

POPULAR Computing WEEKLY

35p 3-9 November 1983 Vol 2 No 44

This Week

Educational programs

Keith and Steven Brain look at learning programs for the Dragon. Page 16.

Spectrum

D H Cox demonstrates two programs for trigonometric tables and quadratic equations. See page 21.

Sorting

Michael Batty explains sorting procedures in the second of a three-part series. Page 26.

New Releases

All the latest software games including *Ant Attack* by Quicksilver, *Mission Impossible* from Silver Soft and *Chequered Flag* from Psion. See page 57.



News Desk

Texas pulls the plug on micros

TEXAS Instruments is to withdraw from the home computer market.

Production of the TI99/4A computer will cease in November — development of new consumer electronics products has already been stopped, and existing stocks of the 99/4A will be cleared by further reducing its £99 tag. As many as 1/2m units could be sold off before Christmas for as little as £50 each.

News of the US company's decision coincided with release of TI's third-quarter results — including a further loss of \$110.8m. Sales were down 4 percent to just under \$1.01 bn.

TI chairman Mark Shepherd and president Fred Bucy, in a joint statement, blamed "disappointing" third quarter sales of 99/4A home computer consoles and software.

"With this situation continuing into October, it became apparent that fourth-quarter demand would not be sufficient to prevent large

additional losses.

"In order to limit further financial drain on TI we have made the decision to withdraw from the consumer and home computer business."

In this country the 99/4A computer has never been a top-seller. Its troubles began from the moment it was introduced in a form incompatible with the British tv system. It was supplied together with an NTSC standard monitor,

Continued on page 5

Jupiter hits the dust

JUPITER Cantab, maker of the Ace microcomputer, has gone into receivership.

The decision to fold the company was apparently taken by Jupiter's directors. Stephen Rout of solicitors Chater and Myhill, acting for Jupiter, said: "We have been notified by the directors of the company to call a creditors meeting and to prepare a statement of affairs with a view to winding the company up."

Jupiter's directors have recommended that Chater's

Continued on page 5



Classified

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BBC B. Sell Landfall City, Defence, 747, Battlezone, Footer, £3 each. Write to James Skinner, Winterclyde, Rogers Lane, Stoke Poges, Bucks.

Continued on page 51

Classified



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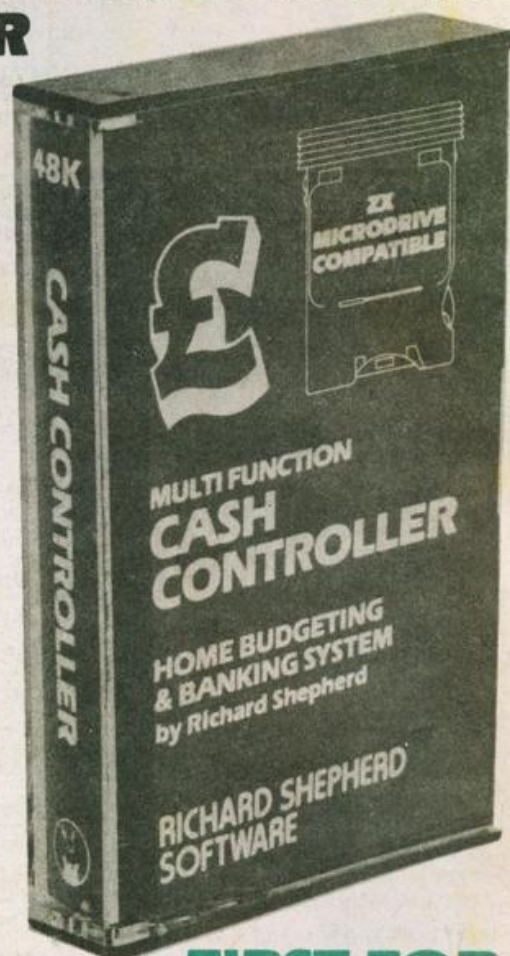
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ABC

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All submissions should be typed and a double space should be left between each line. Please leave wide margins.

Programs should, whenever possible, be computer printed.

We cannot guarantee to return every submitted article or program, so please keep a copy. If you want to have your own program returned you must include a stamped, addressed envelope.

Accuracy

Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish, although we will always try our best to make sure programs work.

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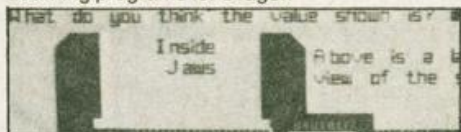
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Editorial

The demise of Jupiter Cantab, though not entirely unexpected, has still come as a blow to the micro industry.

Steve Vickers and Richard Altwasser, the two co-founders of Jupiter Cantab, played a large part in the development of the Spectrum. Steve wrote a large part of the Spectrum's Rom and manual while Richard designed much of the hardware.

However, rather than remain inside Sinclair's comfortable cocoon, they decided to try and emulate Sir Clive by setting up on their own.

Their first product, the Jupiter Ace, received a mixed reception. It had the advantage of being the first low-cost micro dedicated to running Forth, but it only had 3K Ram and a black and white display.

In a market that is being increasingly dominated by a few large manufacturers, there is far less scope for small companies than there was just two or three years ago. Even the larger companies such as Texas, Mattel and Atari have been suffering from the effects of the recent price-cutting war.

Nevertheless, while the Jupiter Ace may not have captured the public's imagination in quite the same way as its ZX brethren, it was a brave attempt. Both Vickers and Altwasser deserve our approbation for seeing an opportunity and trying to make it work.

There is an element of risk in any entrepreneurial operation — but it is better to try and fail than never to try at all and spend the rest of your life wondering 'what if?'

The micro industry will be poorer without Vickers and Altwasser. Hopefully, they will not be away too long.

Next Thursday

Jump over the gaps in the wall while avoiding the flying dragonflies, but don't fall off the wall or you will lose points. Walk on the Wall — next week's star game for Commodore 64 by S Semlee.

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Available for Commodore 64 £7.50 and VIC-20 £6.



MATRIX

Jeff Minter has taken Gridrunner - the game that topped bestseller charts in USA and UK - and created an awesome sequel. Graphically superb, it features multiple screens, new aliens and attack waves, mystery bonuses, renegade humanoids, deflexor fields, diagonal tracking, countdown/panic phase and much, much more.

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8K expansion required. Available for Commodore 64 £7.50 and VIC-20 £6.

HOVER BOVVER

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Gordon Bennet has borrowed his neighbour's Air-Mo lawnmower. Mow your way through as many of the 16 lawns as you can before the pursuing neighbour retrieves his mower. Set your dog onto the neighbour to help you out of tight spots and don't annoy the gardener. Try not to plough through the neat flower beds or overheat your mower!

