you may as well use this method. The advantage is that the increase in speed means you can have more sprites.

Whichever method you use, you will be writing more or less the same routine for putting the sprite on to the screen, masking the current contents and then ORing the sprite on to the empty bits. Saving the background is a matter of copying a number of words from screen memory to a buffer.

The quest for accuracy

One might feel that once a computer program has been written and is running properly that is an end to the matter – it must be satisfactory. That is far from the truth. Something extra can always be added – a new feature or an improvement to an old one. Therefore it is impossible to say with certainty that it is completely finished.

If a child is given an arithmetic test the result can be marked to 100 percent accuracy; the answers are either correct or incorrect. Of course, one may choose to apportion marks for style or neatness, in which case the judgement becomes subjective.

Publication

When preparing a program for publication there are two factors to take into consideration – whether the program is satisfactory from the writer's point of view and whether it is satisfactory from the general publics point of view. If the program is being written solely for profit it is only the general public which need to be considered. Usually the writer may be less aware of quirks than a new user. This is why programs are often tried on a panel of people before they are published fully.

All programs published work within the constraints set by their authors. Only a lunatic would send a program he knew would not run to a magazine for publication. The limits within which the program runs are subjective and it is that which has to be judged first by the author as to whether to submit it for publication – and then by the editor of the magazine.

The quest for accuracy may be expensive both in terms of time and money. Absolute perfection is impossible to achieve, because although the program may run properly there are always improvements which could be made.

In physics, the same phenomenon appears frequently. One example is the speed of light. One can continue to add energy to a moving body and at first it accelerates evenly. As its velocity approaches the speed of light, however much energy one adds, the increase in speed reduces and the absolute speed never reaches the velocity of light. Again, in cryogenics, one can cool a body and at first the temperature falls evenly. Again, as one approaches absolute zero one finds that one can never extract all the heat from it.

Although in a field such as accounting one can get books to balance – achieve a state of perfect accuracy – the amount of effort required to reach perfection increases the greater the accuracy required. If the law permitted the books of a company to be accurate within, say, 95 percent, the cost would be substantially less than 95 percent of the cost for full accuracy.

Trade-off

There is therefore a trade off between perfection and achievement. One person can continue to polish a short program for a long time before publishing it, whereas another could produce 10 in the same time to satisfy 90 percent of the readers. Needless to say, the second will make 10 times the money! The first may well claim that a job is not worth doing if it is not done properly. Even if the program was published on discs and 10 percent of the achiever's work was returned for a refund, he would still make nine times as much as the perfectionist. With either form of publishing, his work would have brought satisfaction to nine times as many people.

John de Rivaz

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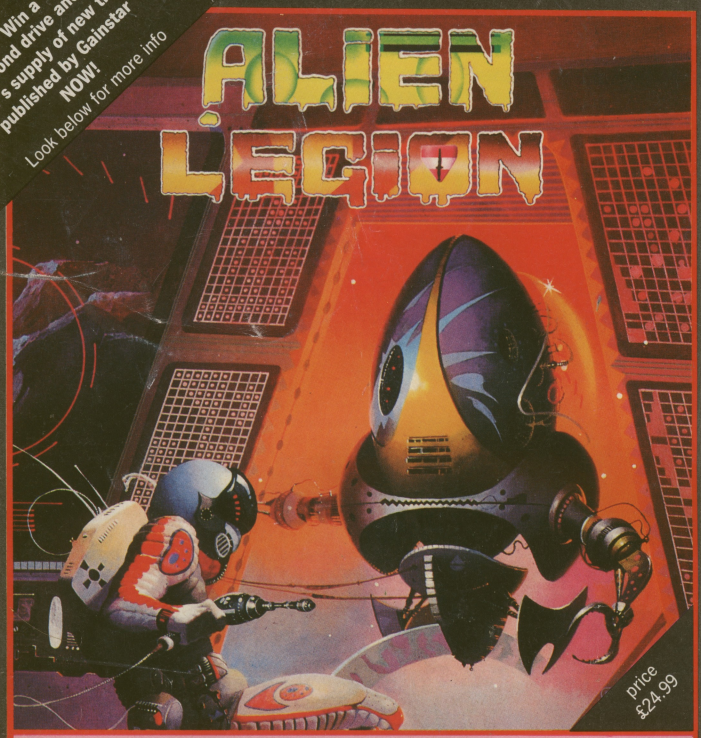

