POPULAR COMPUTING WEEKLY

A FOCUS MAGAZINES PUBLICATION

January 7-13 1988 60p

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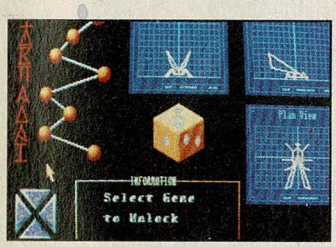

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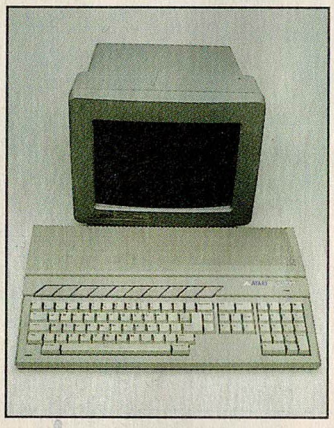
Atari putting modulator in 1040 ST machines



Atari – internal modulators.

ATARI is set to produce new 1040 STFM and 1040 STF machines with internal modulators.

According to a letter which Atari European technical manager Les Player sent to a *Popular Computing Weekly* reader, these computers will be available in March or April. Intended originally as a business machine, the 1040 ST did not have a modulator because it was used with a monitor rather than a TV screen. The 520 ST was the machine designated as the home computer.

Things have changed recently, however, with the introduction of 2Mb and 4Mb machines. These mega STs are capturing the majority of business users. Coupled with price reductions on the 1040, the evidence indicates that Atari is now targeting the 1040 at the home market rather than business users.

"Many people would probably buy one if the modulator is included. There is considerable demand for a machine with a big memory," said a computer industry source.

The letter added that from April Atari is also expecting to incorporate the blitter, which enhances graphics animation, as standard in the 1040 STFM. This, together with the internal modem, makes the 1040 more powerful and more able to compete on the level of the Commodore Amiga.

Atari public relations man Peter Walker was surprised that *Popular Computing Weekly* knew of the 1040 plans, saying: "We do not normally pre-announce that kind of information." He admitted, however, that "the gist of the letter is right although the timing is a bit optimistic. We are aiming for the middle of this year."

When asked why Atari was introducing the new version, Walker said: "Because there will be a demand for them." He denied that it was intended to compete with the Amiga. "I do not see them fulfilling the same functions. The ST is cheaper in Europe than the Amiga."

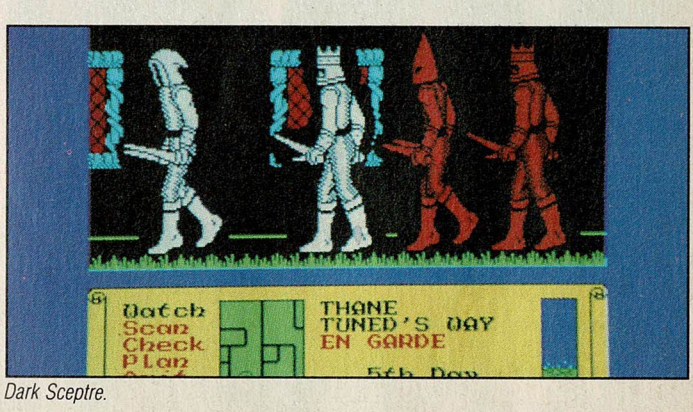
Maelstrom and Bo for BT

TELECOMSOFT has gone on a January shopping sale spree by signing up two more software developers to produce games for both their Firebird and Rainbird labels.

The two software developers are Maelstrom Games and Bo Jangeborg. Maelstrom Games has been signed to produce four titles across all major computer formats to be released during this year.

Behind Maelstrom are Mike Singleton and Malcolm 'The Kid' Hellon who are backed up by a team of six in-house programmers.

Pete Moreland, development manager of Telecomsoft, said, "We are extremely pleased to sign a long term deal with Maelstrom. These four products are set to be stunning and the games feature truly innovative program techniques."



Dark Sceptre.

Mike Singleton has had a number of software hits including such

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WHAT THEY SAID ABOUT...

Accolade™

HardBall!

Accolade™

"An absolutely incredible sports simulation"
"Sets new standards in gameplay, depth and animation" Zzap 64

"The playability, design, variety and exceptional realism make this a sports simulation to remember" Atari ST User

WHAT THEY WILL BE SAYING ABOUT

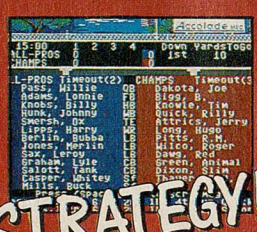
4TH & INCHES

"4th and Inches gives you all the hard-hitting action of real football: the bombs, the blitzing, the goal line stands. You'll experience graphics and animation that are as riveting as a live action blind side hit"

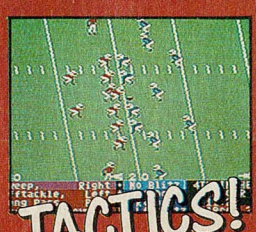
"It's hard to imagine that there can be anything more exciting for the home based football fan, even from the game's premier spectacle... the **SUPERBOWL** *"*

"Winning at 4th and Inches demands all the moves of the League's premier quarterback plus the tactical genius of a veteran lead coach"

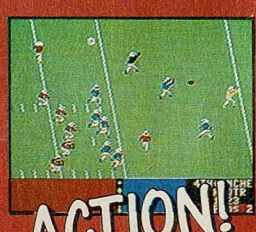
CBM 64/128
£9.99
cassette
£14.99
disk



STRATEGY!



TACTICS!



ACTION!

U.S. GOLD
All American Software

U.S. Gold, Units 2/3,
Holford Way, Holford,
Birmingham B6 7AX.
Tel: 021 356 3388

EDITORIAL

Last week we followed a train of thought about where the games computer market was heading this year. We concluded that CD-Rom was destined to hit the proverbial fan much sooner than some had predicted, and that we could expect a realistically priced, mass-market unit in a matter of months rather than years.

There are a number of factors which pose a further question. Consider the impending arrival of CD-Rom. Consider the revival of the games console market, led by Sega, Nintendo and Atari.

More importantly, consider the fact that most people use their micros for playing games, and thereby support a multi-million pound industry in the U.K. alone.

This poses the question – what is the future for home micros as opposed to increasingly sophisticated dedicated games machines? It may well be that the application of many home micros – games playing – will outlive the technology that supported it in the first place.

This will leave a gap in the home micro market. After all if this trend does continue, all those millions of non-games dedicated micros aren't going to disappear, nor are the manufacturers going to throw in the towel and stop producing them.

There are too many exciting new developments occurring in the home micro industry for its mass-market appeal to disappear.

But the fact remains that a lot of people do not program, do not calculate accounts, perform wordprocessing, but only play games.

It therefore makes sense to assume that many of these will go over to dedicated machines.

Clearly all this points to increasing fragmentation of the home computing market. Although this process is already under way, and indeed has always been latent within the home computer arena, there are grounds for believing that it will intensify in the coming months. 16-bit machines (subdivided into PCs or 68000-based units), 8-bits, games consoles, CD-Rom – the development of all these markets will increase demand for more and better specialised 'niche' software products. Let's hope the industry can rise to the challenge.

John Brissenden

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Mastertronic goes MAD

MASTERTRONIC this week relaunched its MAD range. With the price remaining at £2.99, the range will now offer two games on one cassette.

According to Mastertronic's marketing manager, Rachel Davies, MAD X is, "based on the record industry's idea of a B side." Products chosen for the A side will be premium titles with the B side housing either an older game or an unreleased title.

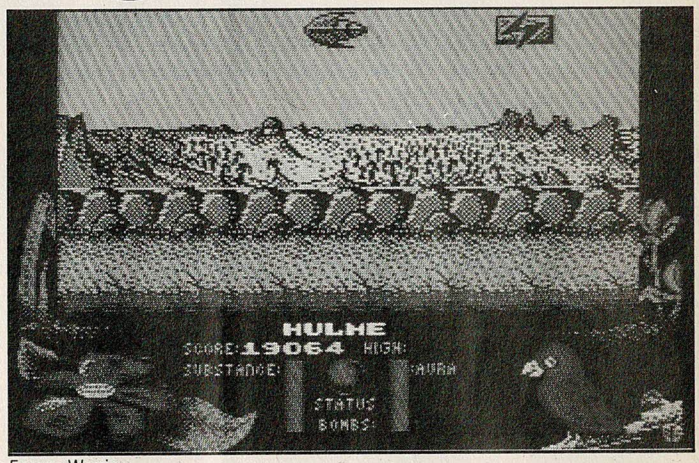
The new MAD X range is not expected to affect any of Mastertronic's other £2.99 ranges, such as Rack-It or Americana. These will remain in their current mould as will the £1.99 budget range.

While the MAD X range has a new look, logo and style, it does not delete the existing MAD range. These will still be available in their current packaging. No new titles, however, will be added to the MAD range, only to the MAD X series.

Mastertronic aims to offer at least one new MAD X title per month. The first product to be released is *Energy Warrior*, a shoot-em-up, with *Molecule Man* on the B side.

The next title is *Rockford*, the first arcade conversion of *Boulderdash*.

Concentrating on the character, Rockford, the 16-bit version of the game is being released under the Melbourne House label, while the 8-bit is a budget title under MAD X. According to Rachel Davies, the consumer is getting the special treat of a full-price game at a budget price. "This makes the launch special since the game is good enough to have been full-price," she said.



Energy Warrior.

Expanding Robtek

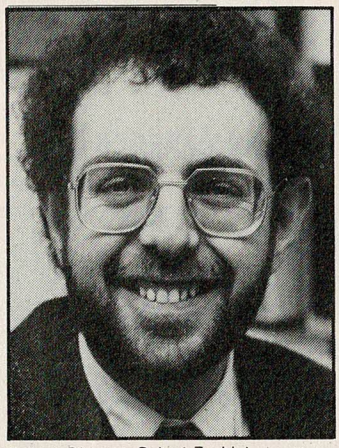
ROBTEK plans to increase its hold on the 16-bit market in 1988, following its success last year.

"We achieved what we set out to do with our Diamond Games label in only six months and we are now the leading 16-bit utilities producer with our Hi Tek label", claims Mike Segrue, Robtek's sales director.

According to Robtek, the PC Ditto had sold so well that Robtek was looking at the possibility of launching a PC Ditto for the Amiga in March.

Expansion will also be the order as Robtek plans to make a number of acquisitions. "We want to expand in the U.K., and we have our eyes set on future acquisitions," says Robtek director Robert Zysblat. "This will probably be in the first quarter of 1988 and will help us further establish our base in the U.K. and European publishing markets.

Segrue indicated that Robtek is making approaches to companies it thinks will fit in its framework - a budget label, for example. "We have no budget label for the Amiga," Segrue commented, "so we are interested in purchasing a budget company."


Robtek Director, Robert Zysblat.

Robtek also hopes to expand in the budget PC software domain. 'Ten' will be a range of PC software available for £9.99, incorporating databases, spreadsheets, word processors; Robtek has yet to finalise plans. It may do business with a company already producing the software, taking control of the marketing and sales and leaving the original company to source the products.

Powering ahead

BUDGET software house The Power House is hoping that 1988 will see it emerge as being a leading force.

Titles to emerge from the various licensing deals they have been securing include *Desert Fox, BC's Quest For Tires, Powerama* and *Dambusters*.

The titles will be available on the Commodore 64, Amstrad CPC and Spectrum and retail at £1.99 on cassette.

The Power House will also be releasing a range of disc based software for the Commodore 64 known as Double-Disks.

Two titles will be put on each disc and will retail at £4.99. The Power House have also announced details of an agreement with Canadian software house Sydney Development Corp to market five of their games as budget.

Ashley Hildebrandt, a director of The Power House said that despite the low profile of The Power House they have achieved successful sales.

1988 will also see many new releases from them. Hildebrandt said, "We will be releasing well over 100 products at a rate of at least 10 a month."

A cult game?

LEADING Atari distributor SDL is refusing to stock and sell a new game from small independent software house Red Rat.

The game on 8-bit Atari is *Little Devil*. SDL is claiming that the reason why the game is not being stocked by them is because they consider it to be harmful to children.

"We decided that things to do with the occult, we won't stock," said marketing manager John Arandale of SDL. Arandale said that though they aren't stocking *Little Devil* is doesn't mean they won't still be supporting the 8-bit Atari.

"We carry a range of over 1000 titles. To say we are dropping 8-bit Atari is far from the truth," Arandale said.

Harry Nadler spokesperson from Red Rat said that *Little Devil* has also created outrage in Europe. "PFL, our exporters won't stock it in Italy and France because of the occult element."

Activision muscles in

PREDATOR – the computer game version is set for release in the next two weeks by Activision.

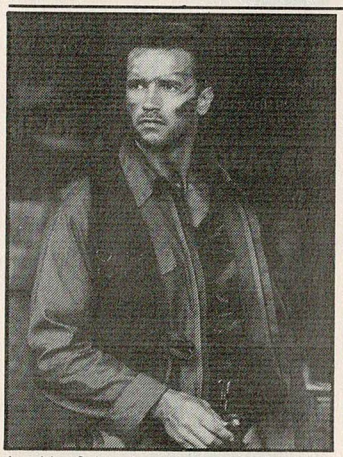
The game is based closely on the film which stars muscle man, Arnold Schwartzenegger. The player takes on his role as Major Dutch Schaefer and the task is to lead an elite commando unit into the Latin American jungle, to rescue a group of allies captured by guerrillas.

On reaching the camp, the unit finds that the allies have already been killed. After battling it out with the guerrillas, the unit begins its journey back, only now it has become the hunted rather than the hunter.

As members of his squad are executed one by one, Schaefer is eventually left alone to confront the Predator. Gone are the grenade launches, the automatic machine guns and the sophisticated minigun, instead Schaefer must now rely on his own intuition and muscle power.

Predator embodies duel-speed sideways scrolling and numerous screens. According to a spokesperson for Activision, it also features "superb state-of-the art graphics."

The game is available on the Spectrum at £9.99, the Commodore 64/128 and £9.99 and £14.99, the Amstrad CPC at £9.99 and £14.99 and the Atari ST at £19.99.



Arnold Schwartzenegger in Predator. Copyright Twentieth Century Fox Film.

New label hatched

POWERPLAY is a new budget label, created by Smart Egg Software and Maynard International. The label is for 8-bit micros and will consist mainly of £2.99 double releases.

The first two titles, which went on sale in December, were graphics adventures.

Magical Mystery – A Harvesting Moon is coupled with *Faerie* and the amusing Royal romp, *HRH* is linked with *Cuddles.*

This month's titles are again graphics adventures, *Earth Shock* and *The Guest.*

Nigel Brooks of Smart Egg Software is positive about the future of the new label, believing it offers something a little different from other budget companies and gives the consumer better value. "We are hoping to produce at least 23 or 24 titles this year," he says. "If we get more outstanding titles we may even do four games per month."

Smart Egg Software has already received many games for evaluation but would like many more. "Any game sent to us will receive a critical but fair assessment and we are prepared to offer advice where necessary and even programming skill if it would help a game," Brooks says.

Powerplay is at 11a College Terrace, Brighton BN2 2EE. Tel: 0273 601882.

HRH by Smart Egg Software.

HAVE YOU GOT THE BALLS TO PLAY ROADWARS

Take the Mickey

FOLLOWING in the footsteps of *Basil, the Great Mouse Detective,* Gremlin will be releasing its next Disney game, *Mickey Mouse,* in April.

This is Mickey's 60th anniversary year and it is likely that the character will be promoted extensively throughout the year. Having benefitted from all the publicity surrounding *Masters Of The Universe,* Gremlin is hoping that the same will apply to Mickey Mouse.

While many may write off Mickey as a children's cartoon, Ian Stewart, managing director of Gremlin, says: "He is a fun character and the game is aimed at anyone aged eight to 80."

Described as an addictive arcade adventure, the game places Mickey in the haunted Disney Castle, armed only with his magic water-pistol. Kevin Bulmer, program supervisor at Gremlin, says the player's object is to help Mickey exterminate all ogres and ghosts.

"Rather than have Mickey beat them up with a baseball bat, we have given him a water-pistol with magic water. When squirted at the monsters, they turn into bottles of water which Mickey can then pick up."

The majority of the game is 3D. There are also several sub-games; one has Mickey bouncing on a trampoline, trying to knock corks into overhead pipes.

Mickey Mouse will be released first on the Atari ST.

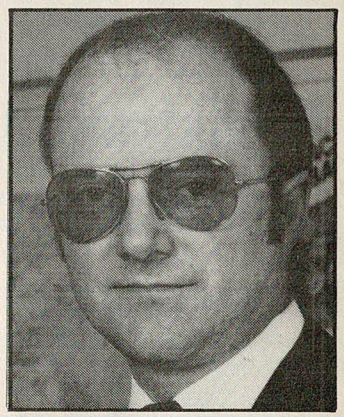
Durell's new game

DURELL Software starts the new year with a new release and also a new price point in computer games software. The new release, *Chain Reaction,* is the first game from Durell to be priced at £6.99.

Further releases will also cost £6.99. It is several years since software has been released at the price but Durell remains adamant that the label will succeed.

Marketing manager Geoff Grimes says: "I see no reason why Durell Software should not qualify as one of the major suppliers of the product."

Grimes explained how Durell is able to offer the software at £6.99. "Because we do not have to pay upfront licence fees we can offer the product at a more attractive price to the consumer."



Geoff Grimes.

Grimes is coy about plans from Durell but admits: "There will be something soon."

Missions impossible

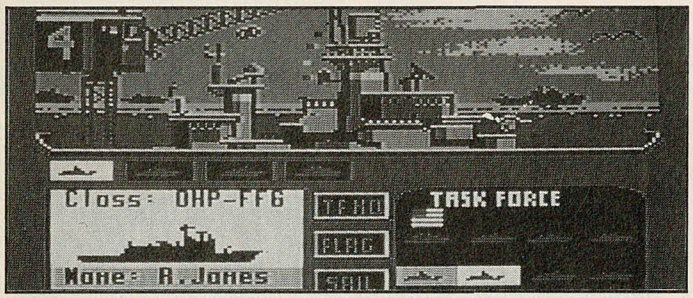
ELECTRONIC Arts has announced details of two new software releases for the C64. The releases are *Strike Fleet* and *Skyfox 2*.

Skyfox 2, is the follow up to the original *Skyfox* released over three years ago. In *Skyfox 2*, the player takes on the role of Federation Warpwarrior with the object of defending the Federation against the Xenomorphs. In order to defend the Federation, the player must use the technologically advanced Skyfox 2 warpfigher. It is a one player game, with various levels of difficulty to test your skills.

Electronic Arts says that *Skyfox 2* features a new plot, enhanced graphics, better sounds, faster action and a more realistic sensation of flying.

Strike Fleet is the latest release from Lucasfilm Games. The game is described as being a combination of strategy and arcade action. You play the role as a commander of a whole naval fleet of warships. As commander you have ten dangerous missions successfully to complete which are centred around the dangerous 'hot spots' of the world. 3-D graphics are incorporated within the game.

Both games retail at £14.95 on disc.



Strike Fleet.

More Robtek games

ROBTEK has recently announced six new games to be released next month.

Available for £19.95 are four titles.

Champ is a boxing simulation where the player can choose from four boxers at various weights. With an authentic soundtrack, the game is claimed to offer a realistic fight situation.

Crazy Football will test the player's co-ordination skills as one has to kick four footballs out of a maze simultaneously.

Pinball, based on the American version, is the predecesssor of all arcade games.

Last, but not least, is *Starways*, which is similar to *Trailblazer*, except that the player is the trailblazer instead of a ball.

The other two titles, costing only £9.95, are the shoot-'em up *Galaxy Fight* and *Nakamoto*. The latter has 55 levels and the player's task is to pick up as many pieces of junk as possible. Sounds enthralling.

Maelstrom and Bo for British Telecom

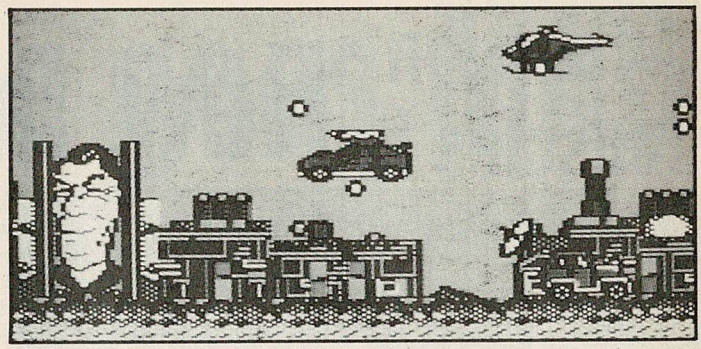
◀ continued from page 1

titles as *Lords Of Midnight* series and *Dark Sceptre*. The other developer is Bo Jangeborg of Fairlight fame.

Steve Perry, development manager of Telecomsoft said, "Bo is an excellent programmer and we are thrilled to be working with him."

The deal with Jangeborg is for the release of two titles. The first is for the Spectrum and a spokesperson for Telecomsoft described it as being "A hi-res arcade game". The second release will be a 16-bit product to be developed over this year.