£7.50



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Planet earth needs you! Hostile aliens have used genetic engineering to mutate camels from normally harmless beasts into 90 foot high, neutronium shielded, laser-spitting death camels! Can you fly your tiny, manoeuvrable fighter over the mountainous landscape to weaken and destroy the camels before they invade the humans stronghold? You must withstand withering laser fire and alien UFOs. Game action stretches over 10 screen lengths and features superb scrolling, scanner 1/2 player actions and unbelievable animation! Play this game and you'll never be able to visit a zoo again without getting an itchy trigger finger! Awesome m/c action!

Available for Commodore 64 £7.50.



ABDUCTOR

A classic new space game! ZAP the swirling alien hordes before they ram you - and abduct your humanoids! Survive the assault for long enough and you'll get an extra stage on your spaceship with double firepower! Awesome unexpanded VIC Action.

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GRIDRUNNER

Finally true arcade quality on the unexpanded VIC! Shoot down the segmented DROIDS invading the grid. Beware of the pods and zappers! The awesome speed, sound, and graphics gives you the best

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Commodore 64 £5.00 Atari 400/800 £7.50



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Texas

Continued from page 1
priced at over £1,000.

In the US however, the machine was extremely successful and a recent survey gave TI a 23 percent share of the under-\$1,000 computer market.

However, the 99/4A was an expensive computer to manufacture, never being geared to low-cost mass production. Vicious price cutting by its main US rival Commodore with the Vic20 and Commodore 64 machines, and the low-cost entry of the TS1000 in the US and the Sinclair ZX81 and Spectrum in the UK forced the price of the 99/4A down to under £100. At this price, it was suggested by some analysts, Texas was actually losing money on each machine sold. The company was far too slow to replace the 99/4A, and was forced to shelve at least two new products — the 99/2 and 99/8. Both became outdated before they were launched.

Now Texas intends to concentrate its activities on its semiconductor division, on the business market with the TI Professional Computer, and on the calculator market.

Jupiter

Continued from page 1

senior partner, John Cross, be appointed liquidator.

Sales of the Jupiter Ace had never lived up to the expectations of the company's joint founders, Steve Vickers and Richard Altwasser. One source suggested that the company's failure had in part resulted from management weaknesses.

The Ace, launched in August 1982, was the first low-cost computer to use the Forth



Steven Vickers

language, rather than the more widely accepted Basic. However, the Ace is both silent and black-and-white. As a result it was quickly overshadowed by the Spectrum.

As interest in Forth grew,

Sinclair plans low-cost system

SINCLAIR plans a low-cost development system to encourage software houses to write material for its new 'professional' machine.

"It is our intention that there should be, for our next computer, a relatively low-cost software development system available — priced around £1,000," said Sinclair's managing director Nigel Searle.

"Keeping the serious but small software house working on Sinclair products is very important to us. Something like a Vax system is clearly beyond the realms of some houses and developing software on the machine itself is no fun. So, we have put out a contract to develop such a system for a reasonable sum of

money."

The announcement is bound to increase speculation that the new professional computer — code-named the ZX83 — will not be based around the Z80-chip, possibly a 16-bit device. Nigel Searle: "We would use a processor other than the Z80 when we can get a good price — a 16-bit device might cost as much as £10.

"Certainly we have looked at them all. We spent a lot of time looking at the 16032 which Acorn has gone for, but it is perhaps still a bit early. There is a danger of choosing a processor which does not become a standard and is not supported by the industry."

At the same time Nigel Searle reaffirmed Sinclair's

commitment to the Spectrum machine, emphasising that the ZX83 — expected to be launched in early 1984 — would not be a replacement for it.

"We have considered the options available to us, but at the present there are no plans for any new low-cost machine.

"Obviously we would consider it much more keenly if Spectrum sales showed signs of dropping off, or if we felt that a competitor was seriously on the verge of damaging our sales. But, at the moment, I don't see anything on the horizon that might do that.

"Even so, we could not replace the Spectrum except with something completely software compatible."

Atari price problems

ATARI'S plan, to convert its own games to run on other microcomputers, may be hit by its own pricing structure.

A new software division, Atarisoft, is developing material for the Vic20 Commodore 64 and TI99/4A on Rom cartridge, which will be priced at £29.95. Titles for the Spectrum, Dragon and BBC machines will go on cassette, priced at £14.99.

Seven titles are planned — *Pacman*, *Centipede*, *Defender*, *Dig Dug*, *Donkey Kong*, *Robotron* and *StarGate*.

The Vic20 and 64 cartridge prices would appear to com-

pare unfavourably with Commodore's own cartridges at £9.95 — a difference of £20. Similarly, the Spectrum cassettes seem overpriced when compared with a more usual price of around £6.

Defending the pricing, Atari UK's marketing manager Eric Salamon said: "These are the best-selling games worldwide and at the end of the day you are paying for artistic input."

The first title will be *Pacman* for the Spectrum, available in November this year. Other titles will follow with the full range across the six machines due to be complete by April 1984.

The Vic20, Commodore 64 and TI conversions are being carried out in the US, while the cassette material for the Dragon, Spectrum and BBC computers is being developed by sub-contractors working for Atari UK.

Spectrum versions are being produced by a new company formed for the purpose, Software Converters.

GSI expands to Frimley



Sinclair's Camberley distributor, GSI, has moved to new enlarged premises in Frimley.

The expansion has been necessitated by the volume of goods being handled — GSI distribute to the high-street chains as well as operating Sinclair's mail-order service. Ten percent of Spectrum's are now sold by mail-order.