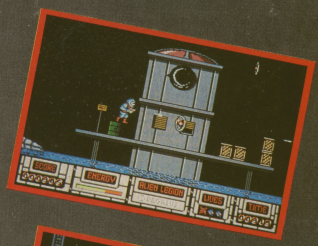

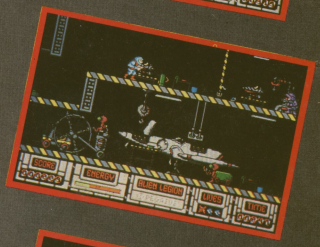

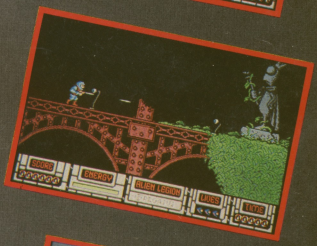

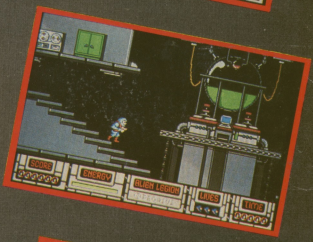

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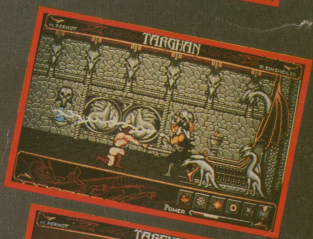

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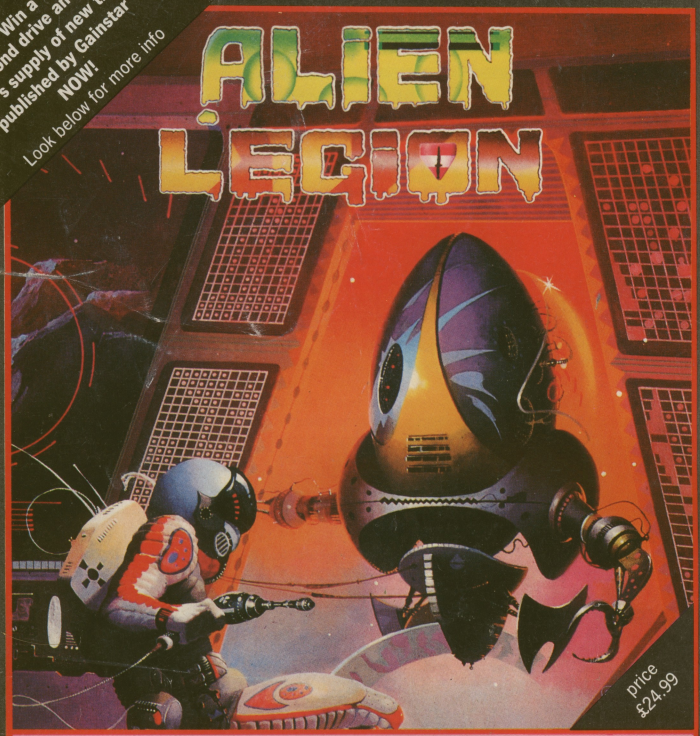

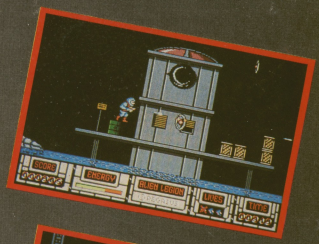

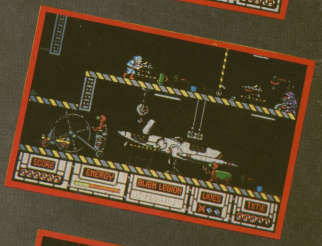

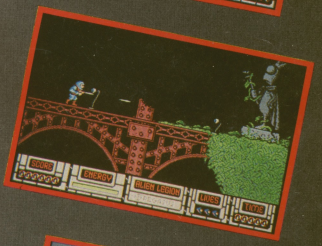

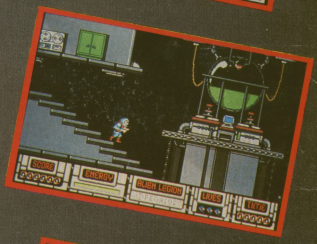

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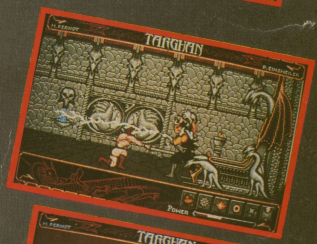

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