Firebird has also announced details of the release of its hit game *Elite* for MSX machines. The game is available on disc at £17.95 and on cassette for £14.95. Versions for the Amiga and Atari ST will also be released.



SOFTWARE HOTLINES

What's this, an Infocom game with sound! Scandalous, amazing, unbelievable. But true!

Sherlock: The Riddle of the Crown Jewels is part of the *Immortal Legends* series created by **Challenge Inc.**

Surprisingly you play the part of Watson, but can confer with the great detective when you're in a fix (that joke was intentional, laugh now please).

Author Bob Bates will be using Infocom's development tools to recreate Victorian London, and adding the unheard of feature of high quality sound, on the 16-bit versions only.

The C64 version is due for mid-February, while the audio versions are expected in mid-March. Whatever next? Not graphics surely?

The picture this week, is from Gremlin's **Tour de Force,** an interesting looking arcade thrash, that bears a not dissimilar resemblance to Virgin's **Action Force.**

Here's an interesting thing. The laser disc arcade game Mach 3, which features a superimposed fighter racing over real barren landscapes, has been converted to the ST by **Loriciels.**

No news of who is going to distribute it in this country yet, but we'll see what we can turn up by next week.

Can another year really have flown by? Time has this habit of rolling on relentless. If you were with us last year you would have read the staff's personal favourites from the year gone by. Partly because I'm susceptible to sentimentality at this time of year, and partly because I'm the only one left from then, here, for the record, are my eight fave pieces of software from 1987:

1) *The Bards Tale* **(Amiga).** When the going gets tough the Bard goes drinking. Brilliant piece of pseudo-RPG, with enough twitching, snarling, dripping monsters to make you afraid of the dark.

2) *Balance of Power* **(ST).** Geopolitics in the nuclear age. Utterly fascinating game where starting a nuclear war loses the game.

3) *Universal Military Simulator* **(ST).** The dawn of a new age in computer wargames. 3-D terrain maps and the option to design your own conflicts overwhelm the few flaws.

4) *GFA Basic* **(ST).** The best version of Basic for the ST. A great piece of software to rekindle your interest in a great machine.

5) *Garrison* **(Amiga).** So good a Gauntlet-style game that US Gold sensibly signed up the rights to distribute it here. Superb sound effects and graphics make this an essential buy for Amiga owners.

6) *Superbowl Sunday* **(C64).** With the American Football season heading towards the climax and the Superbowl, this Nexus (now kaput) game is the one I come back to after Sunday night's highlights.

7) *Airball* **(ST).** The first 3-D 'Ultimate style' experience on the ST featured fabulous detailed graphics, three bouncy tunes and excellent gameplay. Also the only time anyone has ever sent me a bottle of champagne after reading my review.

8) *Colonial Conquest* **(C64/ST).** Enormously entertaining strategy game in the grand old tradition. Stomp on underdeveloped countries as you carve out empires.

The ST version has far better graphics but a bug means that beating computer controlled countries is almost impossible.

Popular Computing Weekly, the magazine that gets things done!

Following the recent review of **Red Rat's** *Screaming Wings* and the condemnation of the sound, an ashamed programmer was told to do something about it.

The lads in Manchester are now releasing it again, but this time with SAMPLED SOUND! Wow-ee!

Actually, I notice that the sample of someone yelling hysterically, "Game over man, game over," has been lifted from the film *Aliens*. Naughty boys!

Duncan Evans

Household word

Thanks for providing such an excellent magazine which caters for the advanced and new entries into the computer world. I would like to use this opportunity to say keep up the good work.

I'm sure it will interest you to know that even here in Nigeria the name *Popular* has almost become a household word among my friends and me.

There is one problem though: in the subscription form I found in my Commodore 128 compendium pack, it says that the magazine will be sent weekly by first class mail at a price of £39.

I placed a subscription some time in early May 1987 and received the first copy - the May 8-14 edition some time in late June.

The first and second copies arrived promptly with one week intervals but since then the copies have not been regular.

There is usually a three to four week delay before I receive the remaining copies in a bunch.

Sometimes there is a delay then remaining magazines are sent in the wrong order. (Letter edited for length.)

Akimtuyole Akinnawo,
Lagos, Nigeria.

It's always heartening to hear of our fame abroad. Sorry to hear about your problems receiving subscription copies though.

Your letter has been passed on to our subscription department, and we may decide to introduce an airmail subscription service – although that might be rather expensive.

Desperate

I am writing to you again, concerning the letter I wrote about auto-booting applications.

I fear that I may not have made it clear in my letter that the AUTO folder and STARTUP program cannot run Gem applications, as the Gem is run after these programs. The only way I know of running a Gem application from scratch is to use a program called Gemstart . . . so it is possible, but slightly more effort.

After reading Henry's letter about the lack of an adventure page in the same issue I have to say that I agree with him completely.

Popular Computing Weekly desperately needs an adventure section - after all, virtually the entire magazine is now given over to arcade games, so surely just one page of hints and tips would not be too much to ask.

Finally, where has the regular Comms page gone?

It would seem as if everything is being phased out to make more and more room for arcade game reviews.

Matt Fender,
London SE24.

Thank you for your addition to your previous letter.

Now to deal with your comments on the magazine.

YES we are considering the return of an adventure column.

NO we don't desperately need an adventure section.

NO the entire magazine isn't given over to anything, least of all arcade games – by which you presumably mean arcade-style games.

NO everything is not being phased out to make more room for game reviews.

The Communications page was never a regular, ie weekly, feature. It was, and remains, an occasional space for articles by contributors such as Graham Edkins and Steve Gold, as you will note from this week's piece by Graham.

We have no intention of discontinuing these pieces, but at the same time it would be unrealistic to carry one every week, since the subjects covered in the section are not time-specific or worthy of inclusion week-in, week-out.

In any case, Graham and Steve send their pieces in on an occasional, rather than weekly, basis.

Games reviews on the other hand are totally time-specific. It would be a pretty strange, not to mention doomed, weekly computer magazine that didn't have an up-to-the-minute games section. Apart from which the new, full-colour, upfront games section has enjoyed lavish praise, so – as they say – if it's not broken, don't fix it. Next!

Is this for real?

I have just finished reading your issue dated 17-30 December. In it there is a piece talking about the Amiga and it says it has a built-in IBM PC emulator.

As I am studying on IBMs at college it would be helpful to use the packages on my Amiga.

The packages we are using are: Lotus 1-2-3, dBase III, WordPerfect and Pegasus.

Could you please tell me if these packages would run on the Amiga.

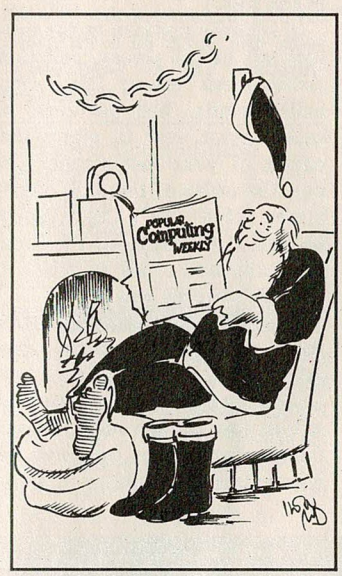
To add to the Amiga v ST debate, it might be helpful and save a lot of money for people to know that a lot of the software for the ST will not run on the newer versions.

I found that out to my cost but I was lucky enough to exchange for the Amiga.

A Meachem,
Address withheld.

Please refer to the letter on this subject in last week's issue. The Amiga does NOT, repeat not, have a built-in PC emulator, although there is an add-on available for a cool £400.

As for your point on ST software, the answer is – sort of. The reason some software doesn't work on the 520STFM is that the



software protection takes advantage of an extra two tracks on the disc that the internal drive is not guaranteed to read. Our features editor has spoken!

Eager reply

In reply to W A Hartley's Spectrum +3 query in the December 17-30 issue, the +3 will accept the instruction only if entered as follows: 280 IF d(y) < d(x) THEN GOSUB 230

i.e., the less than sign must be preceded and followed by a space – a minor quirk which probably applies to all the relative operators.

What is not so minor is the appalling editor, where the cursor seems to please itself where it comes to rest on the screen from time to time at random intervals. The connectors for the RS232 and AUX ports are particularly ill-conceived, being telephone plugs which are extremely difficult to obtain and impossible to wire up even if they can be obtained.

Contrary to the manual, neither 'your Spectrum dealer' nor Amstrad plc can supply a lead for these ports. RSD Connections Ltd, PO Box 1, Church Street, Ware, SG12 9EN - 0920 58285 - can supply a QL printer plug 1.5m which brings out all six connections to either an open end or to various plugs/sockets which will fit as required.

J M Dunnett,
Wellington,
Somerset.

Me too

With reference to W A Hartley's letter in the December 17-30 issue, Basic Instruction needed. I had the same problem and I was fortunate a friend of mine gave me the answer. In 128K mode you must leave a space between the variable and the < symbol. If this line is entered as follows:

280 IF d(y) < d(x) THEN Go Sub 230.

When using the < or > or both <> with a variable there must be a space between the < and the variable. If it is a number there is no need to leave a space.

Don Weerasinghe,
Shepherds Bush,
London W12.

Quality upgrade

I've had an Amstrad PCW 8512 for the last 6 months, I now see that Amstrad have a new PCW the 9512.

Do you think it is worth upgrading to this new machine?

Adam Leighton,
Manchester.

If you need to have letters which are printed on a letter quality printer then it may be worth your while in upgrading, or you might be able to find a dealer who will take your 8512 in part exchange.

We are sorry but Popular Computing Weekly cannot guarantee to reply to *all* letters requesting a personal answer. It helps us enormously if readers are prepared to have general queries answered on these pages, so, if possible, please do not send SAEs.

Life is hard . . . and then you die

In the world of repetitive arcade games, continual pixie quests, and big budget coin-up conversions, originality is something of a forgotten commodity.

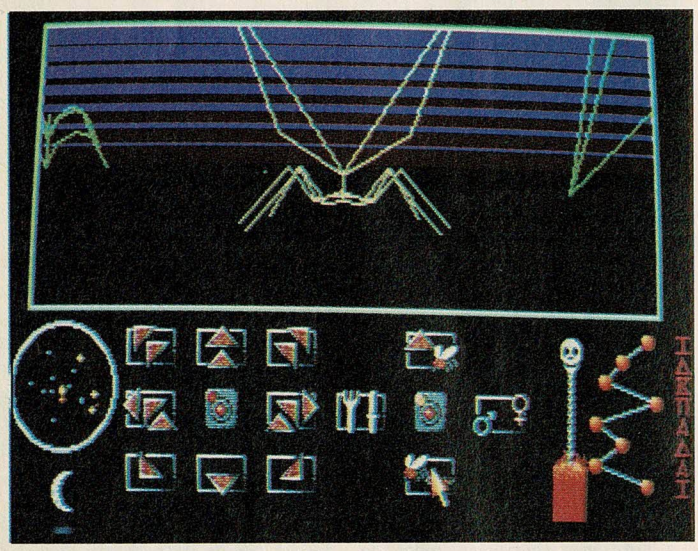
Eco is the game of nothing less than evolution – there is even a quote from Darwin on the loading screen. Using 3-D vector graphics, a complete ecosphere is created for the player to live and die in.

The object is to evolve from a basic life form into one over which the player has complete genetic control.

In the beginning the computer selects a world at random, with its own population and weather conditions. The world can be temperate, arid, tropical or arctic.

Eight genes determine the form of the creature that the player controls, and these are set and locked into a simple insect form at the commencement of the game. Basically you either get a spider, or a spider with wings, which is one hell of an improvement considering how dangerous the world is.

Once created the player controls the insect on its travels through 3-D vector land. The



first objective is to eat. A simple spider can eat either of two things; grass or worm-like creatures. The problem with the former is they appear when seeds from trees take root and begin to grow. In this world life runs at an accelerated rate so they grow and then begin to shrivel before your very eyes.

It is rather irritating to have legged it all the way to a nice piece of juicy grass, only to have it wither away before you can take a bite.

Worms are equally nutritious, and don't wither. Unfortunately they don't want to be eaten either so going after one can be a bit of a chase. After eating though, the real fun starts. The insect is now ready to mate, and it doesn't need any Mates to get in the way.

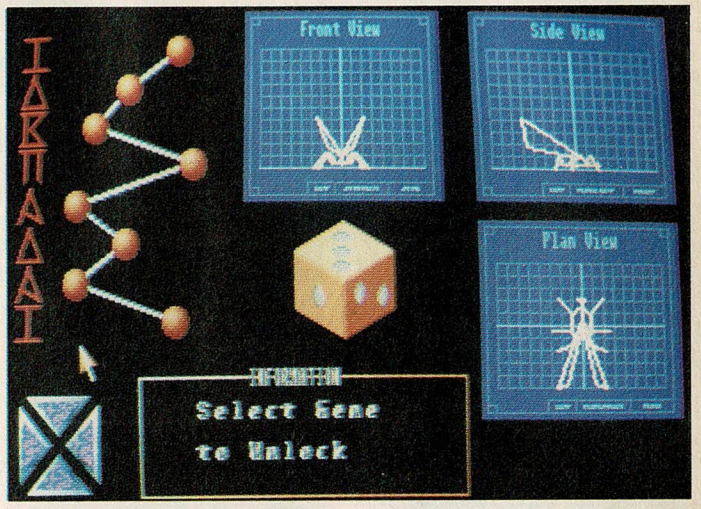
A scanner appears in the bottom left of the screen, and this shows trees, enemy life forms and potential bed partners. A quick sprint over to where the object of your lust wanders is now the order of the day. Sometimes this isn't necessary though. If a compatible life form is nearby and ready to bonk, it will run towards you.

The most important phase of *Eco* now comes into play – the gene design screen. A small key appears which can be used to unlock any of the eight genes. Once unlocked the gene can be manipulated, by sliding it horizontally. This manipulation usually affects the shape and form of the creature under your control. Watch the display on the right and hope for a more advanced creature.

Once unlocked any gene can be re-manipulated whenever the next generation of the creature is ready to be born.

Not all alterations are useful, and it is annoying to have survived long enough to reproduce, only to pick a gene which doesn't advance your cause. It is even possible to turn yourself into a plant. This is fatal.

When all the genes have been unlocked complete genetic manipulation is possible, enabling you to evolve your creature into



whatever form you like.

This is the ultimate aim, and there is a scoring system to monitor progress beyond this point, so that *Eco* doesn't become completely pointless from then on.

Having manipulated the genes it's back into the ecosphere for another round of food and copulation.

Actually staying alive to produce the next generation of crawly is very difficult. Out there in the big, bad, wide world there are faster, bigger and more importantly, meaner creatures than you. And they're all ready and able to stomp on you. It's a dog eat dog eat anything that moves world.

Life is hard and then you die.

There is nothing as frustrating as having your fourth generation creature eaten or get squashed because something three times your size wasn't looking where it was going.

No, I tell a lie, there is something more frustrating. Your aforementioned beastie is nearing the end of its lifespan, indicated by flames rising towards a skull, and the thing you want to mate with gets trodden on before you get to it.

However, death isn't instantaneous. The dying slowly fold up and wither away, and in one memorable game my spider leapt onto a thingy with wings that was about to peg it, and wallop! The next generation was saved.

The graphics for the life forms can be quite complex, and as they are all animated it does partially explain why the animation is not fast, nor smooth.

The other feature worth mentioning is the original pulsating music.

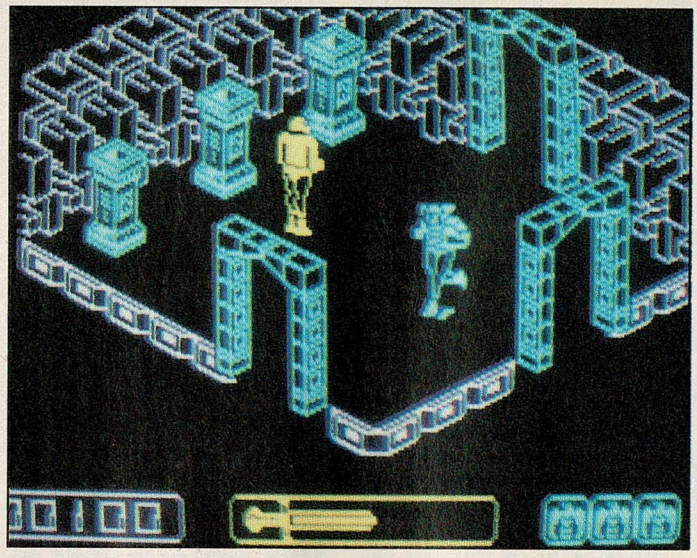
It is MIDI compatible, so if you have a MIDI keyboard you're lucky. This is easily the best MIDI compatible music on any ST game.

While certain elements of *Eco* bear resemblance to Conway's life (conceptually) and the *Quirks* boardgame, the execution has produced a truly original program.

While this is going to bore the pants off some people, if you have the imagination, and the money, then *Eco* will provide hours of bizarre entertainment.

Program Eco
Reviewer Duncan Evans
Rating 17
Micro Atari ST
Price £19.95
Supplier Ocean

Phantom Club



The once good and powerful members of the Phantom Club have been led astray from the path of righteousness by the evil Overlord Zarg. What I want to know is who let this guy in, in the first place?

You play Plutus (wasn't he a dog?) who starts the game as Zelator, the lowest rank in the club. The objective is to progress up through the ranks in order to be able to challenge the Overlord and once again return right minded thinking to the club.

Plod through 550 rooms and complete the tasks that are set you.

To defend yourself against the other super heroes, be they in monk, buddah, spider or transforming guise, you are armed with a psychic bolt which springs forth from your head.

All good and well so far. With missions to undertake the standard 3-D arcade adventure format has its life considerably extended. Alas, the programming fails to live up to the spec, at least on the Amstrad version anyway.

The control is the major fault, the joystick is particularly unresponsive, but then using the keyboard is little better. Having Plutus shuffle forwards a few steps with every press of the key or every twitch of the joystick, and compound that by making the response lacklustre makes the game irritating to play. This tends to spoil the good features of Phantom Club.

Now we get to the crunch point. The graphics are awful. Single colour objects and walls, not the same single colour though, I must point out, do not a pretty Amstrad game make. The sound effects are equally unimpressive.

Put all this together and you are left with a game that had the potential to be good, but failed dramatically in the execution department.

Reviewer Duncan Evans
Rating 5
Micro Amstrad CPC
Price £8.95
Supplier Ocean

Sidewalk

Sidewalk is a rather unusual game for the Spectrum from French software house Infogrames.

The plot of the game concerns you having your motorbike being stolen.

Various pieces of the bike are scattered around the city and you must get all the pieces together as one so that you can then take your girlfriend to a concert organised by the Band Aid Trust. If you don't get all the pieces before 7.30 your girlfriend will go out with John to the concert.

As you go around the town you will encounter different characters, some of whom have information concerning your bike. When you meet up with a character there are three options, you can ask a question, escape or fight.

Asking a question may give you some help as to a location of one of the pieces, escape will get you away from the character while fight will engage you in a confrontation which you will either win or get beaten up.

The top half of the screen features the animation of the game while the lower half is used for icons which give you options.

Sidewalk is a very enjoyable and different game. The plot of the story is quite easy to get into and there is alot of variety within it.

The game is in mono, which seems to be the latest trend in computer games, with *Andy Capp* being a recent release just using mono.

Above all, *Sidewalk* is a game which doesn't require a lot of thinking, it's a game you'll be coming back to for more.

Infogrames will donate at least 15 pence to the Band Aid Trust for every copy sold.

Reviewer Leslie Bunder
Rating 14
Micro Spectrum
Price £9.95
Supplier Infogrames

Your complete guide to all the software released this week

Amstrad CPC

Program *Venom* **Price** £1.99 **Supplier** Mastertronic, 8-10 Paul Street, London EC2.

Routine adventure with graphics and icon control.

Program *IK+* **Price** £9.99 (tape), £14.99 (disc) **Supplier** Activision, 23 Pond Street, London NW3 2PN.

More of the same. More fighters, more backgrounds, new moves and remixed music. If you couldn't get enough of the original there is enough here to keep you happy.

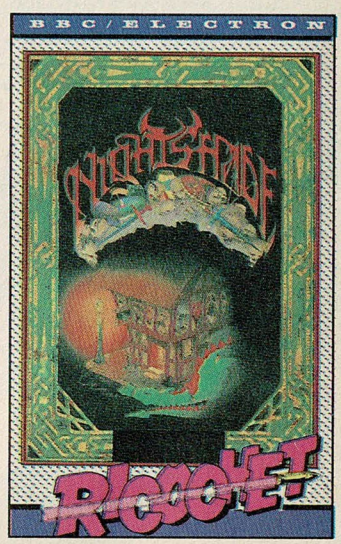
Program *Prestige Collection* **Price** £9.99 (tape), £14.99 (disc) **Supplier** Activision, 23 Pond Street, London NW3 2PN.

Four games from Lucasfilm for the post Christmas spending frenzy.

Rescue of Fractalus, The Eidolon, Koronis Rift and *Ballblazer* make up the collection, that represents fair value for money.