When GSI first started processing postal orders for the

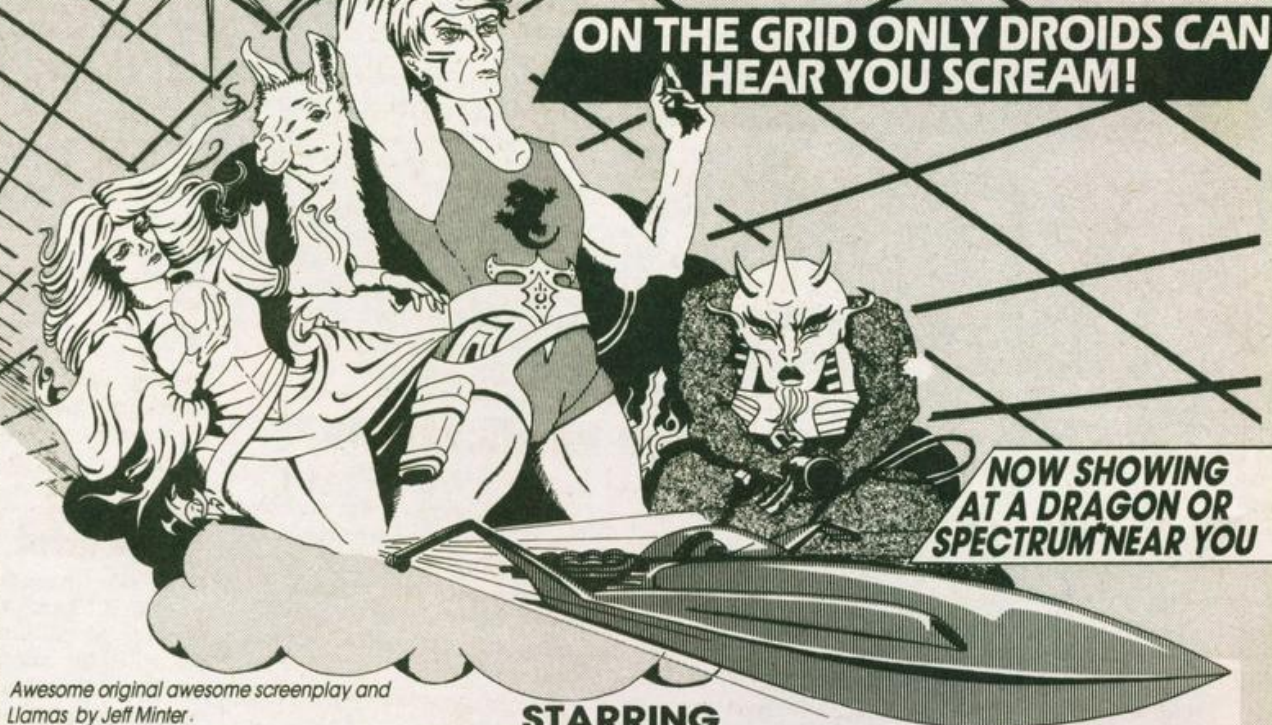
ZX80 computer in 1980, it dealt with around 500 orders a week. At present GSI has over 20,000 Spectrums a week passing through its system.

GSI is now gearing up to deal with orders for the Sinclair flat-screen tv and, next year, the new Sinclair 'professional' computer. As with Sinclair's other products, the new computer is expected to be offered first by mail-order.

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* Spectrum versions
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COMING SOON from the same awesome team:

LASER ZONE

quality software for the Dragon 32, Oric-1 and BBC Model B microcomputers.

600XL goes on sale this week

THE new Atari 600XL computer goes on sale for the first time this week.

Its introduction marks the first stage of the company's proposed recovery plan. On it, and its more advanced relative, the 800 XL, Atari is pinning its hopes of recouping some of the huge losses incurred by the company in the last nine months.

The 600XL will be priced at £159 and replace the existing 400 machine. The 800XL —

the 800 replacement — which it is still hoped will be available in quantity by late November, will sell for £249. The 600XL will be upgradable to the 800XL for the price difference of £90. The two new machines are completely software compatible with the existing 400 and 800 computers.

"Both machines will have all the features we have had with the 400 and 800, but at a price we can make money at it," commented Atari UK's man-



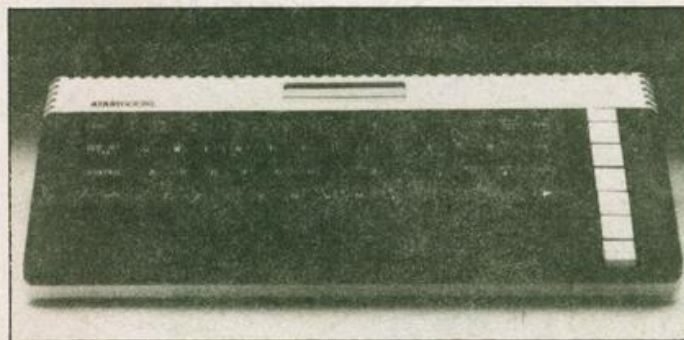
Graham Clark.

aging director, Graham Clark.

"Everyone, over here and in the US, is stumbling through a period when margins are declining, and some will go down.

"But Atari is here to stay and we are beginning to recover our position.

"In most of the major markets I think we will see good sales this Christmas. Obviously it takes time to build back up a market share like Commodore or Sinclair, but I think by Christmas 1984 we will have a very substantial piece of the UK market."



Former Ed joins Acorn

FORMER *Daily Express* Editor Christopher Ward has joined Acorn. He was appointed a non-executive director in June this year.

His responsibilities include looking for marketing and communication opportunities.

"A lot of people have expressed surprise at an ex-Fleet Street Editor going into the field of micros," he says, "but it is actually quite natural. Micros and newspapers are both in the business of transmitting information and are moving closer together all the time."

AWA take-over

AWA Software has been taken over by MC Lothlorien.

The three AWA programs, *Orion* — an oric assembler/disassembler — and *Beetlemania* and *Bedlam* — action games for the Spectrum — will now be marketed by Lothlorien.

Also, Steve Hughes, AWA's programmer, will join Lothlorien on an exclusive contract to produce further arcade-style titles.

1000 Metalab applications

SINCLAIR Research is still sifting through over 1,000 applications for the few vacancies at its new £2m research and development centre at Milton Hall in Cambridge — Metalab.

When the facility was first announced in June this year, Richard Cutting, formerly of Cambridge Consultants, was appointed to head it up. He announced that Sinclair would be looking for a small number of top-flight researchers to work at Metalab, investigating a wide range of topics from battery technology to robotics.

About 12 people are ex-

pected to be chosen, although the final number will depend on the strength of the applications. A spokesman for Sinclair Research said, "Nearly all of the 1,000 applications have been of an extremely high quality."



Richard Cutting.

Chess prize money

ACORN Computers is to provide over £40,000 in prize money for the World Chess Championships, due to be held in Britain for the first time next month.

The company, the only one to sponsor the event, will make an additional donation of over £20,000 to the competition organisers, the World Chess Federation.

A suitable arena for the contest — to be known now as the Acorn World Chess Championships — has not yet been found.

Commodore profits go up

COMMODORE International has again reported increased profits.

Sales for the quarter to October 1 were up to \$209m, more than doubling the \$103m earned in the previous three months.

The figures are in sharp contrast to those announced in recent months by many other big US computer companies — many of whom have reported heavy losses.

Interface for Model B

THE Pro-link is a programmable joystick interface for the BBC model B.

Manufactured by Aztec Software, the Pro-link enables any Atari compatible joystick to be linked to the BBC via the user port. Nine different functions can be programmed into the joystick, such as fire, up, down, right and left.