Program *Deflektor* **Price** £9.95 **Supplier** Gremlin Graphics, Alpha House, 10 Carver Street, Sheffield S1 4FS.

An experience in laser logic. One for strategy minded arcade players.



continued on page 10 ▶

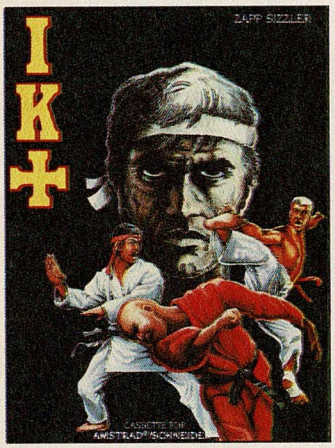
Software guide continued

◀ continued from page 9

Amstrad PCW

Program *Knight Orc* **Price** £19.95 **Supplier** Rainbird Software, 74 New Oxford Street, London WC1A 1PS.

There can't be much left that this Level 9 adventure is not available on. A sticker on the back of the box claims quality colour illustrations. No, they haven't come up with a revolutionary method of generating colour on that green screen, but there are indeed graphics.



Atari ST

Program *International Karate* **Price** £14.95 **Supplier** Activision, 23 Pond Street, London NW3 2PN.

Re-release of System 3's martial arts game from last year, but at a lower price.

The graphics are still very good, but the gameplay is very suspect. And why do the fighters look like monkeys?

Program *Leviathan* **Price** £19.95 **Supplier** English Software, 1 North Parade, Manchester M3 2NH.

I don't believe it. This ST conversion looks just like the Amiga version. What is even more incredible is the quality of the diagonal scrolling. It isn't perfect but it's miles better than anything else like this on the ST.

The game is difficult to play due to the control system where the ship turns 90 degrees to the left instead of sliding over in that direction. However, stunning graphics and hearty sonics make this arcade thrash worth checking out.

continued on page 15

Masters of the Universe

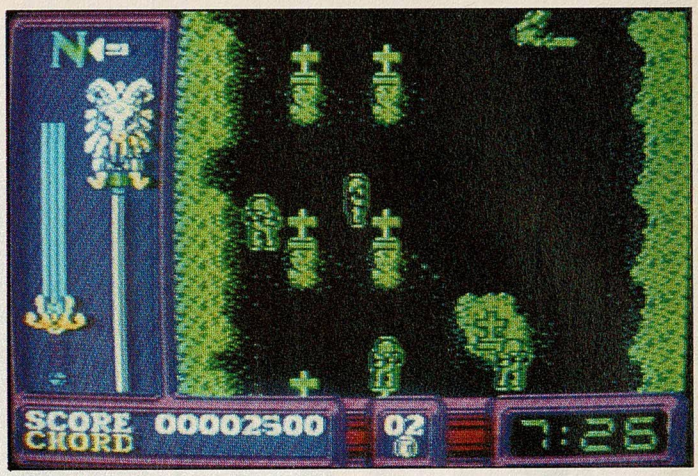
A little while ago, US Gold released a *Masters of the Universe* computer game which wasn't very well received, the game has since been released on budget.

Gremlin has now released its own *Masters of the Universe* game based on the current film of the same name, starring Dolph Lundgren as the hunky, chunky, He-Man.

Masters of the Universe is a battle between good and bad with a prize going to the winner. That prize is the Cosmic Key to time travel and the title Master of the Universe.

During a battle, the key has slipped through a vortex in time and ended up with an American college student. The college student doesn't realise the power of the Cosmic Key and thinks it's a musical instrument. Every time he plays a tune it attracts the evil Skeletor and his band of henchmen. With He-Man on the planet Earth as well, Skeletor's henchmen are in for quite a rough time, as He-Man is after the key so the universe can be safe.

The computer game is closely based around the film. The main



object of the game is for He-Man to collect 8 chords. These chords can be found in the streets and others after you do battle with Skeletor's henchmen.

The game is split into five parts. Each part is a scene from the film. Charlie's Shootout has you being held up in Charlie's Electronic Store where you must kill Skeletor's men, who are holding a key.

The final part is the head to head confrontation with Skeletor. Only by defeating Skeletor can there be peace in Eternia and for the rest of the universe.

Masters of the Universe is an enjoyable game and features some quite good music on the title screen. The graphics, while not being too detailed, are still quite impressive on the screen.

Gremlin is also doing a follow up game to *Masters of the Universe*. I hope it matches the quality they have set with their first attempt. This is first rate fun action and unlike a lot of film licences actually sticks closely to the film plot. Well done Gremlin.

Reviewer Leslie Bunder
Rating 15
Micro Spectrum
Price £7.99
Supplier Gremlin Graphics

Rampage

The Commodore 64 version of the coin-op conversion *Rampage* was not too favourably received when it was released recently.

Activision has, however, now produced the definitive home computer implementation in the form of the ST version.

Rampage is a game about eating and destruction. You destroy buildings and eat people.

This is all quite normal because you take the part of a monster, either a lizard, gorilla or giant wolf. Or alternatively, Godzilla, King Kong and Wolfman.

All three of these characters can be under human or computer control, just like the arcade game, and it is indeed more enjoyable when three people indulge in ripping bits of buildings and stuffing people down their throats.

There are 50 cities to chomp, gouge and munch through, some of them different.

The National Guard soon turn up on the scene with tanks, which are especially nasty, helicopters and sharpshooters.

The graphics for the monsters are excellent, but the rest of the scenery looks very similar, regardless of which screen you are playing, at least in the first four.

The crunching sounds are also of decent quality, even though they are overlayed on the continuous music, which for once is not particularly intrusive.

Although *Rampage* is not that well suited to being a home computer game, and it is a little overpriced, afficionados of the arcade original will be rubbing their hands with glee over the ST implementation.

Reviewer Duncan Evans
Rating 13
Micro Atari ST
Price £24.99
Supplier Activision

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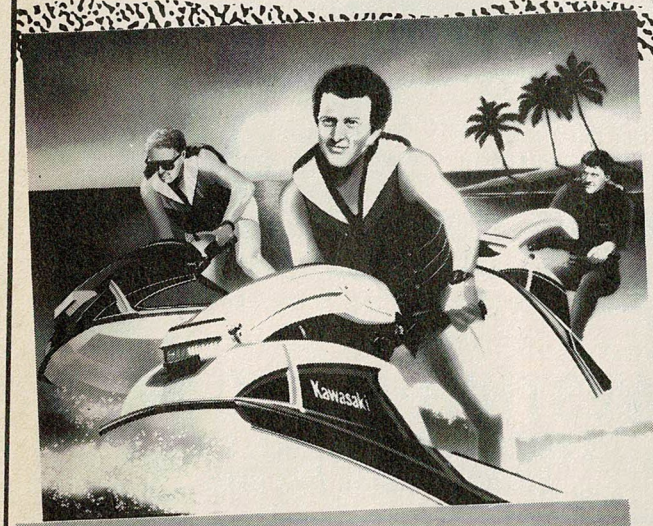

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SIDE FOUR

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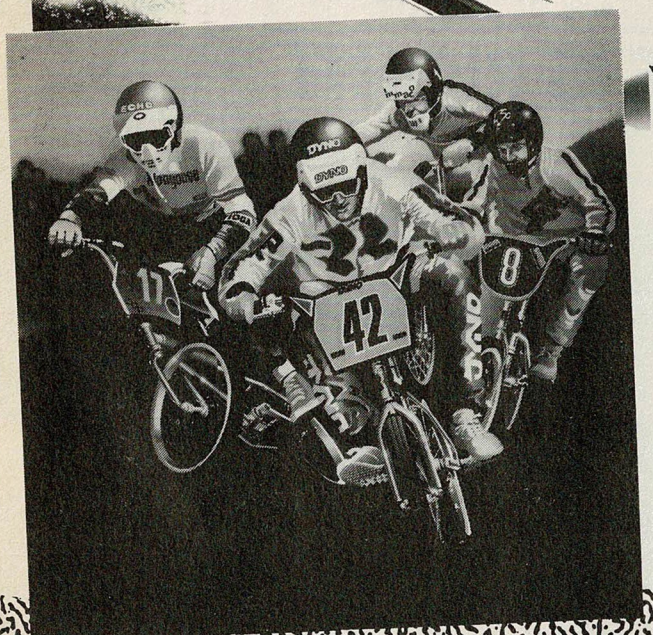

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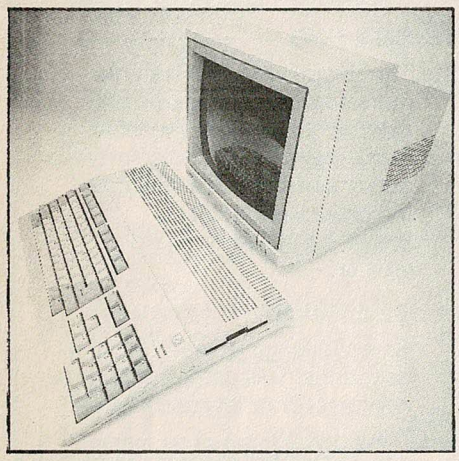

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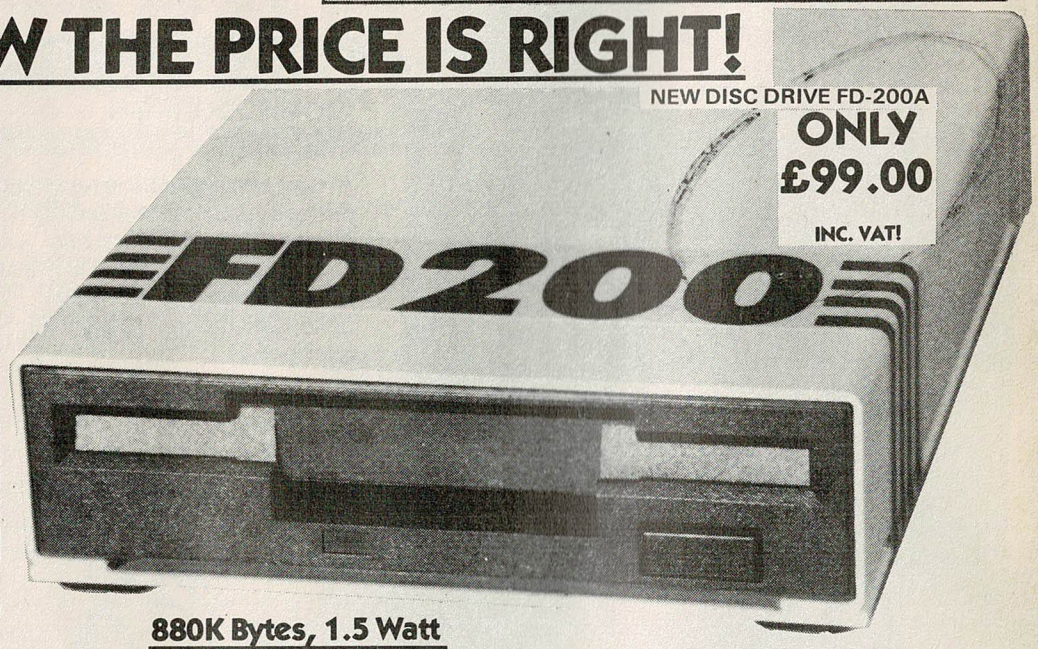

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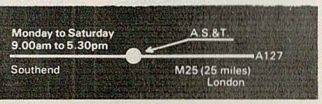

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Screen Scene

FOOTBALL DIRECTOR

D&H GAMES
Commodore 64/128
Price £8.95

After a weekend in which I watched my beloved QPR arise to the top of Division One, what more could I want than a good what at a football game — wren, hing *Football Director* from a disillusioned Mike Pattenden's hands I was off. *Football Director* is the first offering I've seen from this soccer crazed software house in Stevenage, so it was with a certain degree of curiosity that I cast my eye over this.

The packaging was the first thing to catch my eye, it seems to bear a very strange likeness to Imagine's *Super Soccer* still mustn't grumble. Whilst loading up the game I thought I'd have a customary read of the instructions only to find there weren't any, nothing other than an extensive list of the game's features, and a guide to the prices you can expect to pay for players.

When you have chosen your team (UPR naturally) you may then either change any other team names (try *O.P.R.* to 'Donley — *Ed*.) and then on to the main menu. The game is controlled by pressing the initial letter of the option you wish to use. The options are:

Play Match: get stuck in there, the moment of truth. Can your boys in the league do what they did in training? Only choose this when you are satisfied you have selected your strongest squad, as once you've kicked off you cannot make any other changes for ninety minutes. The match is shown with the two teams names written on screen and the clock ticks away (a match takes ninety seconds). When someone scores the goal and the scorer are shown under the team.

After your match is finished the other results from your division are shown and then your wage bill and weekly news. The weekly news tells you if you made or lost money this week, if any players are injured, and even bills you if there was any crowd trouble.

Check match: This option allows you to suit up your opponents, it tells you their league position, their formation, and the skill of their goalkeeper, defence, midfield and attack, so you can adjust your squad in order to wallop them!

Fixtures: This shows you a table of your previous results and the matches you have left to play in your thirty eight game season.

Extra training: This option allows you to give extra training to either the goalkeeper, defence, midfield or the attackers. This is in order to improve their skills. You can train them for any length of time between one to nine hours, but don't give them too long as they may slack or even get injured.

Transfer Market: As you are given only half a million pounds to begin with you ought to be very careful at the transfer market as the striker you buy could have excellent potential. Then again he could be the next Alan Smith! Each player has a certain amount of skill between one and nine. You can expect to pay any thing between £10,000 and £100,000 for a player and the inlay does give you a key to help yourself make successful bids.

Injuries/Goals: This gives you a run down of who is injured, how many goals have been scored, and how many the 'keeper has conceded in your squad.

Bank: As in life itself you can obtain a company loan, but as in life itself it is a very small one with a very large rate of interest. You can also obtain a mortgage should you wish to build a new stand.

Gamble: This tempting option allows you to bet that your team will win the league title, F.A. or League (Littlewoods) Cup, or for the less extravagant of you just to simply gain promotion. You can bet anything up to £100,000.

Employees: At this option you can hire a coach, physio, and a team scout all of which are fairly necessary. You can also hire a youth team manager which at £2000 a week may seem rather expensive but every so often a promising young lad qualifies to the ranks of the big boys.

Shares: Every football director is a bit of a capitalist — some more than others (Yes you Mr Bullstrode!).

Watch your share prices rise and fall, and decide when to sell or buy but take my advice don't sell to Murrel Estates!

Insure: like this. Should any of your players get injured, and you have taken out a policy, you're in the readies for a while.

Build Stand: Why not buy one that? Naturally it costs.

Postponements: Simply tells you if there are any.

Level: This is a nasty one. There are three levels easy, normal, and hard. With normal you can choose which level you wish to start on, but the nasty evil wicked twisted programming team have been extremely cunning and taught the computer to put you up a level if you are playing too well, and won't allow you to turn it down. I don't want to sound like a wimp with sour grapes but this is indeed a bitch! If you are bottom of the league and getting thoroughly beaten then you are permitted to continue getting slaughtered on easy level. But then should you start playing half decently it's on to the next level you go which means you fly down to the bottom of the league. I've had words with the programmer and I am informed that you must have the perfect blend of players for each division, not too good to be moved up a level and not useless so they don't lose even on level one, all I know is I haven't found the correct formula!

Football Director is an extremely competent simulation/football strategy game. It has the correct blend of speed, realism, and playability not to be found on any other game of this type since *Football Manager* which I confess I am thoroughly sick off, and for this reason it is better than the old Addictive classic.

It is a rather tricky game but sheer patience will soon overcome this. The 64 needs good football games like Bristol City need good players (Oh! — *Ed*.) and this is one.

Ferdy Hamilton

Graphics 8
Sound
Toughness
Endurance
Value
Overall

"COMMODORE USERS"
Review October Issue

FOOTBALL DIRECTOR

64/128 £8.95

Marcus Although most of the games industry has been cornered by the big companies with their vast marketing spends, advertising budgets and freebie lunches for Dr Berkmann (more, please!), there's one tiny sector that's still well under control of the independents — the footie management simulation. It's probably got much to do with the massive success of *Kevin Toms' Football Manager*, which has bobbed in and out of the charts for nigh on five years and is probably the best selling Speccy game ever. (Is it? I'd be interested to find out.)

The best of the current crop is D&H Games' *Football Director*, which is about to be made widely available after some time on mail order only. Written by De Salis and Huggard it's a no-frills sim which cuts out any unnecessary graphics and attempts at arcade action and sticks to what footie sim fans really want — pure strategy. The packaging's modest — a simple inlay card with the barest of instruction — but if you're interested in a game like this, you're going to know exactly what's required, and what you don't get immediately you'll pick up along the way.

Starting at the bottom of Div 4 (where else?) you must pick your team and battle through a full league programme without throwing all your money away. You can mortgage your club when the going gets tough (which it will) and also borrow dosh from the bank. There's a full timetable of League, FA Cup, League Cup and European matches. Players have skill points, which are influenced by morale, which is naturally decided by winning or not. Morale is surprisingly fragile. There are appalling hazards all along the way — injuries, sendings off, postponements, crowd violence, retirements, interest, tax, other managers trying to poach your players, even sackings. There are fixture lists, automatic updatings of the league, midweek games, the opportunity to buy or sell shares, international games, loads of transfers and even three skill levels. It makes *Football Manager* look like a tatty old Basic game. If you like this sort of thing (which I do), you'll love this.

If you have problems finding it in the shops, send £8.95 (cheque/PO) to D & H Games, 19 Melne Road, Stevenage, Herts SG2 8LL. Oh, and remember to save regularly — it has the occasional tendency to crash!

NOTTS FOR

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D	2 ANDREUS	4-	A14 CLOUGH	4#
D	3 COLLINS	4	15	0
D	4 PARKER	6	D16 WALLACE	9+
D	5 CARR	6-	17	0
M	6 WEBB	6-	G18 REID	3
M	7 WILLIAMS	7+	M19 STEVENS	6#
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YS CLAPOMETER

A definite Match Of The Day *for football fans. Low on action, but high on strategy. You'll be over the moon with this one!*

TOTAL 8

"YOUR SINCLAIR"
Review November Issue

"Don't take our word for it, take the word of the reviewers who like strategy games".

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Border Zone

Infocom likes to boast about interactive fiction, and game playing that is just like reading a book except that you are the hero. All nonsense of course. The latest adventure though, shows advances from the stagnating standard that Infocom had set.

Border Zone takes place in real time, a feature that gives adventures more reality and excitement than the crossword style so beloved of puzzle solvers. Also many of the characters are independent.

The plot is also a first for Infocom. A spy adventure that lets you take the part of three different characters in the story.

The story then begins on a train to the fictitious country of Litzenburg, a peaceful country just outside the Iron Curtain. At Constitution Day festivities in the border town of Ostnitz a plan is afoot to assassinate the American ambassador who is to give a speech.

Heading for Ostnitz, and passing through Frobnia, which is on the other side of the Curtain, are an American businessman, a Yankee spy and a KGB operative. The three chapters of *Border Zone* cast you into each of their shoes, as they interact in carrying out their own personal assignment.

Getting to see all sides, and all the problems, of this spy adventure is not only original, but fascinating.

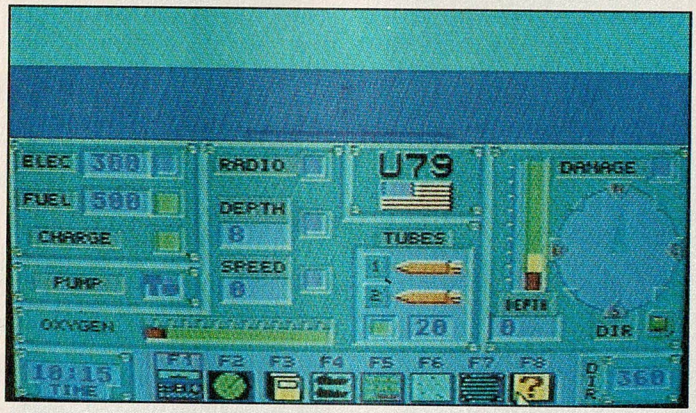
Packaged with this Marc Blank adventure are goodies such as a business card for Riznik's Antiques, a packet of matches, a map of the territory and a guide booklet called, 'I am Frobnia'. This latter item has some real gems, including useful phrases for talking to ordinary Frobnians. 'Pimsna sufrizim fludgetz' is hello I have diarrhoea. "Fludgetz oboi' is bad diarrhoea.

Additional features in the game include having the clock run at slow speed, and on line hints, as seen in the recent release *Nord and Bert Go Shopping.*

For diehard Infocom fans *Border Zone* is a real treat, and for those who wouldn't normally bring themselves to play anything that didn't have pretty graphics, the imagination, originality and excitement should be enough to overcome any objections.

Reviewer Duncan Evans
Rating 13
Micro C64
Price £19.95
Supplier Activision

Blue War



Blue War is the latest game for the Atari ST from Go! – the US Gold offshoot label. As a midshipman in command of a U39 submarine and its crew of 35, you must seek out and destroy the enemy.

Blue War is, according to the packaging, "The supreme submarine simulation". This is the second time I have seen Go! resort to calling poorly designed games as being either good or exciting.

Blue War plays very slowly, and compared to a real submarine simulation such as *Silent Service*, this is a very poor example.

Sound effects are kept to a bare minimum and do not exploit the ST capabilities. The only major sound effects are on the loading screen where there is a sound of crashing waves in the sea. Even when you crash the submarine, there is no sound effects to go with the crashing.

A few tunes or even sounds here and there would have added to the game. Trying to play a submarine game with no real sound at all is like playing football without a ball, you just can't do it.

Blue War appears to be set during the Second World War as the enemy are the Japanese, but this fact appears to be missing from the packaging and the instructions to the game.

Having honestly tried to get into the game for several hours, I found that I couldn't. The packaging is bound to appeal to the impulse buyer, so if you own an ST and buy on impulse, this is one game to steer clear of. Maybe as a budget game *Blue War* might be of interest, but at full price it's asking a bit much.

Reviewer Leslie Bunder
Rating 5
Micro Atari ST
Price £19.95
Supplier Go!

Software guide continued

◀ continued from page 10

BBC B

Program *Knightslore* **Price** £1.99 **Supplier** Mastertronic, 8-10 Paul Street, London EC2.

If you don't already have this old Ultimate title then rush out and buy it at this price.

Single colour graphics are countered by brilliant gameplay. One of the best games ever for the BBC.

Program *Nightshade* **Price** £1.99 **Supplier** Mastertronic, 8—10 Paul Street, London EC2.

Less successful addition to Ultimate's filmation series, but still worth £1.99 of anyones money.

Commodore 64

Program *Legend of the Amazon Women* **Price** £2.99 **Supplier** Mastertronic, 8-10 Paul Street, London EC2.

An arcade adventure so over the top it's great fun. Rescue your daughter from the clutches of the Amazon women. Pouting pixels abound in this well sleazy adventure.

Program *Grand Prix Tennis* **Price** £2.99 **Supplier** Mastertronic, 8-10 Paul Street, London EC2.

Hardly gripping tennis simulation. Mediocre graphics add nothing to the game, and it's a bit early for Wimbledon fever yet.

Program *Sub Battle Simulator* **Price** £14.99 **Supplier** US Gold, Unit 2-3, Holford Way, Holford, Birmingham B6 7AX.

Lots of detail but the graphics and gameplay lack that winning touch. *Silent Service* is still the one to beat.

Program *Scruples* **Price** £9.95 **Supplier** Virgin Games, 2-4 Vernon Yard, Portobello Road, London W11 2DX.

If you liked the board game, or even if you didn't, invite a couple of friends round and indulge in light hearted bluff and double bluff. Highly recommended, especially at this time of year.

continued on page 16 ▶

Software guide continued

◀ continued from page 15

BBC Master

Program *Star Wars* **Price** £12.95
Supplier Domark, 22 Hartfield Road, London SW19 3TA.

Absolutely essential purchase for arcade gamers everywhere. The ST version is the definitive one, but don't let that stop you.

IBM PC

Program *Ultima 1* **Price** £24.95
Supplier Microprose, 2 Market Place, Tetbury, Gloucestershire GL8 8DA.

The classic series starts on the IBM. Technically very dated, but if you're going to get into the Ultima series you may as well start here.

Spectrum

Program *Dynatron* **Price** £1.99
Supplier Mastertronic, 8-10 Paul Street, London EC2.

Guide your space commando through an alien complex. Old hat but very colourful and well designed graphics bolster the plot.

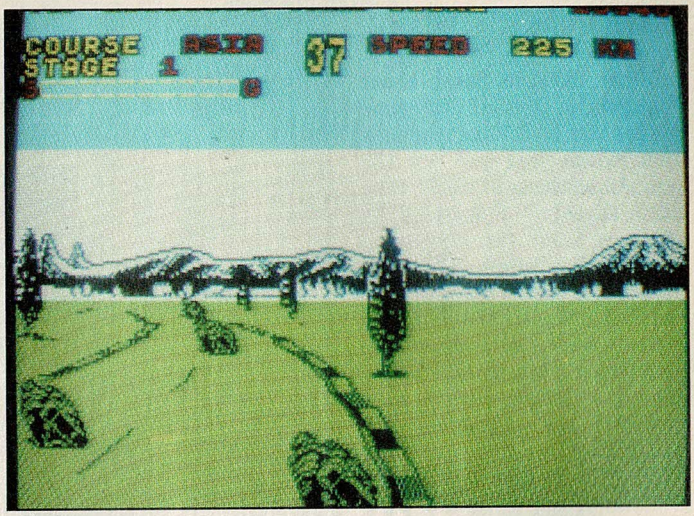
Program *Legend of the Amazon Women* **Price** £1.99 **Supplier** Mastertronic, 8-10 Paul Street, London EC2.

Incredibly sexist piece of software that really needs to be seen on the C64 to get full value out of the graphics.

Program *Knight Orc* **Price** £14.95
Supplier Rainbird, 75 New Oxford Street, London WC1A 1PS.

Text only version for the Spectrum at last. Three tapes means you get a lot of adventure, but what about the quality?

Super Hang-On



Enduro Racer was a Sega arcade game until Activision brought it into the home across the 8-bit formats. The main feature was the outdoor racetrack which undulated as the player's motorbike growled its way round.

From the same stable comes *Super Hang-On*, a motorbike racing game in 3-D that takes the player across the burning sands of Africa, the heaving humidity of Asia, the concrete jungles of America and the wide open spaces of Europe.

Control is simply a matter of steering left and right, and using up/down to accelerate and brake. When the speed of the bike makes 280 kph a jab of the fire button pushes it into turbo mode, and then it really starts to fly.

The undulation is there as before, but this time it is used to greater effect. Long sweeps uphill and sharp drops down the other side are now the order of the day.

Collision with other motorbikes doesn't result in a burnt biker, rather the bike loses speed and valuable seconds are wasted. You can, though, still be run off the course by an unscrupulous competitor.

The only drawback to what would have otherwise been an excellent racing game is that the bikes and the pieces of scenery are all one colour. No use has been made of the Amstrad's multi-colour graphics, so *Super Hang-On* tends to look like it's running on a Spectrum. The sound effects are thankfully better than Spectrum standard, though.

A very entertaining follow up to *Enduro Racer*, it is one of the best games to come out this week, and something of a must for CPC bikers.

Reviewer Duncan Evans
Rating 15
Micro Amstrad CPC
Price £9.99 (tape), £14.99 (disc)
Supplier Activision

Bangkok Knights

Funny people at System 3. Just when the office was being besieged by sports simulations they release martial arts games. The sort of thing that was all the rage two years ago. Presumably in 1990 there'll by Olympics '88.

Bangkok Knights isn't about the infamous nightlife of Bangkok, but rather Thai Boxing. However, Anco has collared that particular title.

The game consists of fighting eight different opponents in a match. Each match is divided into five bouts, or rounds, of a specific time. To win the match simply beat an opponent to the floor three times, or if that proves too difficult, have registered more knockdowns than the opposing fighter. A points win so to speak.

The fighting takes place in scenes ranging from the clifftop near your village, down to the Lumpini stadium where you get to swap blows with the Bangkok Knights. Before each round a rounds girl wanders across the screen with a board, and appears to announce the winner.

There are two pointers to keep an eye on. Heart power which shows the available energy left to a fighter – to knock one down all his energy must have gone.

Secondly, punch power, which indicates the effectiveness of all the blows thrown. When punch power is getting low a defensive posture must be used to restore it.

While the basic game is less than original, System 3 has gone overboard trying to dress it all up. The graphics for the fighters are huge compared with other games, and eight way scrolling livens up the routine scenery.

Rob Hubbard and Matt Grey have conspired to produce a decent music soundtrack and there are even one or two sampled utterances thrown in for good measure.

Flashy fades, clever moves, and other glitzy effects add to the overall effect.

Bangkok Knights is a bit like candyfloss. It looks nice, and for a brief while it even tastes nice. But ultimately it amounts to nothing at all.

It's as if the expression old wine in new bottles was conceived for this game.

Reviewer Duncan Evans
Rating 11
Micro C64
Price £9.95
Supplier Activision

Masters of the Universe

For the man who has everything...

Dolph Lundgren – he of the all embracing muscles – is the star of *Masters of the Universe,* the new all action motion picture from Cannon films.

Hunky Dolphie plays the role of He-Man, defender of the universe against the wicked Skeletor. The film has also found its way onto the TV screen courtesy of Gremlin Graphics with the wonderful *Masters of the Universe* computer game.

We at *Popular Computing Weekly* were rather fond of the film so have decided to run a *Masters of the Universe* competition.

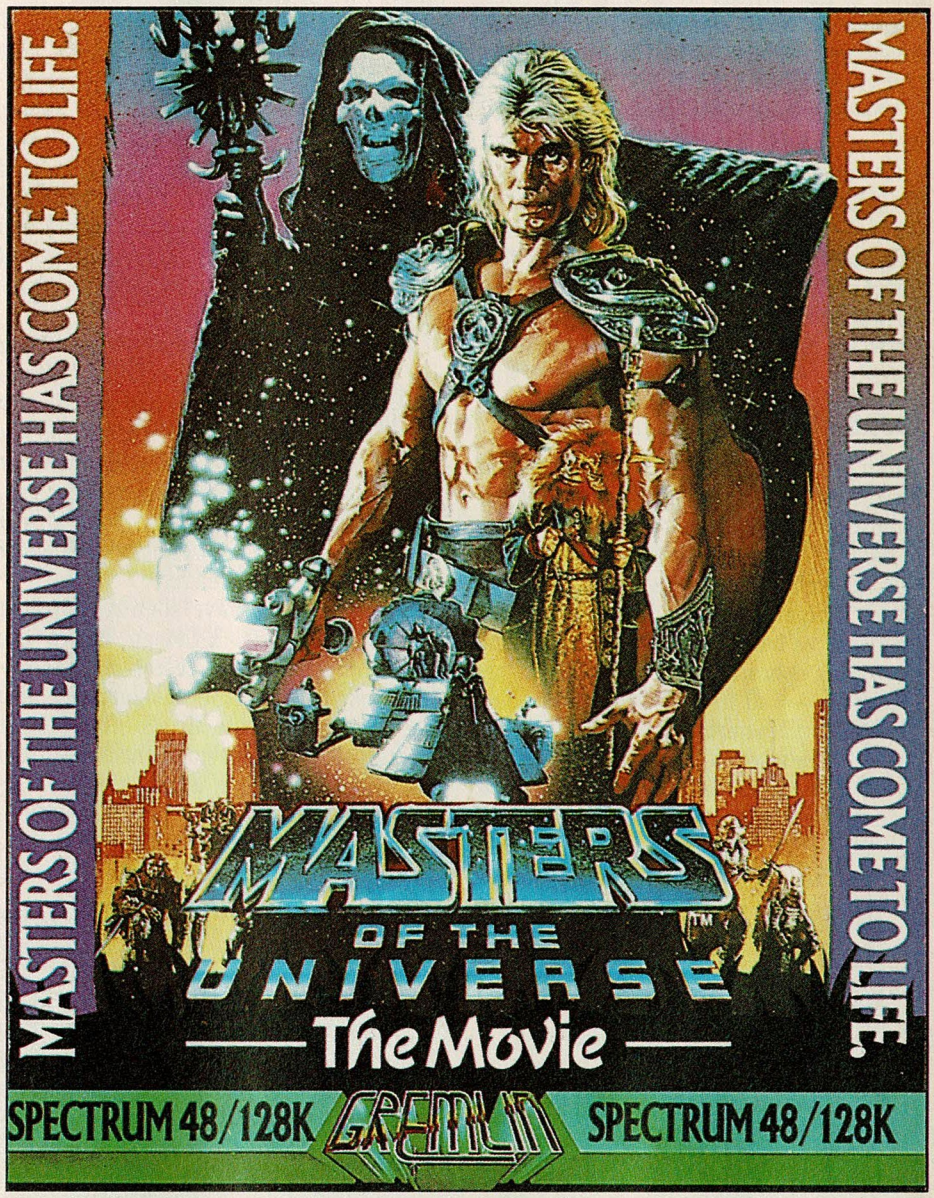
Cannon Releasing has given us six totally awesome and ultra-super *Masters of the Universe* watches worth £15 each, plus Gremlin Graphics are giving away 75 copies of the fabby game for the Commodore 64, Amstrad CPC and Spectrum.

For the first six prizes we are giving one watch and one game for the machine of your choice. Runners up will win a copy of the game only.

All you have to do to have a chance of winning a prize is answer the following two questions:

1. Which film did Dolph Lundgren play a Russian boxer in?

2. Which Gremlin game features a bouncing ball?



Address the answer on the back of a sealed envelope to:

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Competition closes last post Monday 25 January 1988.

Backroom boys

Software development houses are the unsung heroes of the computer industry. David Lester reports.

Dalali, Sentient, Icon Design, Ashminster Computing Ltd, Source, Black Knight. These names might not sound very familiar. Binary Design, RealTime, Design Design, Magnetic Scrolls, Probe – they might be more so. What are they all? The unsung heroes of the software industry. The chances are that your latest fave game is not written by Ocean, U.S. Gold, Pirahna or Activision but by a software development house, which is what all the firms mentioned are.

The software development houses, by and large, keep a very low profile; often their names do not appear on a game's packaging but they have produced most of the top selling games in the last few years. They are gaining ground, too. Only a few months ago a director of one of the top software publishers in the U.K. left a good job to set up a new development house.

Corporate muscle

What is more, many of the independent houses of the past no longer exist as publishers in their own right but are merely development houses producing titles marketed under the old label, by a larger company. Hewson is the latest in a long line to have delegated its sales and marketing operations to one of the majors – Gremlin – and its budget label is being handled by Mastertronic, leaving it with only the development side on which to work. Others to have done the same include Addictive, now owned by Prism Leisure; PSS, now part of Mirrorsoft; Leisure Genius, part of Virgin; Ultimate Play The Game, English Software; and there are more.

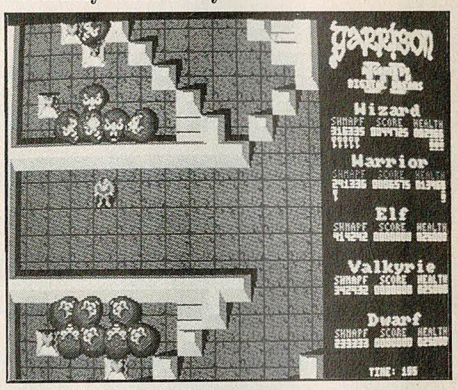
It is just another aspect of the phenomenon which has been affecting the software market for the last few years, commercial maturity and corporate muscle. Many software publishing firms went bankrupt, others were taken over, still others formed development houses.

Meanwhile it is now difficult to think of any independent software houses still around, let alone any which are successful. Domark, Palace and Novagen are almost alone now that Hewson has withdrawn from marketing its own products and Durrell has sold to Elite. Palace is owned by a larger organisation while Domark and Novagen have created niche markets of their own, for yuppie and mega combat/strategy games respectively.

What are the development houses? They are firms set up to specialise in the development of new games and specifically not to try to publish them. They employ a variety of people, mainly programmers, but also graphics and music specialists and, sometimes, games designers, too, with a few managers and administrative staff thrown in for good measure.

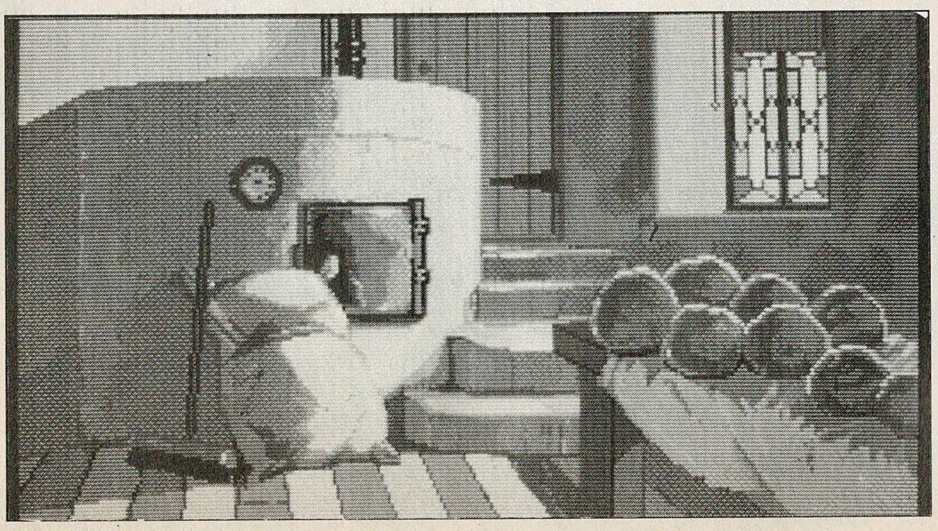
Different firms have slightly different operating methods, although all do the same things. Most use teams of programmers employed by the development firm and who work at the firm's offices. That way, all software development is managed and organised, which allows the development house to give the publishers more guarantees about when a product will be ready. It also makes an excellent sounding board for new ideas, as there are many very able programmers around, each with their own imagination.

Most of the major houses are commissioned by one or other of the publishing conglomerates to produce a new title. Sometimes the publisher provides a game idea or even a whole story-board but it is often left to the development house to produce the design. One developer said that he is often given only the name of the latest licence a publisher has bought and told to produce a game for it. Some of the houses develop the new titles on their own, hoping to sell it to one or other of the larger firms once it is written, but that is obviously more risky.



It is one of the key differences between freelance programmers and the more organised and professional development houses. Freelancers have to put in the time and effort to produce a game before getting any kind of financial commitment from a publisher, even though some of the better-known freelance coders occasionally are commissioned. Zarch was commissioned by Acorn, a fairly rare event. So the freelancers, who used to make up the vast majority of the country's programmers, have no security.

Even when publishers liaise with the programmer during a game's development, they always have the coder over a barrel. A full-time programmer, having worked for up to four or five months on a new program, may be sunk if he works alone. Publishers, however, have something to gain from looking after "their" freelance programmers but they must first look after what they consider to be their punters' interests, or they can go bust; and the expansion of development houses means that they are no longer dependent on freelancers.



So it makes sense for programmers to try to team with others, forming a development house or joining one of those already around. That just exaggerates the same trend even further, making life still more difficult for any full-time freelancers.

Another major factor in this grouping of programmers concerns the standards of today's software. As a software buyer, you may rightly expect the best in terms of graphics and sound. If you can buy a game at £2.99 which offers excellent graphics and sound, why buy one which does not? One of the main reasons graphics and sound have improved so much in the past few years is that professionals have been introduced. So graphics are now designed by real artists, rather than by a programmer who may be an excellent coder but whose latest alien design looks rather like a mouldy squashed vegetable.

Good old days

The same goes for sound. Some people have an excellent reputation in the field of sound effects or soundtracks. Hubbard being probably the most notable in the computer games field, although there are others. Development houses can afford to employ several professionals in those areas, since they are producing sufficient titles to make it viable. Putting it slightly differently, they cannot afford not to have them.

In the good old days, when the ZX81 was a technologically-advanced machine, most programs were written by programmers working from home. It meant that they had no overheads and their only cost was their time, but development houses have far higher costs - offices and staff, not to mention the sophisticated development equipment many firms use - and the costs are paid by the publishers.

Complete service

That means that there must be plenty in it for the software houses or they could not afford to pay the extra costs. So why do publishers use development firms? The main reason is that development houses offer a good, complete service. Not only will the games be better than those offered by a single programmer, but using a development house gives the software house more control.

It is also convenient for the publishers to be able to contact the programmers during office hours; individual programmers are notoriously difficult to contact. By passing whole projects to a development firm, all the co-ordinating problems are removed for the publisher, leaving it to market and selling the games.

An alternative solution would be for publishers to set up in-house development teams, complete with graphic artists and sound experts. Several firms have done so, Virgin, Elite, Gremlin and CRL being a few examples. Many firms do not want to employ teams of full-time programmers. In-house teams need looking after. That means office space and other sundries, which gives software houses very high overheads.

By getting someone else to employ the programmers, a software publisher is freer to do as it wishes and is not committed to any one kind of game or to any particular team. Neither are the coders - they are equally free to work for whichever publisher they wish. The Firebird view on the subject is that it is a publisher; it regards itself as very much in the position of a book publisher, operating a service for its authors. It does not employ full-time staff, but likes to have the flexibility of choosing different programmers for different jobs and to give the programmers the flexibility to work for whoever they wish.

So, for a mixture of reasons, software development houses appeared to make sense; they were a logical happening in the industry but why did the development houses not publish their own material? If Ocean can make a fortune from publishing software, even after paying a development house its high fees, why do the development houses not do the same?

The answers are interesting. Some did and either didn't do very well or failed completely, or decided to get out while they were still solvent. Others are still contemplating a return to the publishing arena, possibly in conjunction with a bigger firm for marketing and sales support.