The Pro-link package, which consists of an adaptor and a software cassette, costs £9.99 including VAT.

Aztec is also about to release Centronics printer interfaces for both the BBC and the Commodore 64. A combined printer/joystick interface for the Acorn Electron will also be available by the end of November.

Aztec Software, which is based at 18 Gregory Springs Lane, Mirfield, West Yorkshire WF14 8LE, will be exhibiting their wares at the Northern Computer Fair, Manchester, on November 24-26.

New MD for Mattel

THE new managing director of Mattel Electronics UK, after the departure of Mike Lunch earlier this month, is to be Ian Wilson, presently the acting managing director.

The announcement comes amid increasing speculation that the struggling US parent may try to sell off a part of its toy division's stock to raise quickly needed funds. Unlike the stricken electronics division, the toy company is enjoying a record year.

It is also reported that, at one point, Mattel seriously considered closing down its electronics and computer division entirely before the end of this year. This option now appears to have been ruled out because it could damage any sell-off of toy division stock.

Schools fair

THE Educational Publisher's Council is organising a Schools Computer Fair, aimed at teachers.

The event is being held at the Regent Crest Hotel, Carburton Street, London W1. Doors open at 9.30 am on both days, closing at 8 pm and 7 pm respectively. Entry is free.

MR CHIP SOFTWARE

SPECTRUM GAMES

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Five games of darts for 1-5 players, 501, Cricket, Killer, Round the board, Noughts and Crosses, four levels of play per game, take on the computer or friends at these games of skill and judgement **£5.50**

WHEELER DEALER

As for the Commodore 64, but now available for the 48K Spectrum, Texas T.I.99/4A and Dragon **£5.50**

VIC 20

GAMES AND UTILITIES

JACKPOT

This is it, the ultimate Fruit Machine for the VIC with nudge, hold and respin 100% machine code. "Overall Jackpot is a beautifully written simulation giving superb graphics, animation and use of colour. In fact, this program makes Commodore's Fruit Machine cartridge look unbelievably cheap and nasty." Home Computing Weekly No. 20 19/7/83 **£5.50**

KWAZY KWAKS

Accuracy and speed are required for this Shooting Gallery, superb use of colour and graphics in this new and challenging game from the author of **Jackpot**. 100% machine code, joystick or keyboard control .. **£5.50**

PACMANIA

Choose your own game from the following options — difficulty 1-2, speed 1-3, size of maze 1-3, visible or invisible maze, still or moving power pills, define your own key controls, any combination, if this is your type of game, then this is the one for you, for the 3K expand. VIC only **£5.50**

SNAKE BYTE

Guide your ever hungry snake round the screen, eating the flies and wasps, to stay alive you must avoid the deadly mushrooms, quick reactions are required for this biting game, keyboard control, for the unexpanded VIC **£5.50**

BUGSY (Joystick Only)

This is a Minefield with a difference as you step on the stones whilst collecting purple boxes which give you both time and points, they disappear from beneath your feet. DO NOT DESPAIR! "BUGSY" will randomly replace the stones but avoid bumping into him or its sudden death! An original compulsive and challenging game **£5.50**

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SUPER BANK MANAGER — A full feature version any memory size, but needs 3K expansion **£7.50**

COMMODORE 64

GAMES AND UTILITIES

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WHEELER DEALER

A game for two to twenty players, become a tycoon of the motor trade, you must obtain gearboxes, tyres and engines to produce cars for sale. Form syndicates, buy and exchange parts, buy dealerships, but be careful, you may become bankrupt and have to liquidate, find out what you are made of, have you got what it takes to become a WHEELER DEALER **£5.50**

LUNAR RESCUE

Our new version, avoid the asteroid belt, to rescue the stranded scientists, then fight your way back to the mother ship, fast reactions are required to safely land and dock your lunar module **£5.50**

PONTOON — ROULETTE — ACE'S HIGH — More powerful versions, that make three great games of chance for the 64 **£5.50**

CHIPMON

Contains a 1 for 2 pass assembler/disassembler and monitor, a programming aid for the development of machine code programs and routines on the CBM 64 **£12.50**

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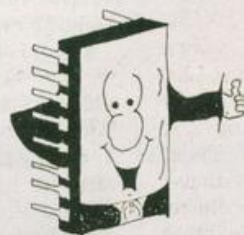
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Which joystick?

I have recently acquired a 48K Spectrum and I would now like to add a joystick for added enjoyment of the many games available. However, I am somewhat confused as there appear to be many different types of joystick on the market. I wonder whether you or any of your readers might advise me on the best choices for use with the Spectrum. Perhaps anyone answering this plea for help would also advise me of the pros and cons in respect of their recommendation.

Stephen Paris
71 Farnham Road
Branksome
Poole
Dorset
BH12 1PW

Flight simulator

I have recently purchased a Vic20 home computer and as I am very keen on aircraft I have been trying to find a flight simulation for it. However, so far I have been unsuccessful and I would appreciate your help. Please could you tell me if there is currently one on the market, and if not, whether there is one planned for the future.

Kevin Smith
9 Castleton Court
Marlow
Bucks
SL7 3HW

Surprisingly enough, I am not aware of any flight simulation programs for the Vic20, though they seem to abound for other machines. If any of our readers know of such a program, hopefully they will write in and tell us.

Dragon disc drive

I have just read this week's issue of your magazine (20-26 October) and I was interested in the letter from J A Niblock of Nuneaton. There are one or two points that I would like to raise in connection with this, to save other readers with Dragon disc

drives getting confused.

I agree with the first point concerning the use of separators, but the second point raised is rather misleading.

In the manual (preliminary version) it states that the end of a file can be detected by Eof ("File"), which will have the value of 0 if the read pointer is at the end of the file or 1 otherwise. This is incorrect, the values should be reversed, ie, Eof ("File") = 1 if at the end or 0 otherwise.

There is a further problem here however. If you follow convention, and check for Eof before a Read command, you will get a value of 0 returned. This is because the system variable Eof is reset to 0 by the next Basic instruction. This means that Eof will only have the correct value of 1 at the end of the file, if the Eof function is used after the Read command. The way this is used would be:

```
IF EOF ("FILE") = 1 THEN do end
routine ELSE action
```

Another point worth noting is that it is not necessary to use the file specifiers for Eof, ie, Dat, Bas, Bak, Bin.

With regard to point 5, J Niblock says that only 5 read and 5 write files may be open. This is 10 and not 5. When a file is written to for the first time (ie, it is created) the file pointer will default to the beginning for Fread and Fload and to the end for Fwrite. Therefore, you may have 10 files open, the controller does not discriminate between the two. I regularly use 9 data files simultaneously without trouble.