It is amazing how some of the biggest development houses producing some of the supposedly best software are the firms which, two or three years ago, produced poor-quality products which didn't sell. One of the most common statements from development houses was that the software market was changing so much that they could go any way - into publishing or to closer links with particular publishing giants, or even out of the market. Equally, most of them recognised that to compete as a publisher they would need tremendous financial muscle, which most of them do not yet have.

Since development houses are to some extent only a little more than middle-men it seems surprising that the programmers work for them, giving up a slice of their earnings.

The trends outlined reveal the answer. To compete, and to continue to produce top-quality games, most programmers had little option. Development houses cite other reasons, such as being able to choose on which of a number of exciting new licence deals or other projects they will work, and being involved in the leading edge of software, developing new techniques and standards.

The almost endless stream of advertisements for more programmers in *Popular Computing Weekly* implies that there is a shortage of people of sufficient calibre but that would not seem to be so. Only one of the development houses said it had any problems finding sufficient coders and most had received a heavy response to all the advertisements placed.

Investment

Given the high level of investment needed by software publishers, how will the development houses be affected by the much-predicted decrease in demand for full-priced 8-bit software? More of them than you might imagine are happy about the situation, since they are all getting into 16-bit software in a big way and some even write titles for some of the budget publishers.

It is interesting that several of the houses wrote both budget and full-price software and yet felt no conflict between the two. There was no difference in quality between the two, at least from a coding point of view. "The same amount of code goes into both a budget and a full-price product" and "we take exactly the same amount of care with our products regardless of whether they are budget or full-price", according to two sources. The difference, as they see it, which they feel is justifiable, is that the packaging and presentation involve far more background work for a full-price product than on budget; then there are the licence fees to be paid for coin-op conversions or games of the film/TV series.

It is those conversions which form a large part of the development house trade; some even work solely on conversions - from arcade machines or other computer versions of a title.

How will we, the people buying new games, be affected by the trend? Development houses and publishers are sure we will benefit by having more games of a better standard than previously. The professionalism will also help by providing more stability with fewer software houses going broke. But I think it will also be bad for creativity and innovation.

Too many people will be less prepared to take risks and so many good ideas will fall by the wayside. It seems inevitable that software houses will opt for the winning formula more and more and so just produce the same old material, month in, month out. The developers deny that, as one might expect, saying that creativity will be spurred by the encouragement of the new atmosphere for programmers and by the funding now available. □

Bomb the base

In the last of his series of articles on the PipeDream software for the Z88, Barry Smith examines its potential as a database.

The collection of software bundled with the Cambridge Computers Z88 is fairly comprehensive. Given the ability of *PipeDream* to behave like a spreadsheet and a word processor, the most obvious lack is of a true data management package. With a little ingenuity it is possible to overcome the limitation.

It would be feasible, of course, to write a custom database application in BBC Basic. Although the BBC variant of the Basic language is often praised, it is rather primitive as a development environment for database applications, lacking the built-in indexing of the Amstrad PCW Mallard Basic, or even some of the random file-handling commands of plain, old-fashioned Microsoft Basic.

Free-form text

Another possibility is the Diary application; the Z88 diary is a kind of database, storing free-form text indexed by date. You are not limited to a single diary; you can store the current one as a file with <>FS and load another with <>FL. Because of this you might possibly be able to use a second diary file as a database, ignoring the date display and treating each day as a separate record.

To index Diary records, you would need to embed keywords in the text, perhaps as headings at the beginning of each record. That would permit you to retrieve items later using the <>BSE search command in conjunction with the next and previous match commands, <>BNM and <>BPM. The diary is comparatively limited as a database but if you need to store records consisting of free-form text it might just be usable.

No bad thing

For database applications of a more traditional kind, such as storing names and addresses or maintaining a stock file, *PipeDream* is more promising. Its main restriction is that there is no forms view to allow each record to be entered and displayed on a single screen form. You have to be satisfied with a tabular view of your data, in which each record is represented by a row, and each field, or data item, is represented by a column.

This is no bad thing. Most traditional databases allow you to look at and amend your data in a table. It is often useful to be able to view several records at a time but it becomes a little cumbersome if there are more fields in each record than can be displayed across the screen.

Flat file manager

PipeDream also lacks the ability to relate multiple files together on the basis of common fields - in database terms it is what is usually referred to as a flat file manager. Within its limitations, though, *PipeDream* is usable as a database and as far as Z88 users are concerned it is probably the best choice. *PipeDream* offers many of the traditional database features, including sorting and retrieving records on any field, text, date and numeric data types, and calculated fields.

In theory, *PipeDream* allows up to 32,768 records to be held in any one file. You could have as many as 42 fields - columns - per record. Before you could take advantage of those capabilities, however, you would almost certainly need to expand the storage capacities of your machine.

Large databases would probably cause the Z88 to run out of memory but there is a way to circumvent that. *PipeDream* has a multi-file capability, allowing documents to spill across several files, with a holding file to link the elements. Some operations, including the search options, can take in a whole multi-file at one attempt, so that it would in theory be possible to split a database once memory became tight.

Options page

To create a database you first open a new *PipeDream* document. Go straight to the options page by hitting <>O and make sure that the options settings are suitable for working with databases.

The Z88.

Most of the defaults are correct as they stand. The text/numbers options controls whether slot entries should be treated as text or expressions by default and you should leave this set to text. The Insert on wrap option should be left at Rows but turn off word wrap by entering N at the Wrap field. Under no circumstances do we want a record to spill over on to a second line, since that would destroy our one-row-per-record structure.

The columns/rows field on the options page controls the order in which expressions are calculated and it is best set to rows rather than columns. This is a good idea if you plan to use calculated fields, to ensure that values from the current row – record – are used to evaluate the calculated value.

Large databases with calculated fields will work best if automatic recalculation is set off. If auto-recalculation is set on, data entry will be slowed by the need to re-calculate the whole worksheet every time a new expression or number is entered. Having set re-calculation to manual, of course, it is vital to remember to force a calculation with <>A before relying on the values of calculated fields.

Typically, a database involving numerical values is likely to include money fields; if so leave the decimal places setting to 2 but if number fields are all certain to be integers, you might as well set the decimals places option to zero at the outset.

Automatic numbering

Having set up the options page the next step is to format the worksheet columns according to the data to be entered into each field. In the case of a stock file you might want to use separate fields for part number, description, unit cost and quantity on hand. A final calculated column could hold the total value of each stock item held.

Start in cell A1, set the field width to 4 (<>W) and type the field heading, *No.* Enter *Description* in B1 and set the width to about 20 and continue in the same fashion for the *Unit Cost, Qty on Hand* and *Stock Value* fields. In row B, type sufficient underscore characters in each column to provide a continuous rule across the screen and lock the top two rows against scrolling with <>LFR. The field headings will then be displayed on screen wherever you are in the database.

If you database is wider than the screen you can also fix key fields so that they are always displayed even when you pan to the right. To do this, make sure that you make the key fields the first fields at the left-hand side of the database. Position the cursor in the rightmost column to be fixed and enter <>LFC.

In the current example, calculated fields could be used, first, to provide automatic part numbering and second, to compute the stock value of each item.

Enter the formula 1 in cell A3. Enter A3+1 in the cell below and replicate this formula through the range A4 to A100 using the <>BRE command. The cell reference in the formula A3+1 is *relative.* When the formula is replicated down the column, the A3 reference is taken to mean 'the cell above' and each formula therefore increments the number in the cell above by one. Re-calculate the worksheet and the part numbers should be in place for the first 98 records.

Suspended task

To calculate the stock value automatically, enter the formula C3*D3 in cell E3. Replicate this formula from E3 down to E100 and then go to cell A101 – use <>CGS to go to a slot address directly. Enter another line of underscores to remind you that the formulae are in place only down to row 100; you can replicate them further later on if you need to do so.

The stock number and quantity fields should be formatted as integers; mark each column in turn using <>Z at the top and bottom, enter <>LDP and choose 0 decimal places.

Name the database with <>FC and save it as a file; this is safer than holding it in memory as a suspended task. Now the database is ready to use. Remember to enter numeric quantities as expressions, using <>X to ensure that numbers are properly aligned on the decimal point and used properly in calculations.

If you need to restructure the database, <>EDC will allow you to delete a field – column – and the <>EAC and <>EIC commands provide for adding new columns. You can maintain the database in sorted order by entering new records in the appropriate place. <>N will open a new blank row and <>Y will delete a whole record.

Speed sorting

You would have to replicate formulae through the new rows but his could be done at the end of a batch of entries by replicating formulae again from row 4 to row 100. An alternative to maintaining the database in sorted order during data entry would be to sort the database once the parts list had been entered.

PipeDream allows you to sort on a specific column in either ascending or descending order using the <>BSO command. You could sort by column B to obtain a stock list alphabeticised by description. The Don't Update References option could be set to Yes to speed sorting but do not be tempted to do this if you are using calculated fields as in the current example.

Because *PipeDream* allows you to search for records containing a given string you might be able to avoid using a sorted database. The <>BSE command allows you to enter a search string, such as "Widgets", and find matching records. Several options make this command particularly useful. You can confine the search to a given field by setting the Search only range of columns option and you can instruct *PipeDream* to ignore case – a good idea unless you are confident how you have typed each part name.

For very large databases spread across several *PipeDream* files, you can elect to search all the files. The wildcards x? and x# match one and any number of non-blank characters respectively; entering W# as the search string would find all the records containing words beginning with W. Once *PipeDream* has found the first matching record, you can move from match to match using the <>BNM – next match – and <>BPM – previous match – commands.

Searching allows you to match only character strings but you might also want to make a list of all out-of-stock items, or all items costing more than £100. You can achieve that by using a feature of the <>FS file save command; <>FS allows you to save records matching a given expression in a separate file.

Selection criterion

To make a list of out-of-stock items, first save the database then choose <>FS again and re-set the name of file to save '. This is important because otherwise you will over-write the main database. Choose Save only a range of columns if you want only some fields in the list and also choose the Save selection of rows option. This will allow you to enter an expression containing your selection criterion.

Since the quantity on hand column is D, enter D1=0 as the expression to locate all out-of-stock items. Similarly, C1>100 would select all items where the unit cost is more than £100. Notice that the expression refers to the slot in row 1. That does not mean *PipeDream* will check only row 1. As *PipeDream* saves the file, it updates the cell reference to each row in turn and saves matching rows. Now load the new file to examine your selection.

The examples are relatively simple but expressions can be as elaborate as you like. By using the & (AND), | (OR) and ! (NOT) logical operators, you can make selections on the basis of complex criteria. The expression C1>100 | E1>1000, for example, would select all items with a unit cost more than £100 or a total stock value of more than £1,000. □

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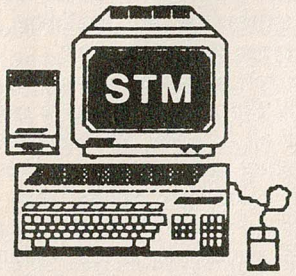

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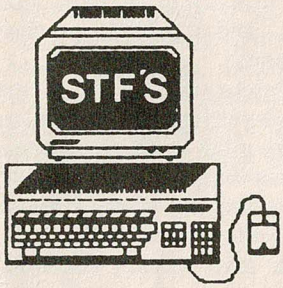

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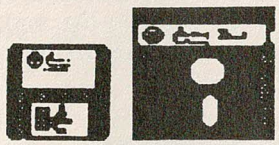

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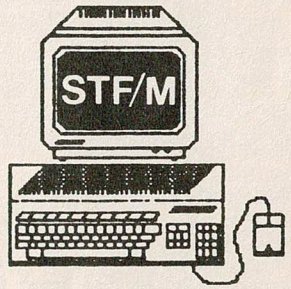

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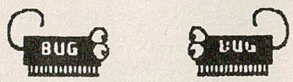

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Little drummer

Mark Jenkins with new software for micro drummers on the ST . . .

In the last few years the drum machine has become very popular. The drummer who could arrive on time and play consistently with sequencers and other electronic instruments has not been born. The drum machine provided accurate – sometimes over-accurate – tempos, controllable sound and, once sampled drum voices had become common, very high audio quality.

The trouble with most drum machines is that they limit you to the sounds with which they are provided. New chips for models such as the Sequential Drumtrax and Linn tended to be expensive and cheaper machines such as the Korg DDM110 had a very limited selection of sounds.

Heavy Metal

The solution of late has been to use a multi-timbral sampler such as the Akai S900 or S700 to take the place of your drum machine. Loading a new disc or set of discs into the sampler gives totally different drum sounds, from Heavy Metal sets to Simmons-type electronic kits, but, these samplers by themselves lack the capability of storing the patterns in which you want the drum voices to sound.

Enter *MidiDrummer* for the Atari ST, which has recently been released by Bit By Bit Software of Lincoln. The package aims to make drum composition easy using instruments other than drum machines and would be equally suitable for use with a multi-timbral sampler or synth such as the Casio CZ-101, or with a whole bank of simpler Midi synths, each set to create one drum sound.

Electric grand piano

Sam Griffiths of Bit By Bit says he is particularly pleased with the fact that the latest revision of *MidiDrummer* can also play some limited melodic patterns, hence the inclusion of a demonstration piece with parts for steel drum, marimba, celeste and electric grand piano.

After loading *MidiDrummer* you are presented with a main display which features a right-hand matrix of patterns from 0-9 and A-J – 100 patterns – and a left-hand matrix of 16 beats against 16 instruments. The exact nature of the instruments, of course, depends on what devices you have running from the program and what sounds they are set up to create; you can label each instrument with a name of up to nine letters.

MidiDrummer has two modes, Pattern Mode and Song Mode. In Pattern Mode the package plays the current pattern continuously, while in Song Mode a pre-programmed selection of patterns is played. A button flicks from "P Play" to "S Play" under the control of the mouse and the mouse also controls the tempo, using the right button for Tempo Up and the left button for Tempo Down.

Song Edit and Song Protect are also selected by the mouse, as are the Play/Pause buttons and the Memory Number from 001 to 054. To play the demonstration pattern you need to set up your sounds to correspond to the demo sounds, which means going to the Control option and assigning each Voice a Midi Channel and, if necessary, a Midi Note Number.

In this section you can also set Velocity Defaults – it is possible to alter the velocity on different beats, which will be useful if you are using velocity-sensitive synths – and to start the metronome, change the display colours and go into Tap Write mode, which allows you to enter new beats by hitting the keys A to P.

Otherwise new beats are entered easily into the grid representing each pattern by clicking the mouse on any grid point. You can change the display to show velocity values rather than beats and you can edit velocity values as well as the time signature of each pattern. In the Song mode you use a strip across the bottom of the screen which marks the intro, mid section and end of the tune, and labels each pattern with the appropriate number. Up to 1,053 patterns can be used to create a song.

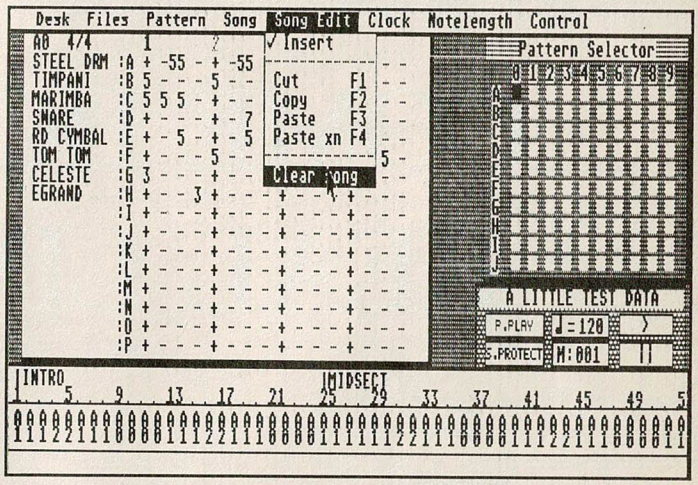
So far as synchronisation is concerned, *MidiDrummer* can be the master or can be slaved to an external Midi clock and sends and receives the increasingly-useful Midi Song Pointers, which tell Midi equiment from which part of a song to play. The Notelength options – Trigger, 1 Midi Clock, 1 Beat or Sustain – allow you to sound longer notes correctly such as marimba or cymbals, or any tuned musical sound if you are using *MidiDrummer* to play melodies.

Sound definitions

Eight songs can be held in memory and can be edited, again using the mouse. You can cut, copy and paste blocks of patterns using the function keys to create variations of your song and can, of course, name and save completed songs to disc.

MidiDrummer will save an entire set-up of sound definitions, patterns and songs and, overall, the program runs smoothly and straightforwardly. The package has many of the facilities of much more expensive software available in the States and aimed largely at the Apple Mac.

The only problem with the package is that it will use up your ST to create a drum part and you will be stuck when you want to create the rest of your music. You could use a package such as *Kuma K-Switch* to run a sequencer like Super Conductor simultaneously but, ideally, Bit By Bit should launch a file-compatible sequencer at a similar price so that you can compose your drum part on *MidiDrummer* and merge it on to a single track of a powerful sequencer. □



Bit By Bit MidiDrummer main screen showing velocities.

Bit By Bit Software, 139 Spencer Street, Lincoln LN5 8JH. Tel: 0522 40205.

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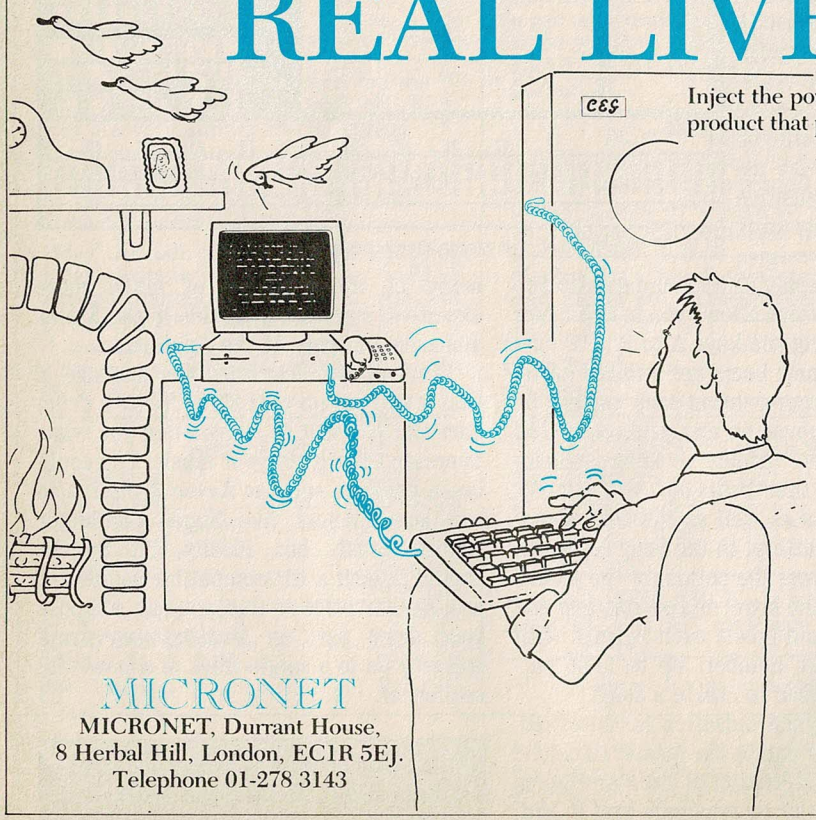

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It's you we answer to

Graham Edkins delves into the information service provided by British Telecom's Prestel.

Prestel offers a first class public information service which is widely ignored by both the public as a whole and the users of home computers in particular.

When Prestel opened its doors, the objective was to make the service as commonplace as Teletext is today; it does indeed offer much more than Teletext can with its many thousands of pages of in-depth information, faster response time and user interaction which can be used for everything from home shopping to electronic mail.

Lack of information

Unfortunately the public did not jump at this new tool of information technology in the way that was planned. The cause for this is most commonly blamed on the lack of information about the service and not on the public in general.

With the arrival of the home micro revolution people had the ideal instrument to access Prestel with very little added cost.

A Prestel subscription is just £6.50 per quarter and offers a local call access to the vast majority of the U.K. A modem and access software for most micros cost no more than three or four good games.

Directory

Every quarter Prestel subscribers receive a printed directory of areas on the network. Many rewarding hours can be spent randomly accessing the page numbers shown and finding out were they lead. I shall now tell you about some of the areas that I have found in the hope that I can interest some people who are not subscribers and possibly encourage a few Micronet users to look a little more widely at what is available.

Games, or what the IP's like to call 'Leisure', are particularly well covered. It would be impossible to list all the places that you can go but one that stands out is Concept Videotext, in particular their 'Dynamic Games' starting from the Index at 606801. These games use the Prestel dynamic frames to the full and although you have to pay per frame there is a chance to win a cash prize.

Concept

Concept also has sporting games, adventure and space games, puzzles, quizzes and what it calls 'belligerent' games which includes things like 'Russian Roulette'. Its free draw page is on 606820 which may be well worth a visit.

Viewdata Marketing Services (*VMS#) also has a Fun and Games Index on page 344079 which has an astonishing array of quizzes. It also has a good Graphics Gallery at 344079 and true to its travel agent orientation, they have the latest exchange rates on page 34475001.