The patterning on the screen could be caused by a number of things. There is a certain amount of interference caused by any external (to the cpu) event, as can be seen when using Sound or Cload and Csave. This would seem to be a fault of the modulator. I have converted a colour tv and fitted a video input to it, and have no trouble. This problem is also quite apparent when using Telewriter and printing.

The power supply, although running warm, should be quite adequate for the controller. My machine gets left on with Tandy's Edtasm+Assembler cartridge in for days at a time and I never unplug the power supply, so the transformer is always warm. It is much more

likely to get hot, due to the fact that the cpu is doing a lot more work by loading and dumping data to disc.

When I bought my drive, the controller was faulty but this was quickly changed by my supplier, and the system is very robust and forgiving. I would suggest to J Niblock that he get his system checked out by his dealer.

Martin Vernon
8 Trinity Square
Llandudno
Gwynedd

Issue 3 problems

The letter from Sinclair Research in PCW, 13 October, on the basis of practical evidence, is untrue, and your footnote to the letter from J S Mellor is too complacent; there is a real problem with the parts on the Issue 3 computers!

I recently found it necessary to purchase a new Spectrum when my Issue 2 Spectrum went on the blink.

The new computer was an Issue 3 model. Contrary to the claim made in the Sinclair letter that 'D6 is set to zero when there is no signal coming from the tape recorder', I found that this bit, unlike Issue 2 computers, is highly unstable. The bit went from zero to one, in an irregular fashion over a period of ten minutes, when the computer was started from cold.

This was tested several times (without any tape connections made to the computer) with the same result.

In the hope that this instability was a one off, I have exchanged the computer twice and have found exactly the same problem.

In one of my more used programs I use port 254 as a computer port — after all Issue 3 is a computer for input of information, and as this is done through the ear socket, I use D6.

Issue 3 has a hardware problem, and Sinclair should face up to it. Good hardware practice demands that inputs and outputs from chip systems are firmly referenced to either of the supply rails — to demand, as Sinclair does, that the software should be tailored to accommodate their problem is

to make the tail wag the dog.

M Wales
74 Australia Grove
West Simonside
South Shields
Tyne & Wear

Manic Miner

Owners of a 48K ZX Spectrum who have purchased Manic Miner may be interested in the following. Load Miner in the normal way. When it loads press Enter then type in the number 603 1769.

If you typed it correctly, a boot should appear bottom left of the screen. You now have access to the 20 caverns.

Room	Code
1	6
2	61
3	62
4	621
5	63
6	136
7	632
8	6321
9	64
10	641
11	642
12	6421
13	643
14	6431
15	6432
16	12346
17	65
18	651
19	652
20	1256

Supposing you wanted to go to the final cavern. Simply press keys 6 and 5 and 2 and 1 all at the same time, and then release them quickly.

John Conduit
12 Beechnut Close
Wigston
Leicester

Manic Miner again

Here is a Poke which should come as a relief to any remaining sane people with a copy of Bug-Byte's superb Manic Miner.

Yes, Willy is now unstoppable! The magic instruction is Poke 35136,0 which should be inserted as line 25 in the short Basic program which loads prior to the title. For the technically minded, this replaces the Dec (H) instruction which subtracts one from the number of lives remaining, replacing it with a Nop instruction.

Ian Beynon
33 The Chase
Romford
RM1 4BE

Diamond Digger

A new game for 48K Spectrum by Jim Provan

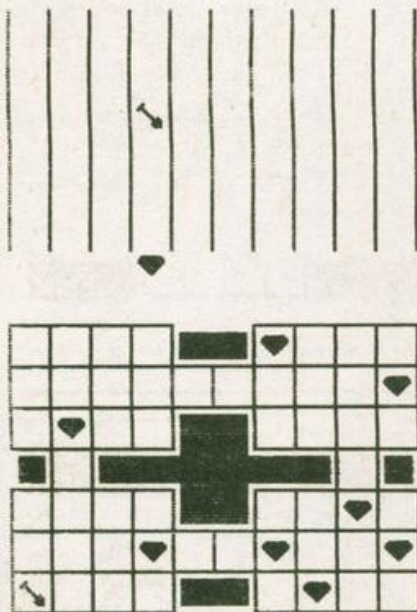
In this game, the object is to move your spade around the different grids, digging up diamonds. Occasionally, an alien will drop down one of the columns. If you are hit, you lose one of your three lives.

You are represented by the spade which

starts in the bottom corner of the grid. After each grid has been mined, you go on to the bonus stage. Your spade moves along the top of the screen until you press a key. Then it falls down the column it is above.

The object is to land it on the diamond. Bonus points are awarded, depending on the colour of the diamond. Use the cursor keys for movement.

This game was written on a 48K Spectrum, but it may run on the 16K machine. ■



```

5 BORDER 0: PAPER 0: INK 7: C
LS
7 GO SUB 9000
10 RESTORE 20: FOR x=USR "a" T
USR "t": READ y: POKE x,y: N
EXT x
20 DATA 0,0,0,31,31,24,24,24,24,24
24,24,31,31,0,0,0,0,0,24,24,24
24,24,24,24,24,24,24,24,0,0,0,0
30 DATA 24,24,24,31,31,24,24,24,24,24
24,24,24,24,0,0,0,0,0,24,24,24
24,24,24,24,24,24,24,24,0,0,0,0
40 DATA 24,24,24,24,24,24,24,24,24,24
24,24,24,24,24,24,24,24,24,24,24,24
50 DATA 0,0,63,127,255,255,255,255
127,0,0,255,254,255,255,255,254
253,31,15,7,3,1,0,0,255,248,240,
24,192,128,0,0
50 DATA 0,63,121,219,255,112,6
0,252,156,159,255,14,60,0
100 LET screen=1
105 LET diff=0
110 LET score=0
115 LET lives=3
120 LET d=0
130 LET p=1
140 LET tot=0
150 LET up=19: LET xp=1
160 IF screen=5 THEN LET screen
=1: LET diff=diff+.05
160 LET tune=0
160 SUB 1000*screen
205 PRINT #0,AT 1,0: INVERSE 1:
000000
220 IF INKEY$="S" AND xp>1 AND
ATTR (yp,xp-3)<7 THEN PRINT AT
yp,xp: PAPER p: "": AT yp+1,xp: "
LET xp=xp-3: GO TO 260
230 IF INKEY$="D" AND xp<20 AND
ATTR (yp,xp+3)<7 THEN PRINT AT
yp,xp: PAPER p: "": AT yp+1,xp:
LET xp=xp+3: GO TO 260
240 IF INKEY$="6" AND yp<19 AND
ATTR (yp+3,xp)<7 THEN PRINT AT
yp,xp: PAPER p: "": AT yp+1,xp:
LET yp=yp+3: GO TO 260
250 IF INKEY$="7" AND yp>1 AND
ATTR (yp-3,xp)<7 THEN PRINT AT
yp,xp: PAPER p: "": AT yp+1,xp: "
LET yp=yp-3
260 IF ATTR (yp,xp)=6 THEN LET
score=score+100: LET tot=tot+1:
LET p=INT (RAND*5)+1: GO TO 300
270 LET p=INT (RAND*6)+1
300 PRINT AT yp,xp: "4 " : AT yp+1
xp: "
305 BEEP .1,a(tune): LET tune=t
une+1: IF tune=37 THEN LET tune=
1
310 IF RAND*.9 THEN GO SUB 500
320 PRINT #0,AT 1,7-LEN (STR$ s
core): INVERSE 1: score
330 PRINT #0,AT 1,29,"-": lives
340 IF tot=d THEN GO TO 800
350 GO TO 210
360 LET pos=INT (RAND*9)+3+1
370 IF RAND(.diff) THEN LET pos=xp
380 FOR h=1 TO 19 STEP 3
515 LET paper=(ATTR (h,pos))/8-
1
517 IF paper=-.125 THEN LET pap
er=7
520 PRINT INK 9: PAPER paper: AT
h,pos: "9"
530 FOR n=1 TO 13: NEXT n: BEEP
.1,a(tune): LET tune=tune+1: IF
tune=37 THEN LET tune=1
540 IF h=yp AND pos=xp THEN GO
TO 600
550 IF paper=-.125 THEN PRINT A
T h,pos: INK 7: "
560 IF paper=-.25 THEN PRINT AT
h,pos: INK 6: "

```



```

555 IF paper>0 THEN PRINT AT h,
pos: PAPER paper;
556 NEXT h
557 RETURN
600 FOR x=10 TO 0 STEP -1: BEEP
.1,x: BEEP .1,x-1: BEEP .1,x-2:
NEXT x
610 LET lives=lives-1: IF lives
=0 THEN GO TO 700
620 GO TO 130
700 RESTORE 710: FOR x=1 TO 7:
READ a,b: BEEP a,b: NEXT x
710 DATA 1,9,1,5,.5,4,.5,2,.5,1
.5,4,2,2
720 IF INKEY$="" THEN GO TO 720
730 RUN
800 FOR n=1 TO 2: RESTORE 805:
FOR x=1 TO 7: READ a,b: BEEP a,b:
NEXT x: NEXT n
805 DATA .2,10,.4,10,.2,12,.4,1
.2,10,.4,6,.6,7
810 CLS: PRINT: PRINT: FOR x
=1 TO 18: PRINT: NEXT x
815 PRINT #0,AT 1,0;"000000": P
INVERSE 1: score
817 PRINT #0,AT 1,29;"-": lives
820 LET p=INT (RND*9)+3+1
825 LET i=0
830 FOR n=1 TO 28 STEP 3
835 LET i=i+1: IF i>7 THEN LET
i=1
840 PRINT AT 20,p: INK i;" ";A
T 21,p: INK i;" ";
850 PRINT AT 0,n,"4 "AT 1,n;"
": BEEP .1,n: PRINT AT 0,n;"
": AT 1,n;"
870 IF INKEY$="" THEN GO TO 90
900 NEXT n
890 PRINT AT 0,28;" "AT 1,30;"
": GO TO 830
900 FOR x=1 TO 20: PRINT AT x-1
n;" "AT x,n;"4 "AT x+1,n;"
": BEEP .1,x+10: NEXT x
910 IF n<10 THEN GO TO 800
920 LET score=score+1000+i
930 PRINT AT 0,11;"BONUS"; INU
ERSE 1:1000+i:
940 FOR x=1 TO 400: NEXT x
950 LET screen=screen+1: GO TO
130
1000 CLS: PRINT:
1010 FOR x=1 TO 7: PRINT: NEXT
x
1020 PRINT AT 21,0;"
":
1030 FOR x=1 TO 19 STEP 3: FOR y
=1 TO 28 STEP 3: IF RND>.8 AND x
<18 AND y<19 THEN PRINT AT y,
x: INK 6;" ";AT y+1,x: INK 6;"
": LET d=d+1: NEXT y: NEXT x: GO
TO 1050
1040 LET i=INT (RND*5)+1: PRINT
AT x,y: PAPER i;" "AT x+1,y: P
APER i;" "NEXT y: NEXT x
1050 RETURN
2000 CLS: PRINT:
2010 FOR x=1 TO 2: PRINT: NEXT
x
2020 PRINT AT 6,6;"
":
2030 FOR x=1 TO 3: PRINT: NEXT
x

```

```

2040 PRINT AT 15,6;"
":
2050 FOR x=1 TO 2: PRINT: NEXT
x
2060 PRINT AT 21,0;"
":
2065 FOR x=7 TO 14: PRINT AT x,7
NEXT x
2070 FOR x=1 TO 4 STEP 3: FOR y=
1 TO 19 STEP 3: IF RND>.8 AND x<
1 AND y<19 THEN PRINT AT y,x:
INK 6;" ";AT y+1,x: INK 6;"
": LET d=d+1: NEXT y: NEXT x: GO T
O 2090
2080 PRINT AT y,x: PAPER (INT (R
ND*5)+1);" "AT y+1,x;" "NEX
T y: NEXT x
2090 FOR x=7 TO 22 STEP 3: FOR y
=1 TO 4 STEP 3: IF RND>.8 THEN P
RINT AT y,x: INK 6;" ";AT y+1,x
: INK 6;" "LET d=d+1: NEXT y:
NEXT x: GO TO 2110
2100 PRINT AT y,x: PAPER (INT (R
ND*5)+1);" "AT y+1,x;" "NEX
T y: NEXT x
2110 FOR x=7 TO 22 STEP 3: FOR y
=1 TO 19 STEP 3: IF RND>.8 THEN
PRINT AT y,x: INK 6;" ";AT y+1
,x: INK 6;" "LET d=d+1: NEXT
y: NEXT x: GO TO 2130
2120 PRINT AT y,x: PAPER (INT (R
ND*5)+1);" "AT y+1,x;" "NEX
T y: NEXT x
2130 FOR x=25 TO 28 STEP 3: FOR
y=1 TO 19 STEP 3: IF RND>.8 AND
x<21 AND y<19 THEN PRINT AT y,x
: INK 6;" ";AT y+1,x: INK 6;"
": LET d=d+1: NEXT y: NEXT x: GO
TO 2150
2140 PRINT AT y,x: PAPER (INT (R
ND*5)+1);" "AT y+1,x;" "NEX
T y: NEXT x
2150 RETURN
3000 CLS: PRINT:
3010 PRINT:
3020 PRINT:
3030 PRINT:
3040 FOR x=1 TO 10 STEP 3: FOR y
=1 TO 7 STEP 3: IF RND>.8 THEN P
RINT AT y,x: INK 6;" ";AT y+1,x
: INK 6;" "LET d=d+1: NEXT y:
NEXT x
GO TO 3070
3050 LET p=INT (RND*5)+1: PRINT
AT y,x: PAPER p;" "AT y+1,x;"
": NEXT y: NEXT x: GO TO 3070
3070 FOR x=1 TO 10 STEP 3: FOR y
=13 TO 19 STEP 3: IF RND>.8 AND
y<18 AND x<1 THEN PRINT AT y,x
: INK 6;" ";AT y+1,x: INK 6;"
": LET
d=d+1: NEXT y: NEXT x: GO TO 309
0
3080 LET p=INT (RND*5)+1: PRINT