Datasolve has a large area on Prestel which includes Selectadog (36010) which helps you choose the right pooch for your environment with a range of question and answer pages which are all free. Elsewhere in that area you will find (you guessed it) yet more prize quizzes.

Key *Teleshopping# to reach a long list of on-line shopping ideas; each is subdivided into areas such as Special Offers, Telebetting, Food and Drink, Home and Garden etc. By following these indexes you can order everything from Lego kits to printer cables. Most advertisers require you to type in your credit card number and confirm your address that is automatically displayed when you show the page, after that you just sit back and wait for the postman.

Order pages

Every order page has the option of sending or not sending so even if you go to the page by mistake or change your mind you are not committed to anything until you 'Press 1 to Send'. The advertiser does not even know that you went to his page unless you do this.

As you would expect there is always a good selection of news available. Unitel offer a free news service (Key *UNITEL#) which is easy to use and offers a full week's coverage as well as news features for a more in-depth look at chosen topics. A more comprehensive news service is given by Viewtel (202) at 2p per page which includes sport and business as well as headlines.

A genuinely interesting read can be found in the Observer Prestel News Service (*OBSERVER#). Here you can find What's On and What's New with reviews of new productions and current highlights of film, theatre and music while TV View gives an independent view of television programs for anyone who hates to sit in front of the box all night.

New features

The *Observer*'s news features are excellent and often give the full story of a news item which can be missed when listening to the odd bulletin on the radio. This can be found at *245650# while the Sports Diary is on *345606#. All of these pages are free to read but be prepared to add an hour to your phone bill.

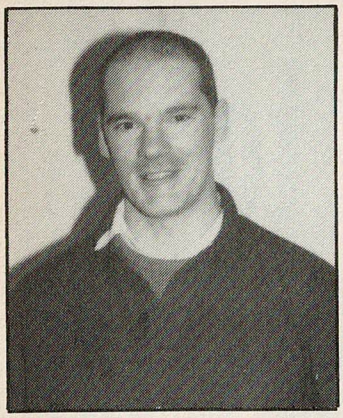
The general information on Prestel is more difficult to categorise but an example of what can be found came when I was asked by a visitor from abroad what the system could do. With just his air service name and flight number I was able to tell him what he would eat while he flew home. I was also able to say what film would be showing on the plane.

On a more down to earth level you can find a full British rail time-table on-line (key BR) or everything that you wanted to know about the British Library (key 5050).

My favourite area, however, is the 15,000 pages of government information on Prestel.

There is so much information available that there is a printed guide which can be requested free on page 500151. I would recommend sending for this provided you can stand the idea of having a large brown envelope dropping on your doorstep marked 'On Her Majesty's Service'. □

KENN GARROCH



Pin charts

C Ian, of Lowerwick, Worcester, writes:

Q As a Commodore user for many years now I have slowly built-up my system until I have just about everything I need. It has always been a problem for me, though, not being able to find good software for my 128. I am by profession a sound-recording engineer, and also a musician, and I earn my living from both of these. At the studio I make quite a lot of radio and TV adverts so being able to play instruments is obviously a great help. I have also built up quite a comprehensive range of MIDI gear over the past couple of years, and have a small studio set up in my spare room. The lack of music related software for the 128 has finally made me buy an Atari 1040 which has just about everything I need (software wise) already available. The main point of this letter is to ask you if it is possible to connect the 1040 to my Commodore 1901 monitor. I have a mono monitor for the Atari but thought it would be nice to use it in colour sometimes.

On looking through the handbook I found the pin charts for the 1040's port, and the monitor port has an audio and composite video out. I wonder if I could use these to connect to the 1901, which has inputs for these same connections? Also, is it possible to transfer all my Basic programmes to the 1040 via an RS232? I know that the Basic is not quite the same, but better to make some alterations than to type them in all over again.

A A clue to the answer to your first question is in the title of the Atari 1040 STF. The F stands for sloppy disc as in the 520STFM where the M stands for modulator. The STF does not have a TV modulator and so does not have the composite video output. However, it is possible to get one fitted for about £50 which will solve the problem and turn your machine into an 1040 STFM. As it stands, the 1040 will not, unfortunately, work with the 1901 to give a video picture although the sound should work. The 1901 also has RGBI inputs but again, unfortunately, these are TTL and are incompatible with the analogue system used on the ST.

I can be a little more positive about transferring your programs since both the 128 and the ST have RS232 serial ports. The drawback is that the 128 needs an interface to convert the 0-5V pseudo RS232 signals it puts out into the standard +12V a real RS232 needs. An alternative would be to use the User port on the 128 in conjunction with the printer port (this works both ways, in and out) on the ST to transfer the data. This would be cheaper since all you need are two connections and some cable. The drawback is that you will have to write the transfer software for both machines, fairly easy on the ST but I'm not too sure about the 128 since I have never tried it. If you are not able to write software to control i/o chips then you are better off getting an RS232 converter for the 128 and doing the transfer from Basic (device 2 on the 128 and INP(1) in Atari ST Basic).

Doing things the hard way

The Doppel-Ganger, of Barnsley, Yorks, writes:

Q As a registered masochist, hooked on flux fumes and a mean hand with the ol' soldering iron, a real believer in doing things the hard way, I am looking to replace my hand-built 68B09 Flex system with something a little more common, and so what I want to know is this:

Could you possibly tell me if, in this country, you can get a PC-clone type system in kit form. I have seen such things advertised in magazines such as Byte, but what with currency changing, transatlantic postage charges, and also having to contact the USA should things go wrong, this does not seem like a viable proposition.

Should a kit PC-clone be available in this country, it ought to work out cheaper than a comparable built system and once you have seen a computer build up before your very eyes from a bare PCB to a fully working system, somehow, unpacking something from a box with the most technical feat required being fitting a mains plug does not have quite the same charm.

A I have looked and looked but I cannot find anyone who supplies what you require. Of course, I may not have looked in the right places but, it seems to me that in this country, DIY computers are very much a thing of the past. What you might like to try is to write to all of the US firms that supply PCc kits and see if they have any British counterparts/subsidiaries/friends/etc. that will do the importation for you.

If you must do things the hard way then I would have thought that all of the hassle of dealing with a US supplier is part of the fun. No? well you might get hold of as many technical manuals for PCs as possible, and build it from there. Perhaps our reader's know of a supplier that will fulfill your needs.

By the way, who's doppel-ganger are you? - not mine surely? Having had to look at the old and new photos that unfortunately have to be taken and printed at the top of this page, I suspect you will find that I look nothing like them in real life.

Software drive

E Hyland, Aylesbury, Bucks, writes:

Q If I attach a 5¼in. drive to my CPC6128 do I require any additional software or will it format correctly under CP/M and be usable under AMSDOS? If it will format correctly, what type of drive am I looking for - tracks, density and so on?

A If you can get an interface to work with a 5·25in. disc drive I see no reason why the Amstrad will not work with it in both AMSDOS and CP/M, as they are the same format. The format of the discs as defined by the format program is either standard IBM floppy disc format, i.e., 40 tracks per side, eight sectors per track, sector interleave 2:1 and each sector with 512 bytes of data giving 160K of storage per side. The other format, known as system format, is 40 tracks, with nine sectors, each sector having 512 bytes, hence 180K of storage per side.

You will therefore need a double-sided, single-density system, although I am not sure that it will work as a double-sided system since, so far as I know, Amstrad machines are single-sided. It should be possible to get at least one side and hence 180K of disc space which is single-sided CP/M compatible.

Sight seeing

Alex Halstead, Mold, Clwyd, N. Wales, writes:

Q I have a Commodore 64 computer and enjoy typing-in the program listings in the Popular Programming section. The only problem is that I sometimes have difficulty in deciphering the Commodore symbols. Is there an easy guide you can print to help those with less than perfect eyesight?

A The most common symbols are shown in the diagram in figure one, together with the key combinations needed to obtain them.

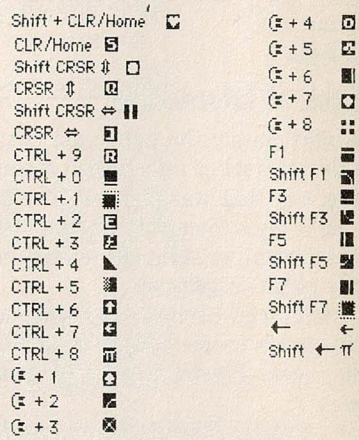


Figure 1. CBM symbols and their associated key combinations.

Gates of logic

A In *Popular Computing Weekly* of December 3-9 a letter from Paul Mooney enquired about OR gates, their packaging, what they look like, and where they can be obtained. There are three main logic components available to would-be constructors - AND, OR, and NOT gates. The logic functions are shown in figure one along with the more commonly available NAND and NOR gates. NAND and NOR are far more useful than straight AND and OR since they include a built-in NOT function. Taking a two-input NAND or NOR and connecting the inputs gives an inverter or NOT

function. They are in various packages depending on the number of inputs needed. The standard sizes are 2, 3, 4, 5, 8, and 13 inputs, although not all those sizes are available for all types. The packages with fewer input gates generally contain more than one gate, e.g., the 7400 contains four two-input NAND gates in a 14-pin dual-in-line package whereas the 7430 has a single eight-input NAND in a package of the same size.

Two input truth table

A	B	AND	OR	NAND	NOR
0	0	0	0	1	1
0	1	0	1	1	0
1	0	0	1	1	0
1	1	1	1	0	0

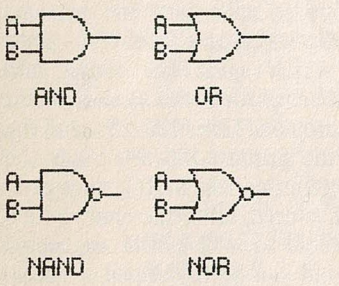


Figure 1. Basic two-input (A B) logic gates.

The packaging for logic chips is generally of dual-in-line type as shown in figure two. They are in various sizes with the most common being the 14-pin type. There are also a number of types or logic families, the 74 series and the 4000 CMOS series being the most common. In the 74 series there are a number of sub-families, usually denoted by two letters following the 74, e.g., 74HC or 74LS. Those chips perform the same function and have the same pinouts normally as their standard 74 counterparts. The difference is that they have better operating characteristics; they are faster, use less power, and have a higher fan out – the number of other chips which can be driven from one chip output. The main sub-families are 74LS which are lower power and faster operation than the standard 74, 74HC which are CMOS high-speed versions and better than the 74LS, and 74AC which are even faster with very low power consumption. For most construction work, the 74HC is generally the best and cheapest to use or, for really fast applications, the 74AC.

Logic chips are used not only for simple logic gates; complex functions can be obtained from latches and shift registers to counters and adders. The best way to find what chips are available is to look in an electronic component catalogue such as the Maplin Electronic Supplies or Radio Spares. They usually have a complete selection of chips showing their functions, characteristics and specifications.

A Maplin catalogue can be obtained from Maplin Electronic Supplies Ltd, PO Box 3, Rayleigh, Essex. Tel: 0702 552911/554161, or look in one of the many electronics specialist magazines for other catalogues.

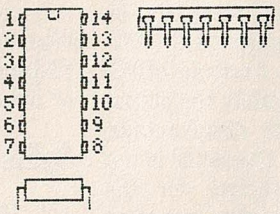


Figure 2. 14-pin dual-in-line package – top, end, and side views.

STumped

T Q Tran, of London SW19, writes:

Q In a recent issue of *Popular* you mentioned that a disc formatted with the label desk-top will auto-run and .PRG file in the auto folder. I cannot get *1st Word* to run even though any other .PRG file will auto-run satisfactorily. It appears that any program which needs an .RSC file will not auto-run using this method – I have tried Megaroid which requires an .RSC file – can you suggest any other method? Also my 520STFN will have all of the desk .ACC files even if the boot disc is not labelled desk-top. Have you any idea why this is so? My ST was bought two weeks ago.

I also remember that you mentioned some time ago that the monochrome detect (pin 4) should be grounded if a monochrome monitor is used. I use a green screen monitor with composite video input and it would be better if I could get it to display a black and white screen with just green characters instead of a full green screen, as now.

Do you think joining pin 4 to pin 13 will achieve this black background? Will it cause any harm to the computer if I try this modification?

A Your first question has me stumped, I have tried everything I can think of to get Megaroids to auto-boot, from compiled Basic programs to machine code, but it will not do it. So far as I can see, the auto routines load the program into memory but do not execute it. I also tried a separate program to change the directory to A:/ and then load and execute Megaroids but this does not work either, although it will operate if the machine is booted and then the loader program is run manually. If any readers know the answer could they put Tran and myself out of our misery?

To get rid of desk accessories, the best thing to do is re-name them from the info menu so that instead of .ACC they are .ACN. This means that they will not load and hence not take up all that extra memory space.

The third question about the monitor has a straightforward answer. The monochrome detect pin on the ST video connector is for use with 70Hz high res monitors only. The composite outputs only the medium and low res modes. So if you ground the mono detect I would think you will get either no picture at all, or a 70Hz image will attempt to arrange itself on your monitor.

The latter situation could damage your monitor unless it is of the multisync variety, which is unlikely, so do not try it.

The way to get a high-res image from the ST is with a monitor which can cope with the higher frequency scanning, i.e., Atari's SM125 or an NEC Multisync.

Up the straight and narrow

A Hamiliton, of Rochdale, Lancs, writes:

Q I am in the process of writing a word processor for my home computer in Basic. The problem I have is that I want to produce fully-justified text – line up both of the margins so that they are straight. Do you know of an algorithm to do this? If so, could you explain the process and perhaps give a demonstration program listing?

A There are a number of methods of fully-justifying text, but they all involve inserting spaces to pad the line so that it is the same length as all of the rest. This can be done by getting a string of text which is approximately correct but less than the true length, then finding the first space from the left and then inserting another next to it. If the line is the correct length, it can be printed; otherwise the next space is found – after the inserted one – and the process repeated. The only disadvantage with starting from the left is that the spaces look lopsided. The program listing starts at both ends and works towards the centre, inserting spaces until the line is the correct length. Unfortunately this, too, can sometimes look a little unbalanced, especially with short lines. What you could try is selecting random positions for the spaces, although this is a little more difficult as it requires all the spaces to be found first and then not used twice until all spaces are double.

For lines of more than 60 characters or so, the program shown should do the trick well. It takes into account the paragraphs, marked by carriage returns – CHR$(13) – and reads the text from a file named TEXT. The variable ll is one fewer than the line length. The subroutine 'just' performs the justification from left and right as described. The program was written in Microsoft Basic using labels instead of line numbers. To convert to other Basics give each line a number and replace all the label references by the appropriate numbers.

```
OPEN "TEXT" FOR INPUT AS #1
ll=75
a$=""
loop:
FOR t=1 TO ll-LEN(a$)
IF EOF(1) THEN fin
a$=a$+INPUT$(1,1)
NEXT
GOSUB just
PRINT j$
GOTO loop
just:
crpnt=0
FOR t=1 TO LEN(a$)
IF MID$(a$,t,1)=CHR$(13) THEN  crpnt=t
NEXT
IF crpnt<>0 THEN dcrlf
t=LEN(a$)
fendw:
IF MID$(a$,t,1)<>" " THEN t=t-1:GOTO fendw
j$=LEFT$(a$,t)
IF RIGHT$(j$,1)=" " THEN j$=LEFT$(j$,LEN(j$)-1)
a$=RIGHT$(a$,LEN(a$)-t)
s=1:e=LEN(j$)
pad:
IF LEN(j$)>ll THEN RETURN
fspacel:
IF MID$(j$,s,1)<>" " THEN s=s+1:GOTO fspacel
j$=LEFT$(j$,s)+"  "+RIGHT$(j$,LEN(j$)-s)
s=s+2
IF s>(LEN(j$)/2) THEN s=1
IF LEN(j$)>ll THEN RETURN
fspacer:
IF MID$(j$,e,1)<>" " THEN e=e-1:GOTO fspacer
j$=LEFT$(j$,e)+"  "+RIGHT$(j$,LEN(j$)-e)
e=e-2
IF e<(LEN(j$)/2) THEN e=LEN(j$)
GOTO pad
dcrlf:
j$=LEFT$(a$,crpnt-1)
a$=RIGHT$(a$,LEN(a$)-crpnt)
RETURN
fin:
CLOSE #1
PRINT a$
x$=INPUT$(1)
END
```

Printing errors

Kenn Garroch continues his series on constructing a printer driver program.

The outline for the printer driver program last week contained a few mistakes. That only goes to show that it is not always possible to have something absolutely correct at the design stage. Problems will occur when converting the outline/pseudocode/flowchart into program format and will either need to be corrected there and then, or a concept will have to be re-examined. The following section shows the alterations that need to be made to the pseudocode/flowchart.

Mistake

I made a mistake in the printer header. Since each char is made up from eight bytes horizontally, the length must be multiplied by eight, before MOD and DIV for n1 and n2 are found - see program listing. The variables in the convert section were set up incorrectly - they did not take into account the fact that arrays start at 0, so those set to 8 should have been 7. ICNT should therefore be decremented to −1 not 0. The same applies to the routine to print the bit image; the buffer is accessed from 7 to 0 not 0-8, otherwise the characters appear backwards.

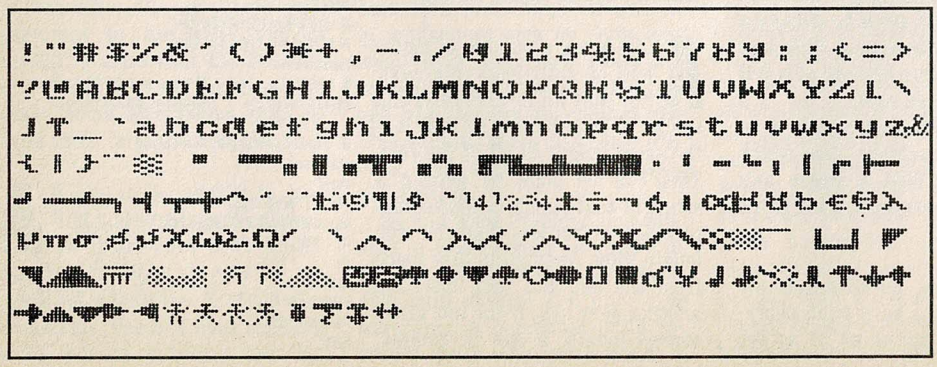
Similar Basics

The first two machines I look at using the program are the Amstrad and the BBC. They can be used almost directly, since they already have printer ports and their Basics are very similar. The C64 and Spectrum need some more detailed interface developments before they can be made to work. I will look at this next week.

Listing one shows the Amstrad driver routine in Basic. Unfortunately the output produced by this has the disadvantage, that the top row of each character is not printed. The printer interface for the Amstrad is only seven bits wide, not eight as it should be. This creates two problems; the first is that the top row is missing, since it is defined by the top bit - only character codes from 0-127 can be sent to the printer. The second is that no more than 128 bytes can be sent to the printer as specified in the header command.

"Problems will occur when converting the outline/pseudocode/flowchart into program format and will either need to be corrected there and then, or a concept will have to be re-examined."

As each character takes eight bytes, that is 15 chars, since the first byte is counted as 1 not 0. I also found that with my printer every so often, although the correct numbers were being sent, spurious mistakes occurred - see figure one. I suspect that this was due to a faulty cable or connection.



Splits

The program is split into the sections defined last week, plus a front-end - lines 10-100 - which splits the string into lengths of 15 chars or fewer to circumvent the top bit problem. Lines 120-220 send the header to the printer; 230-280 reads the character definition into buff(); since symbol after 32 is used, all of the chars which normally would be in the ROM are copied into RAM and can be re-defined if necessary. In this case, they will be printed instead.

Dimension buff

Lines 290-400 convert the definition into printer bit image format; 410-460 send the formatted character to the printer; and 560-570 is the printer driver. Lines 470-550 scan the string (P$) using a pointer (C) to print each character.

The same program can be used with the BBC by changing the ROM variable to &C000 and the printer driver routine to:

```
560 *FX 3,2
570 VDU 2,P,3
570 *FX 3,4
580 RETURN
```

You will also have to change PEEK(a+t) to ?(a+t) and dimension buff(7) and cbuff(7) at the beginning of the program. Lines 10, 20, 40, 60-100, 540 can be omitted and line 50 becomes FOR T=33 TO 128:P$=P$+CHR$(T):NEXT then use GOSUB to print P$.

There are no problems with line lengths since the BBC printer port operates correctly.