```

```

AT y,x: PAPER p;" "AT y+1,x;"
": NEXT y: NEXT x: GO TO 3090
3090 FOR x=19 TO 28 STEP 3: FOR
y=13 TO 19 STEP 3: IF RND>.8 THE
N PRINT AT y,x: INK 6;" ";AT y+
1,x;" "LET d=d+1: NEXT y: NEX
T x: GO TO 3110
3100 LET p=INT (RND*5)+1: PRINT
AT y,x: PAPER p;" "AT y+1,x;"
": NEXT y: NEXT x: GO TO 3130
3110 FOR x=19 TO 28 STEP 3: FOR
y=1 TO 7 STEP 3: IF RND>.8 THEN
PRINT AT y,x: INK 6;" ";AT y+1,
x:" "LET d=d+1: NEXT y: NEXT
x: GO TO 3130
3120 LET p=INT (RND*5)+1: PRINT
AT y,x: PAPER p;" "AT y+1,x;"
": NEXT y: NEXT x: GO TO 3130
3130 PRINT AT 10,4: PAPER (INT (R
ND*5)+1);" "AT 11,4;" "AT 4,1
3: PAPER (INT (RND*5)+1);" "AT 5
,13;" "AT 4,16: PAPER (INT (R
ND*5)+1);" "AT 5,16;"
3140 PRINT AT 15,15: PAPER (INT (
RND*5)+1);" "AT 17,13;" "AT 1
5,15: PAPER (INT (RND*5)+1);" "A
T 17,15;" "AT 10,25: PAPER (INT
(RND*5)+1);" "AT 11,25;"
3150 RETURN
4000 CLS: PRINT:
4010 FOR x=1 TO 4 STEP 3: PRINT
NEXT x
4020 PRINT AT 6,0;"
":
4030 FOR x=7 TO 13 STEP 3: PRINT
NEXT x
4040 PRINT AT 15,0;"
":
4050 FOR x=1 TO 4 STEP 3: PRINT
NEXT x
4060 PRINT AT 21,0;"
":
4070 LET xp=10: LET yp=19
4080 FOR x=10 TO 19 STEP 3: FOR
y=1 TO 19 STEP 3: IF RND>.8 AND
x<10 AND y<19 THEN PRINT AT y,
x: INK 6;" ";AT y+1,x:" "LET
d=d+1: NEXT y: NEXT x: GO TO 41
10
4100 PRINT AT y,x: PAPER (INT (R
ND*5)+1);" "AT y+1,x;" "NEX
T y: NEXT x
4110 FOR x=1 TO 7 STEP 3: FOR y=
7 TO 13 STEP 3: IF RND>.8 THEN P
RINT AT y,x: INK 6;" ";AT y+1,x
:" "LET d=d+1: NEXT y: NEXT x
: GO TO 4130
4120 PRINT AT y,x: PAPER (INT (R
ND*5)+1);" "AT y+1,x;" "NEX
T y: NEXT x
4130 FOR x=22 TO 29 STEP 3: FOR
y=7 TO 13 STEP 3: IF RND>.8 THEN
PRINT AT y,x: INK 6;" ";AT y+1
,x:" "LET d=d+1: NEXT y: NEXT
x: GO TO 4150
4140 PRINT AT y,x: PAPER (INT (R
ND*5)+1);" "AT y+1,x;" "NEX
T y: NEXT x
4150 RETURN
9000 DIM a(36): RESTORE 9010: FO
R x=1 TO 36: READ a(x): BEEP .2,
a(x): NEXT x
9010 DATA 0,0,4,4,5,5,7,7,0,0,4,
4,2,2,-5,5,0,0,4,4,5,5,7,7,2,4,
2,4,2,-5,5,2,4,2,4,2,2,2
9020 RETURN