Obviously, the program is very slow and is not optimised, i.e., it does not use the best instructions and looping techniques but it is in a form which is fairly easy to convert to machine code, giving a vast increase in speed.

```
10 L=15
20 SYMBOL AFTER 32
30 ROM=HIMEM+1
40 sc=0
50 FOR t=33 TO 255:c$=c$+CHR$(t)
:NEXT
60 p$=LEFT$(c$,L)
70 IF LEN(c$)<L THEN p$=c$:c$=""
:GOSUB 470
:END
80 GOSUB 470
90 c$=RIGHT$(c$,LEN(c$)-L)
100 IF c$<>"" THEN 60
110 END
120 n1=(LEN(p$)*8) MOD 256
130 n2=INT((LEN(p$)*8)/256)
140 p=27
150 GOSUB 560
160 p=75
170 GOSUB 560
180 p=n1
190 GOSUB 560
200 p=n2
210 GOSUB 560
220 RETURN
230 a=ASC(MID$(p$,c,1))
240 a=((a-32)*8)+ROM
250 FOR t=0 TO 7
260 buff(t)=PEEK(a+t)
270 NEXT
280 RETURN
290 icnt=7
300 dcnt=0
310 r=0
320 ccnt=7
330 IF (2^icnt)=(buff(dcnt) AND
    (2^icnt))
THEN r=r+(2^ccnt)
340 ccnt=ccnt-1
350 dcnt=dcnt+1
360 IF dcnt<8 THEN 330
370 cbuf(icnt)=r
380 icnt=icnt-1
390 IF icnt<>-1 THEN 300
400 RETURN
410 bcnt=7
420 p=cbuf(bcnt)
430 GOSUB 560
440 bcnt=bcnt-1
450 IF bcnt<>-1 THEN 420
460 RETURN
470 c=1
480 GOSUB 120
490 GOSUB 230
500 GOSUB 290
510 GOSUB 410
520 c=c+1
530 IF c<(LEN(p$)+1) THEN 490
540 sc=sc+1:IF (sc MOD 2)=0 THEN
    p=13:GOSU
B 560:p=10:GOSUB 560
550 RETURN
560 PRINT #8,CHR$(p);
570 RETURN
```

□

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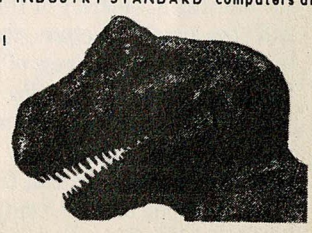

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Down in the dumps

Roger Howorth reviews the Casio CZ-101.

The most common use of the Midi interface is to link various synthesisers so that any one can be played from a master keyboard or to connect those keyboards to a sequencer but this powerful interface can be put to other uses easily and effectively.

A common problem with cheap synthesisers is lack of memory in which to store new or customised sounds. To help overcome this I have written a short utility program to transfer voice data between a Casio CZ101 synth and the ST disc drive.

The program is written in C because of speed and suitability in the area of systems programming but, even so, the routine which captures the voice data from the Casio can function fast enough only if programmed in machine code with all interrupts disabled. I used the Megamax C compiler as, besides being one of the better C compilers it is exceptional in allowing machine code mnemonics to be inserted directly into the C source code.

Although written for the CZ101 the program could very easily be edited to make it work with virtually any Midi synth, in most cases it is necessary only to alter the values sent and received as the header instructions contained in the functions "to_cz" and "from_cz".

Housekeeping

The first function to be executed in a C program is always "main", which I use to perform various housekeeping tasks which prepare the program. First, a standard GEM initialisation function allows the program access to all the GEM specialities later on. Next the "busy bee" mouse which was left over from the desk-top is erased and a global array "pathsp" is initialised with a "default" root directory for drive A.

A welcome message is output and the global variable "buf_add" is loaded with the address in memory of the buffer which will be used to store the voice data temporarily. The address of a variable can be found in C by pre-fixing its name with "&" but in this case we must store the buffer address separately so that the machine code routine can find it quickly.

Having done all that, control is passed to the menu handler which immediately enters a never-ending loop via the "while (1)" construct and it is from here that the rest of the program is controlled.

First, the GEM function "form_alert" displays a dialogue box containing the menu options. GEM then waits for a user response before exiting "form_alert" and passing the user's choice back to the program in the variable "result" which is used by the switch statement to pass control to the relevant function.

Simple menu

The "to_cz" function is a simple menu and switch to determine the voice number and destination, i.e., the Preset, Internal or Cartridge banks within the CZ101.

As the ST midi port is buffered by the operating system it must be cleared of any old accidental data by the routine "clr_midi". Having done this, the ST sends seven bytes of instructions to the CZ101 which will tell it that we want it to send us a particular voice.

Next the function "wait" is used to wait for the Casio to send its first System Exclusive byte which acknowledges our instructions. This routine is useful as it prevents the program "hanging" if for some reason the Casio does not respond, perhaps because it turned itself off.

While we wait for the first byte the Atari keyboard is read and if the "Escape" key is pressed "wait" informs the program which then aborts to the main menu. Assuming this first byte gets through we need check only the data which will arrive rather than worrying about whether it will arrive as well.

The Casio should acknowledge our request by sending back a further five bytes which are read and checked by the five "if . . . Bconin(3) . . ." statements. Because the ST likes to work with 16-bit words and Midi is strictly 8-bit all these replies must be forced into byte form by the "(short)" instruction.

If we receive the correct response from the Casio we can then enter our main routine to send the voice data. As this data is stored on disc the next major task is to find which file to send. To do this we call the function "get_name" which uses the GEM item selector to get the information from the user.

Get_name will return a 0 to the calling function if a valid file name was selected or −10 if the CANCEL button was pressed. If −10 is passed back the function aborts to the main menu; otherwise it tries to read the file into the buffer and issues various error messages if necessary.

All being well, the data is sent to the Casio while the incoming Midi port is checked for activity which would indicate an error. Before returning to the main menu the function sends an "end of system exclusive" message and waits for the Casio to return it; if it does not an error message is output on-screen and the program waits again.

Function routine

The "from_cz" function routine is almost identical to "to_cz" in structure, although of course the voice data is travelling in the opposite direction. The only difference is that rather than using an operating system function to read the voice data from Midi, a special machine code routine is used.

This is necessary, not particularly because C is too slow but because, without disabling all interrupts, which is a privileged machine code instruction, the ST is too slow.

The machine code is small and easy to follow. First, all interrupts are disabled and the buffer and Midi port addresses stored in registers for quick access later. Then the Midi port is checked to see if a byte has arrived and if it has it is stored in the buffer and checked to see if it was F7; if not we loop back to wait for the next byte.

Having received an F7 we exit the loop and calculate the total number of bytes received which is stored in the C variable "tbrd" before we exit the machine code and save the data to disc. The machine code must be executed when the processor is in "Supervisor" mode as several privileged instructions are used, but for simplicity the processor modes are switched from within the main C code.

For those without a suitable C compiler or not interested in typing in such a large program, an enhanced version is available by sending a cheque for £10 payable to Roger Howorth, 71A Flaxman Road, London SE5 9DN. (For listings, see pages 32 to 35.) □

Solution to 'Crossed lines' puzzle of December 17-30

Answer: There are 70 numbers remaining on the list.

Solution: The program needs to find all of the whole numbers in the range 1 to 1000 which do not contain an even digit or zero and are not multiples of 3, 5, or 7.

This is done in two sections. First each number is tested in turn to determine if it contains 0, 2, 4, 6, or 8. This is done using the INSTR function. This tests for the presence of a target string - in this case one of the digits in question - in the longer string F$ which holds the number under test. The value returned as X - line 60 - denotes the position in string F$ of the target digit. A returned value of zero indicates that no such digit was found. If X is non-zero a flag is set to value 1 and the next stage in the computation is omitted.

Numbers which pass this first test are then checked for divisibility by 3, 5, or 7 at lines 100 to 120. Once again, the flag is set to 1 to denote a number to be rejected. Only those numbers which pass both tests are printed-out and their number added by using a count (C).

```
>
  10 C=0
  20 FOR F=1 TO 1000
  30 FLAG=0:F$=STR$(F)
  40 FOR D=0 TO 8 STEP2
  50 D$=STR$(D)
  60 X=INSTR(F$,D$)
  70 IF X<>0 THEN FLAG=1:D=8
  80 NEXT D
  90 IF FLAG=1 THEN 150
 100 FOR D=3 TO 7 STEP 2
 110 IF F/D=INT(F/D) THEN FLAG=1:D=7
 120 NEXT D
 130 IF FLAG=1 THEN 150
 140 C=C+1:PRINT F;" ";
 150 NEXT F
 160 PRINT:PRINT"Numbers left
     on list:";C
```

Solution to 'Be square' puzzle of December 17-30

Answer: The last 'square' date was 4.7.1969 and the next will be 2.5.2004.

Solution: It is fairly well-known that all square numbers msut end in the digit 0, 1, 4, 5, 6 or 9. What is not so well-known is that there are 22 two-digit termini in which such numbers must end. These are listed in the DATA line at the end of the program. Thus only years ending in these values need be considered.

The program uses four FOR/NEXT loops to generate possible values for testing. These represent the century (C), the year (Y) (from the list of termini), the month (M) and the day (D). These values are combined in string form into a single string Z$. This represents the number to be tested to determine if it is a perfect square. This operation is performed at lines 90 and 100.

Because of slight inaccuracies in evaluating square roots on most computers a slightly devious technique has to be used. The square root is found by use of the SQR function and the integer of this value is taken and is multiplied by itself. The result is then compared to the original value being tested. If it matches, the result is printed-out. The reason for also testing the square of P+1 in line 100 is for values which are calculated as being slightly lower than their correct value. For example, the square root of 144 might appear as 11.999999999, so both 11 times 11 and 12 times 12 are tested against 144.

Note that the program makes no attempt to adjust the number of days allowable for any given month, but the results do not include any of these values.

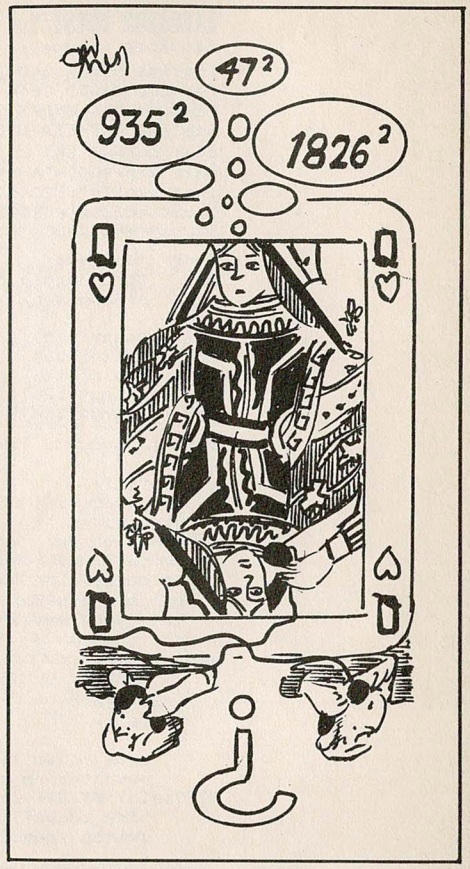
```
>
   10 DIM A$(22)
   20 RESTORE
   30 FOR F=1 TO 22:READ A$(F):NEXT
   35 FOR C=19 TO 20
   40 FOR Y=1 TO 22
   50 FOR M=1 TO 12:M$=STR$(M)
   60 FOR D=1 TO 31:D$=STR$(D)
   70 Y$=A$(Y)
   80 Z$=D$+M$+STR$(C)+Y$
   90 Z=VAL(Z$):R=SQR(Z)
  100 P=INT(R):IF P*P=Z OR (P+1)*(P+1)
=Z THEN PRINT STR$(D);":";STR$(M);":"
   ;RIGH
T$(Z$,4)
  110 NEXT:NEXT:NEXT:NEXT
 1000 DATA "00","01","04","09","16",
"21","24","25","29","36","41","44","49",
"56","61","64","69","76","81","84","89",
"96"
```

Solution to 'Deck of Cards' puzzle of December 31-January 6

Answer: The initial number was 156,156. This is a multiple of three. If the right-hand digit is transferred to the left-hand end, the numbers formed are divisible, respectively, by 5, 7, 11, 13 and 17.

Solution: To minimise running time the program uses a number of techniques to compute the six digits. The operations are run in reverse order, beginning with multiples of 17. This is because there are fewer multiples of 17 in any given range of numbers than there are multiples of three, thus reducing the number of tests to be performed. The range of numbers to be tested is determined at line 60, the STEP 17 ensuring that only multiples of 17 are generated.

The value of X (line 10) is the number of *thousands* in the starting number to be used in the loop at line 60. We know that the digit in the hundreds position must be a five, since this will be the digit which at the units position of the multiple of five - zeros are not allowed. The tens and units values are computed at line 50. For example, the first value of X (111) will



produce a number for J of 1115??, the final two digits being set to the lowest multiple of 17 which begins 1,115.

Once this has been done the digits are shifted in turn and a test for divisibility is made, each acceptable test passing the number to the next subroutine in turn. The final subroutine at lines 4000 to 4030 prints-out the result.

Note that we have already accounted for all multiples of five, so this step is not included and *two* digits are transferred - line 4000 - before testing for divisibility by three.

```
>
  10 FOR X=111 TO 999
  20 X$=STR$(X):Z=INSTR(X$,"0")
  30 IF Z<>0 THEN 110
  40 J=X*1000+500
  50 J=((INT(J/17)+1)*17)
  60 FOR Y=J TO J+100 STEP 17
  70 Y$=STR$(Y):Z=INSTR(Y$,"0")
  80 IF Z<>0 THEN 100
  90 GOSUB1000
 100 NEXT Y
 110 NEXT X
 120 END
1000 Y$=RIGHT$(Y$,5)+LEFT$(Y$,1)
1010 V=VAL(Y$)
1020 IF V/13=INT(V/13)THEN GOSUB 2000
1030 RETURN
2000 Y$=RIGHT$(Y$,5)+LEFT$(Y$,1)
2010 V=VAL(Y$)
2020 IF V/11=INT(V/11)THEN GOSUB 3000
2030 RETURN
3000 Y$=RIGHT$(Y$,5)+LEFT$(Y$,1)
3010 V=VAL(Y$)
3020 IF V/7=INT(V/7)THEN GOSUB 4000
3030 RETURN
4000 Y$=RIGHT$(Y$,4)+LEFT$(Y$,2)
4010 V=VAL(Y$)
4020 IF V/3=INT(V/3)THEN PRINT Y$
4030 RETURN
```

```
£include <osbind.h>
£include <stdio.h>
£include <ctype.h>
£define SYSEX 240
£define CASIO 0x44
£define END_SYSEX 247
£define BUFSIZE 1300
char pathsp[64],filename[64],file[16];
char inpath[]="A:\*.PTC\0";
char ext[]=".PTC\0";
short buffer[BUFSIZE];                          /* buffer of 1.3K          */
int sprstk[200];
short *buf_add;
int   tbrd,handle,dummy;                        /* useful global variables.*/
long  oldssp,ssp;

int   contrl[12];
int   intin[128];
int   ptsin[128];
int   intout[128];
int   ptsout[128];                              /* storage wasted thro GEM */
main()
{
   short i;
   gem_init();                                  /* must initialise GEM first  */
   hide_mouse();                                /* Hide mouse cursor..        */
   cls();                                       /* Routine to clear screen    */
   for(i=0;i<9;i++)pathsp[i]=inpath[i];         /* Initialise 'root directory */
   welcome();                                   /* Print welcome message      */
   buf_add=&buffer;                             /* set to address of buffer   */
   menu_handler();                              /* Then goto main menu loop   */
}
menu_handler()
{
   int result;
   while(1)
   {
      show_mouse();
      result=form_alert(1,"[2][Casio CZ101 Voice Libarian¦What do you want to do
?][Casio››ST¦ST››Casio¦ Quit ]");
      hide_mouse();
      switch (result)
      {
         case  1  :  from_cz();
                     break;
         case  2  :  to_cz();
                     break;
         case  3  :  quit();
      }
      cls();                                    /* clears screen on return to menu  */
   }                                            /* end while                        */
}                                               /* end menu_handler                 */
to_cz()
{
   int result;
   short numb;
   cls();
   show_mouse();
   result=form_alert(1,"[2][Load into which voice bank?][Internal¦Cartridge¦Area
]");
   hide_mouse();
   vs_curaddress(handle,12,24);                 /* position cursor          */
   switch (result)
   {
   case 1   :  puts("Loading into INTERNAL voice bank");
               numb=get_number();
               numb+=32;                        /* add 32 for internal numb*/
               break;
   case 2   :  puts("Loading into CARTRIDGE voice bank");
               numb=get_number();
               numb+=64;                       /* add 64 for cartridge numb*/
               break;
   case 3   :  puts("Loading into AREA voice bank");
               numb=96;                         /* sound area numb = 96     */
   }
   clr_midi();                                  /* clear midi of old data   */
   send(SYSEX);                                 /* send system exclusive    */
   send(CASIO);                                 /* and Casio ID...          */
   send(0x00);
   send(0x00);
   send(0x70);                                  /* use midi channel 1       */
   send(0x20);                                /* tell casio we'll send a voice */
   send(numb);                                  /* tells casio which voice  */
                                                /* ..... now get reply...   */
   if (!wait()) return (0);                     /* wait for casio           */
   if ((short)Bconin(3)!=0x44)error(1);         /* then get casio handshake*/
   if ((short)Bconin(3)!=0x00)error(1);
   if ((short)Bconin(3)!=0x00)error(1);
   if ((short)Bconin(3)!=0x70)error(1);         /* confirms midi channel 1  */
   if ((short)Bconin(3)!=0x30)error(1);         /* OK means casio's ready   */
   midi_output();                               /* call output function     */
}
midi_output()
{
   int count,i;
   FILE *fp,*fopen();
   int timer=10000;
   for (i=0;i<BUFSIZE;i++) buffer[i]=0;         /* clear buffer             */
   while (1)
```

```
    {
       cls();
       if (get_name()==-10) return(0);
       if (!(fp=fopen(filename,"br")))              /* can we open file?       */
       {
          error (7);                                /* if not then issue error */
          continue;                                 /*  ... and retry          */
       }
       if (!(count=fread(&buffer,1,10000,fp)))
       {
          error(8);                                 /* & if we can't read file */
          continue;                                 /*  issue error and retry  */
       }
       if (fclose(fp)==0) break;                    /* if file closes exit loop*/
       error(6);                                    /* else issue error & retry*/
    }                                               /* End while loop          */
    i=0;
    while (i<count-1)                               /* now send bytes to midi..*/
    {
       send(buffer[i++]);
       if (Bconstat(3)==0) continue;                /* Loop if midi inactive   */
       error (1);                                   /* else print error message*/
       return(0);                                   /* ..and abort to menu     */
    }
    send(END_SYSEX);
    while (1)                                       /* wait for handshake..    */
    {                                               /* sysex...                */
       if (Bconstat(3)==-1)                         /* If midi port active     */
          if (Bconin(3)==(short)END_SYSEX) break;       /* break if handshake*/
       if (Bconstat(2)==-1)                         /* If keyboard active      */
          if (get_key()==27) return(0);             /* Return to menu if ESC   */
       if (--timer) continue;                       /* check time out          */
       error(9);                                    /* if run out of time      */
       vs_curaddress(handle,21,27);                 /* position cursor         */
       puts("..or press ESC to abort.");            /* print error and prompt  */
       timer=10000;                                 /* reset timer...& loop    */
    }                                               /* end while loop          */
}
from_cz()
{
    int result;
    short numb;
    cls();
    show_mouse();
    result=form_alert(1,"[1][Save from which voice bank?][Internal|Cartridge|Pres
et]");
    hide_mouse();
    vs_curaddress(handle,12,24);                    /* position cursor         */
    switch (result)
    {
    case 1    :  puts("Saving from INTERNAL voice bank");
                 numb=get_number();
                 numb+=32;                          /* add 32 for internal numb*/
                 break;
    case 2    :  puts("Saving from CARTRIDGE voice bank");
                 numb=get_number();
                 numb+=64;                          /* add 64 for cartrdge numb*/
                 break;
    case 3    :  puts("Saving from PRESET voice bank");
                 numb=get_number();
    }
    clr_midi();                                     /* clear midi of old data  */
    oldssp=Super(&sprstk[180]);                     /* go into super mode      */
                                                    /* then alert Casio...     */
    send(SYSEX);
    send(CASIO);
    send(0x00);
    send(0x00);
    send(0x70);                                     /* use midi channel 1      */
    send(0x10);                                   /* tell casio we want a voice*/
    send(numb);                                     /* tells casio which voice */
                                                    /* ..... now get reply... */
    if (!wait()) return (0);
                                                    /* Read Midi port.....     */
    if ((short)Bconin(3)!=0x44)error(1);            /* should be casio ID      */
    if ((short)Bconin(3)!=0x00)error(1);
    if ((short)Bconin(3)!=0x00)error(1);
    if ((short)Bconin(3)!=0x70)error(1);            /* confirm midi channel 1  */
    if ((short)Bconin(3)!=0x30)error(1);            /* OK means casio's ready  */
                                                    /* so tell Casio to start..*/
                                                    /* ..transmitting voice    */
    send(0x70);
    send(0x31);
    asm                                          /* MSR is the Midi port Status Register*/
    {                                            /* routine will finish on reciept of F7*/
            move.w   SR,D2          ; save 68000 Status register
            ori      £1792,SR       ; IPL 7, disable interupts
            movea.l  buf_add(A4),A1 ; put address of buffer in A1
            movea.l  £16776196,A0   ; put address of MSR into A0
       loop: move.b  (A0),D1        ; put contents of MSR into D1
            btst.b   £0,D1          ; test bit 0
            beq      loop           ; if not set then loop
            move.b   2(A0),(A1)+    ; midi byte in next buffer location
            cmpi.b   £247,-1(A1)    ; compare with F7
            bne      loop           ; if not F7 loop
       end: move.w   D2,SR          ; restore 68000 interupts and Status
            suba.l   buf_add(A4),A1 ; calculate total bytes received
            move     A1,tbrd(A4)    ; and store result in tbrd
    }                                               /* end asm...              */
    ssp=Super(oldssp);                              /* switch to user mode     */
    save buf();                                     /* now save bytes to disk..*/
}
```

```
save_buf()
{
   FILE *fp,*fopen();
   cls();
   vs_curaddress(handle,12,24);                    /* position cursor          */
   while (1)
   {
      cls();
      if (get_name()==-10) return(0);
      if (fp=fopen(filename,"br"))                 /* can we open file?        */
      {
         error (3);                                /* if so it already exists */
         continue;                                 /* so issue error and retry*/
      }
      if (!(fp=fopen(filename,"bw")))              /* can we create file?      */
      {
         error(4);                                 /* if not disk error so..  */
         continue;                                 /* issue error and retry   */
      }
      if ((fwrite(buffer,tbrd,1,fp))!=1)           /* try to write data        */
      {
         error(5);
         continue;                                 /* if error retry           */
      }
      if (fclose(fp)==0) break;                    /* if file closes exit loop*/
      error(6);                                    /* else issue error & retry*/
   }                                                     /* End while loop     */
wait()
{
   int result;
   int timer=10000;
   while(1)
   {
      if (Bconstat(2)==-1)                         /* If keyboard active       */
      {
         result=get_key();                         /* Get next keypress        */
         if (result==27) return(0);                /* if ESC abort to menu     */
      }
      if (Bconstat(3)==-1)                         /* If midi port active      */
      {
         result=Bconin(3);                         /* Read Midi port           */
         if (result==(short)SYSEX)break;           /* exit loop if system ex.*/
      }
      if (--timer) continue;
      error(9);
      vs_curaddress(handle,21,27);                 /* position cursor          */
      puts(".. or press ESC to abort.");
      timer=10000;
   }                                                          /* end while.. */
   return(1);
}
clr_midi()
{
   while(1)
   {
      if (Bconstat(3)==0) return(0);               /* If midi inactive return */
      dummy=Bconin(3);                             /* Read Midi port           */
   }
}
send(byte)
short byte;
{
   Bconout(3,(short)byte);
}

get_number()
{
   short numb;
   vs_curaddress(handle,16,26);                    /* position cursor          */
   puts("Which voice number (1-16)?");
   while (1)
   {
      vs_curaddress(handle,16,54);                 /* position cursor          */
      scanf("%h",&numb);
      if (numb>0 && numb<17) return (--numb);
      vs_curaddress(handle,21,14);                 /* position cursor          */
      puts("Number out of range.... Re-enter between 1 and 16");
      vs_curaddress(handle,16,54);                 /* position cursor          */
      puts("                         ");           /* erase bad number         */
   }
}

get_name()
{
   int result,button;
   file[0]=0;                                             /* No default filename  */
   while (1)                        /* Loops until either CANCEL or name entered */
   {
      show_mouse();
      result=fsel_input(pathsp,file,&button);
      hide_mouse();
      cls();
      if (!button) return (-10);                          /* CANCEL selected.     */
      if (*file) break; else error(10);                   /* Name entered ???     */
   }

   makename();
}

makename()
{
```

```
   short i;
   for (i=0;i<64;i++) filename[i]='\0';      /* Initialise array 'filename'   */
   for (i=0;i<48;i++)                        /* Now fill 'filename' with data */
   {                                         /* from item selector.....       */
      if (pathsp[i]=='*') break;             /* Do until asterisk found..     */
      filename[i]=pathsp[i];                 /* Add i'th char to 'filename'   */
   }
   i++;                                      /* Increment i                   */
   strncpy(&filename,&file,8);               /* make up filename              */
   strncat(&filename,&ext,5);                /* ...to include extension       */
   strncat(&filename,&file,16);              /* Finally add actual file name..*/
                                             /* to 'filename'!!               */
}

welcome()
{
   int result;
   show_mouse();
   result=form_alert(1,"[1][Casio CZ101 Voice Librarian¦by Roger Howorth][Hello]
");
   hide_mouse();
}

gem_init()
{
   short i;
   int work_in[11],work_out[57];
   dummy=appl_init();                                    /* open the application    */
   handle=graf_handle(&dummy,&dummy,&dummy,&dummy);
   for (i=0;i<10;i++) work_in[i]=1;                      /* set all defaults to 1   */
   work_in[10]=2;                                        /* use raster co-ordinates */
   v_opnvwk(work_in,&handle,work_out);                   /* sets work area          */
}
cls()
{
   v_clrwk(handle);                                      /* This clears screen      */
   vs_curaddres(handle,1,1);                             /* this positions cursor   */
}

show_mouse()
{  v_show_c(handle,0);
}

hide_mouse()
{  v_hide_c(handle);
}

get_key()
{
   long filler;
   filler=Crawcin();                                     /* Get next keypress       */
   filler &=0xffff;                                      /* mask unwanted bits      */
   if (filler>90) filler-=32;                            /* convert to uppercase    */
   return ((int)filler);
}

error(flag)
short flag;
{
   show_mouse();
   switch (flag)
   {
      case 1   :  form_alert(1,"[3][Midi receive error¦Try again][ OK ]");
                  break;
      case 2   :  form_alert(1,"[3][Not enough memory!¦Re-boot with less accesso
ries][ OK ]");
                  break;
      case 3   :  form_alert(1,"[3][File already exists¦Please enter another nam
e.][ OK ]");
                  break;
      case 4   :  form_alert(1,"[3][Cannot create file¦Check disk etc then try a
gain.][ OK ]");
                  break;
      case 5   :  form_alert(1,"[3][Error while writing file¦Check disk and retr
y][ OK ]");
                  break;
      case 6   :  form_alert(1,"[3][Cannot close file¦Check disk and retry][ OK
]");
                  break;
      case 7   :  form_alert(1,"[3][File does not exist¦Check disk & retry][ OK
]");
                  break;
      case 8   :  form_alert(1,"[3][Cannot read file¦Check disk and retry][ OK ]
");
                  break;
      case 9   :  form_alert(1,"[3][No response from Casio][ OK ]");
                  break;
      case 10  :  form_alert(1,"[1][No file name entered.....][ RE-TRY ]")
;
                  break;
      default  :  form_alert(1,"[3][General error....][ OK ]");
   }
   hide_mouse();
}

quit()
{
   v_clsvwk(handle);
   exit(0);              /* This closes all files before returning to desktop */
}
```

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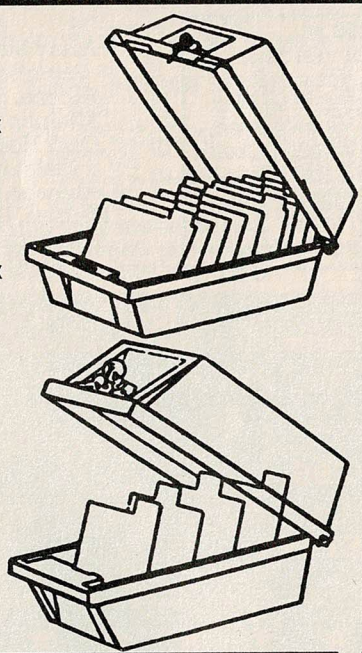

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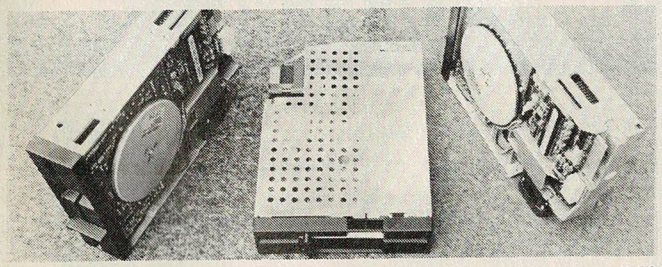

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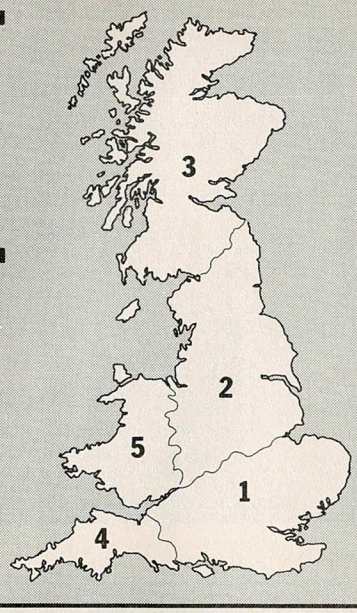

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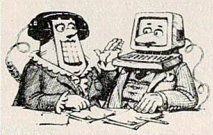

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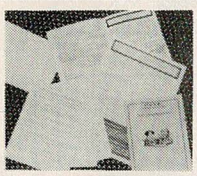

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COMMENT

Cures for amnesia?

Looking through this week's *Popular Computing Weekly*, what do I see? . . . an advert for several new games, a Top 30 chart, ads for new computers, peripherals and the such like.

So what do these "modern computers" offer that my trusty old computer doesn't . . . 4,000 colours, 3D Graphics, speech, 512K RAM, stereo sound, internal disc drive, 16/32 bit power, and so the list could go on.

When I bought my computer it cost £170.00 for the 48k RAM, 8 colours, sound, and to quote the ad ". . . the highly sophisticated serial attribute handling method as used by Viewdata and Teletext . . . thus (this particular micro) never offers less than a healthy 37k of usable memory . . ."

In this week's computer magazine, an ad for the new Commodore Amiga "appears". And to quote from this particular advert "New Amiga 500. Now other home computers are just toys . . ." £499.99 for a machine offering 512K, internal disk drive and so on.

I then look at the ad for my particular computer "Three cures for amnesia . . . (a picture of a bin) . . . a rubbish bin for where your old has been . . . (a pile of money) . . . yet more money for yet more bolt-ons . . . (a picture of my particular computer) . . . the new (name of computer) 48K." Adverts haven't changed that much.

To continue from this ad ". . . and while this may surprise you, it's totally in keeping with a company recognised on the computer industry for performance and innovation . . ." I think we must be talking of two different computers. This particular company that manufactured my particular computer has had its own series of financial problems. And like most companies that had problems, it went to a foreigner, a French company to be precise.

But this particular computer is doing well in France. A new machine has been launched, together with new designed disc drives, printers and such like. An interesting thought has just reached my brain. How many disc systems do you think are or were available for this particular micro, five. What about word processors, five, yes at least FIVE word processors are available for this micro.

So what has been the point of this article. The only micro computer that I own is one that is several years old, but this particular micro STILL WORKS, it does all the things I want it to do, but, and the most important point is that it is still my FIRST computer system.

So why have I kept to my first computer and expanded it instead of buying a new micro with ". . . a mind blowing array of features and capabilities . . ." One reason is money. If I wanted to keep up with the latest micro computer I would need to buy a new one every two . . . three . . . four months. Think of the cost. But there are ways around this problem. I now have the pleasure in presenting my 5 point plan to keep up with the latest computers:

1) Win a popular newspaper bingo once a year.

2) Win on ERNIE.

3) Have a very friendly bank or building society manager.

4) Starve to death, and walk around naked and use the money that has been saved to buy the new computer.

5) Rob a bank or building society.

One day I might buy a new computer which could do everything that my computer does and doesn't. But what could I choose, a Commodore Amiga V12, a Sinclair Spectrum +15, IBM PC System 5, BBC Model Z? What sized discs would this new system use 2", 1" or 1.5"? And how much would this system cost? £50.00 or £500.00?

(By the way, the computer that I AM A PROUD USER OF IS . . . wait for it . . . isn't this great . . . um . . . an ORIC ATMOS 48K!!!!). □

PUZZLE

Painter's canvas

The artist Tommy Tintoretto is in the middle of his cubist phase. For his latest work he has already planned the overall effect of the painting. He has ruled his canvas into squares, 30 across and 20 down, and is about to start applying the paint according to the following rules:

1 Paint in black the top left-hand square and then every 13th square counting across from left to right, continuing on the line below in the same manner until reaching the bottom. This is the stage he has reached in the illustration.
2 Paint in red all squares which have an edge in common with a black square.
3 Paint in yellow any square with an edge in common with a red square but only if the square to be painted is uncoloured.
4 Paint all remaining squares green i.e., those still unpainted.

This will produce the finished work of art, which is as yet untitled. We are not asking you to suggest a title, but we would like to know how many green squares there are in the painting.

HACKERS

NEW LOW PRICE ST!

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FREE STARTER KIT - Only From Silica

When you purchase any Atari ST keyboard, you will not only receive the best value for money computer on the market, but you will also receive the following from Atari Corporation as part of the package:

** BASIC Language Disk * BASIC Manual * ST Owners Manual * TOS/GEM on ROM*

If you buy your ST from Silica Shop, you will also receive:

** NEOchrome Sampler - colour graphics program * 1st Word - Word Processor*

In addition, we at Silica would like to see you get off to a flying start with your new computer, so we have put together a special **ST STARTER KIT** worth over £100, which we are giving away **FREE OF CHARGE** with every ST computer purchased at our normal retail prices. This kit is available **ONLY FROM SILICA** and is aimed at providing users with a valuable introduction to the world of computing. We are continually upgrading the ST Starter Kit, which contains public domain and other licensed software, as well as books, magazines and accessories all relevant to ST computing. Return the coupon below for full details.

DEDICATED SERVICING - Only From Silica

At Silica Shop, we have a dedicated service department of seven full time Atari trained technical staff. This team is totally dedicated to servicing Atari computer products. Their accumulated knowledge, skill and experience makes them second to none in their field. You can be sure that any work carried out by them is of the highest standard. A standard of servicing which we believe you will find **ONLY FROM SILICA**. In addition to providing full servicing facilities for Atari ST computers (both in and out of warranty), our team is also able to offer memory and modulator upgrades to ST computers.

1Mb RAM UPGRADE: Our upgrade on the standard Atari 520ST-M or 520ST-FM keyboard will increase the memory from 512K to a massive 1024K. It has a full 1 year warranty and is available from Silica at an additional retail price of only £86.96 (+VAT = £100).

TV MODULATOR UPGRADE: Silica can upgrade the 1040ST-F to include a TV modulator so that you can then use it with your TV set. This is an internal upgrade and does not involve any untidy external boxes. A cable to connect your ST to any domestic TV is included in the price of the upgrade which is only £49 (inc VAT). The upgrade is also available for early 520ST computers at the same price.

THE FULL STOCK RANGE - Only From Silica

We aim to keep stocks of all Atari related products and our warehouse carries a stock of over £½ million. We import many software titles direct from the USA and you will find that we have new releases in advance of many of our competitors. Unlike dealers who may only stock selected titles, we have the full range. In addition, we carry a complete line of all books which have been written about the Atari ST. A range as wide as ours is something you will find is available **ONLY FROM SILICA.**

AFTER SALES SUPPORT - Only From Silica

Rest assured that when you buy your ST from Silica Shop, you will be fully supported. Our free mailings give news of releases and developments. This will help to keep you up to date with new software releases as well as what's happening in the Atari market. And in addition, our sales staff are at the end of a telephone line to service all of your Atari requirements. If you purchase an ST from Silica and would like any technical advice, we have a full time technical support team to help you get the best from your computer. Because we have both the staff and the systems specifically dedicated to providing after sales service on Atari ST computers, we are confident that our users enjoy an exceptionally high level of support. This can be received **ONLY FROM SILICA**.

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At Silica Shop, we recognise that serious users require an in-depth information service, which is why we mail free newsletters and price lists to our ST owners. These are up to 48 pages long and are crammed with technical details as well as special offers and product descriptions. If you have already purchased an ST and would like to have your name added to our mailing list, please complete the coupon & return it to us. This information service is available **ONLY FROM SILICA**.

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Most orders are processed through our computer within 24 hours of receiving them. Most hardware orders are sent by the overnight GROUP 4 courier service FREE OF CHARGE to customers within the UK. This method helps to ensure minimum delay and maximum protection.

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We hope that the combination of our low prices, FREE UK delivery service, FREE Starter Kit and FREE after sales support, will be enough to make you buy your Atari equipment from Silica Shop. If however, there is something you wish to purchase, and you find one of our competitors offering it at a lower price, then please contact our sales department, providing us with our competitor's name, address and telephone number. If our competitor has the goods in stock, we will normally match the offer (on a 'same product - same price' basis) and still provide you with our normal free delivery. We realise that we are not the only company who will match a competitor's price. However, if you come to us for a price match, you will also be entitled to our after sales service, including free newsletters and technical support. This makes our price match promise rather special, something you will receive **ONLY FROM SILICA**. We don't want you to go anywhere else for your Atari products. So shop at Silica, the UK's No1 Atari Specialist.

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MEGA ST's NOW IN STOCK

For the user who requires even more RAM than the 520 or 1040 ST's offer, the new MEGA ST computers are now available. There are two MEGA ST's, one with 2Mb of RAM and the other with a massive 4Mb. Both new computers are fully compatible with existing ST's and run currently available ST software. The MEGA ST's are styled as an expandable Central Processing Unit with open architecture and a detachable keyboard. They are supplied with GEM, a free mouse controller and all extras as with the 520 or 1040. Prices are as follows:

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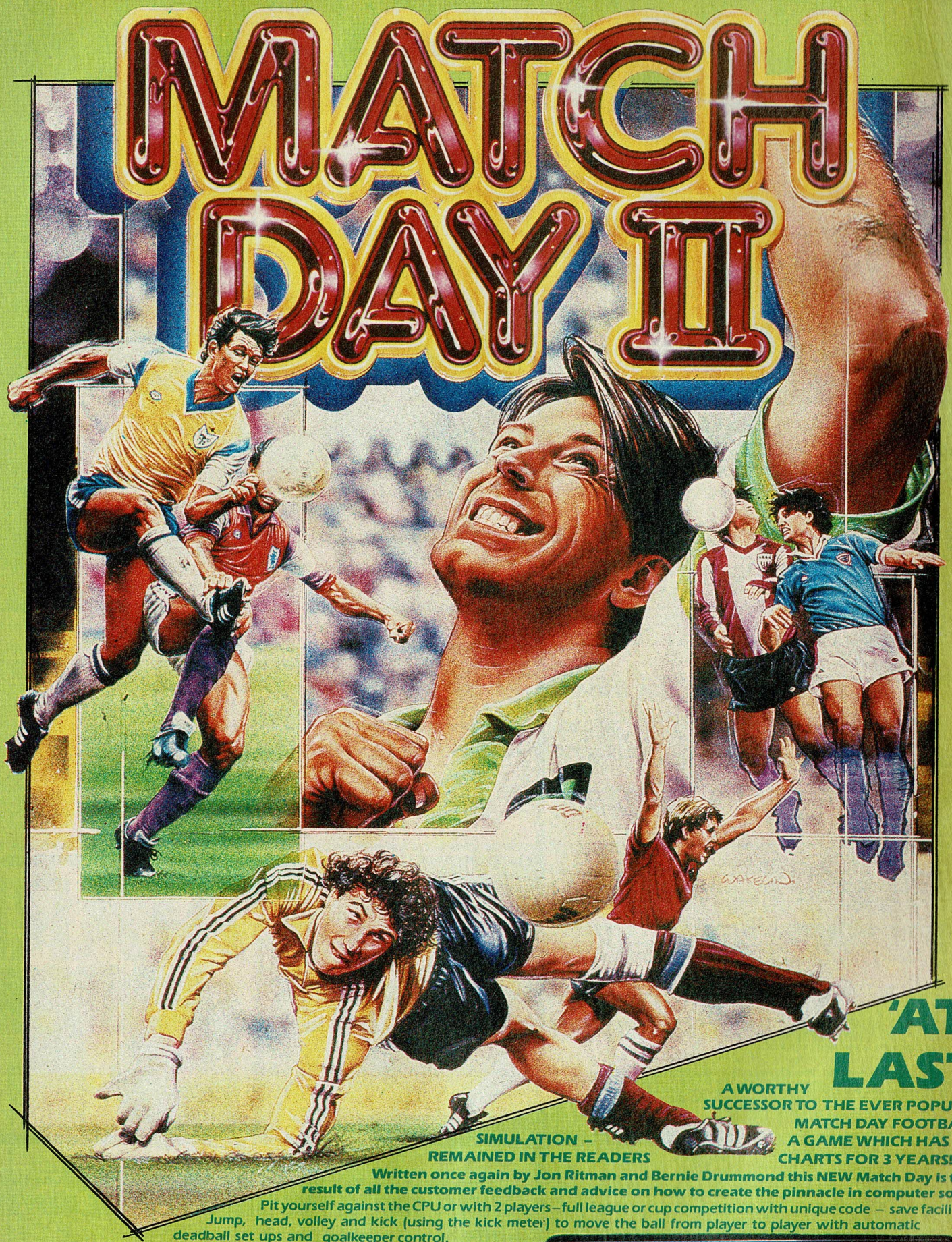

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