```

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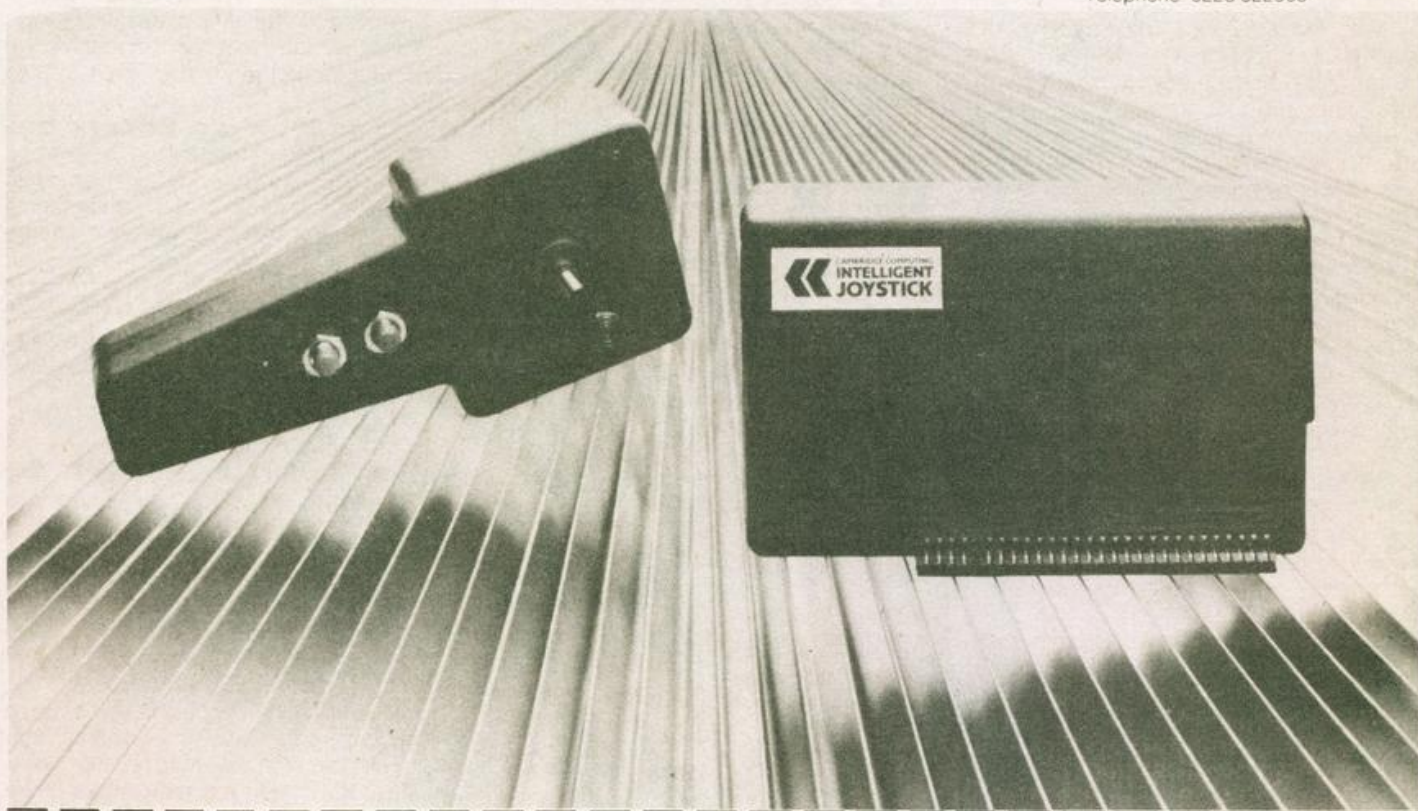
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Off the record

David Kelly talks to Jack Florey and Ashley Gray from CBS

Much has been said recently about the way the home computer industry has "grown up".

By far the biggest upheaval has been in software selling. The games have moved out of the mail-order coupons and PO Box numbers into the stores and high street retail chains.

It has not been an easy transition. In many cases the additional responsibilities have not fitted easily into the company's plans and a number of service companies are now offering distribution arrangements, helping to take the load off the software houses.

Some are new companies, like Prism. Others are established distributors in other areas who have moved to include video games. They come mainly from the book publishing business, like Websters, or from the record industry like CBS or K-Tel.

CBS particularly have made a name for themselves because they have adopted a policy of signing up companies like Quicksilver and Bug-Byte.

CBS first began to look at the computer market in February this year, after they detected a big growth in the number of cassettes being used for computer software.

Jack Florey, CBS's commercial director, explains the decision: "People now have more leisure, sadly partly to do with unemployment, and, as a result, the whole leisure market is growing enormously — which means records, videos and now a part of it is computer games. That is why we decided to go into it."

"At the moment games form only a small part of what we do, but software is going into the record shops, the retailers are moving in, and we must follow."

So, in the early part of this year, Ashley Gray was brought in by CBS to look more closely at the market. An accountant and chartered secretary, his interest was in "the commercial side of corporate life" and, particularly, business development.

He says: "We began to look at computer software seriously when some duplication houses started pushing work our way, work which was for them 'overload' that they couldn't handle."

CBS made the decision to enter the

market as manufacturer and distributor. "Considering we were very late in the market we have moved a long way in a short time," says Ashley. "The philosophy was always that we could go in on the back of our existing involvement in these areas for the music industry, using the 'quality' image of CBS."

CBS offered something that the software houses needed: a company which would take away the hassle of the manufacture and distribution, whilst at the same time leaving the decision making — which title, how to advertise, and so on — still with the software house.

And, to prove the point, CBS has now in its roster of independent software companies Quicksilver, Bug-Byte, Virgin Games and Rabbit.

Ashley explains the reason behind the choice: "There will be a big shake-out in February or March next year, and a lot of the smaller software houses will disappear. Perhaps even they are producing first-class games, but they will get left behind, not because they are doing anything wrong, but because other people are moving ahead so fast now."

"What we tried to do was to identify those in the market who knew what they were doing and who were likely to succeed in the future."

That is not to say that Ashley reckons that after the "big shake-out" there will be smaller companies with good material who will be left high and dry. Instead, he reckons these companies will form a kind of second tier. They will concentrate more and more on the creative business of games writing and programming. "Wherever that creativity pops up it will be taken to one of the companies which does have the resources to take it to the market."

"That great game will always get there somehow — it is like the author who hawks his book round all the publishers, and the last one sees something in it and it becomes a million-seller."

Ashley is convinced that the software industry will become more like the music business. "It's a hits industry. At the moment there are so many companies that games are considered company by company. When there are fewer companies that will change — things will begin to focus on individual authors. And charts will come. At the moment they are a mess, but one chart will emerge as the one."

"We are still going through the boom phase and the market is very volatile."



Jack Florey

Somebody could still just enter the market and become the number one, building the whole company on one top title. Just like Virgin did in the record industry with Mike Oldfield's *Tubular Bells*."

He believes that the market will mature to become marketing driven rather than product driven. "That will be what counts. You have got to make the buyers want the product — you've got to catch their imagination."

"K-Tel are getting in. They are bound to go on tv and just put the games up on screen, it is an ideal medium because it is definitely the quality of the on-screen graphics that will sell a game."

In his view the software market is ideal for CBS: "In a hit business the most important thing is to be able to get the product to the market. Demand for a particular game can develop over a weekend, and drop off just as fast. Our job is to make sure that the companies we deal with make the most of each of their titles."

"Our experience is in the record business which is very similar."

CBS offers the software house cassette manufacturing, packing and distribution to the shops. For that CBS makes a charge on a per-unit basis.

Jack Florey again: "We are just going to a label and saying 'Use our warehouse as your own'. We want the software house to keep its identity, choosing what to release. It's like a partnership arrangement."

"The label is free to concentrate on what it is best at — building up a repertoire and marketing in their own style. After all, they know their own business better than we do."

CBS's manufacturing is centred at Aylesbury, feeding to a central warehouse in Shepherd's Bush, London. From there the tapes are dispatched all over the country by Courier Express.

Eventually CBS hopes to build up a roster of six or seven independent software "labels". "We want to end up," says Ashley Gray, "with the same share of the video games market as we already have in the video and record industries — about 40-45 percent."

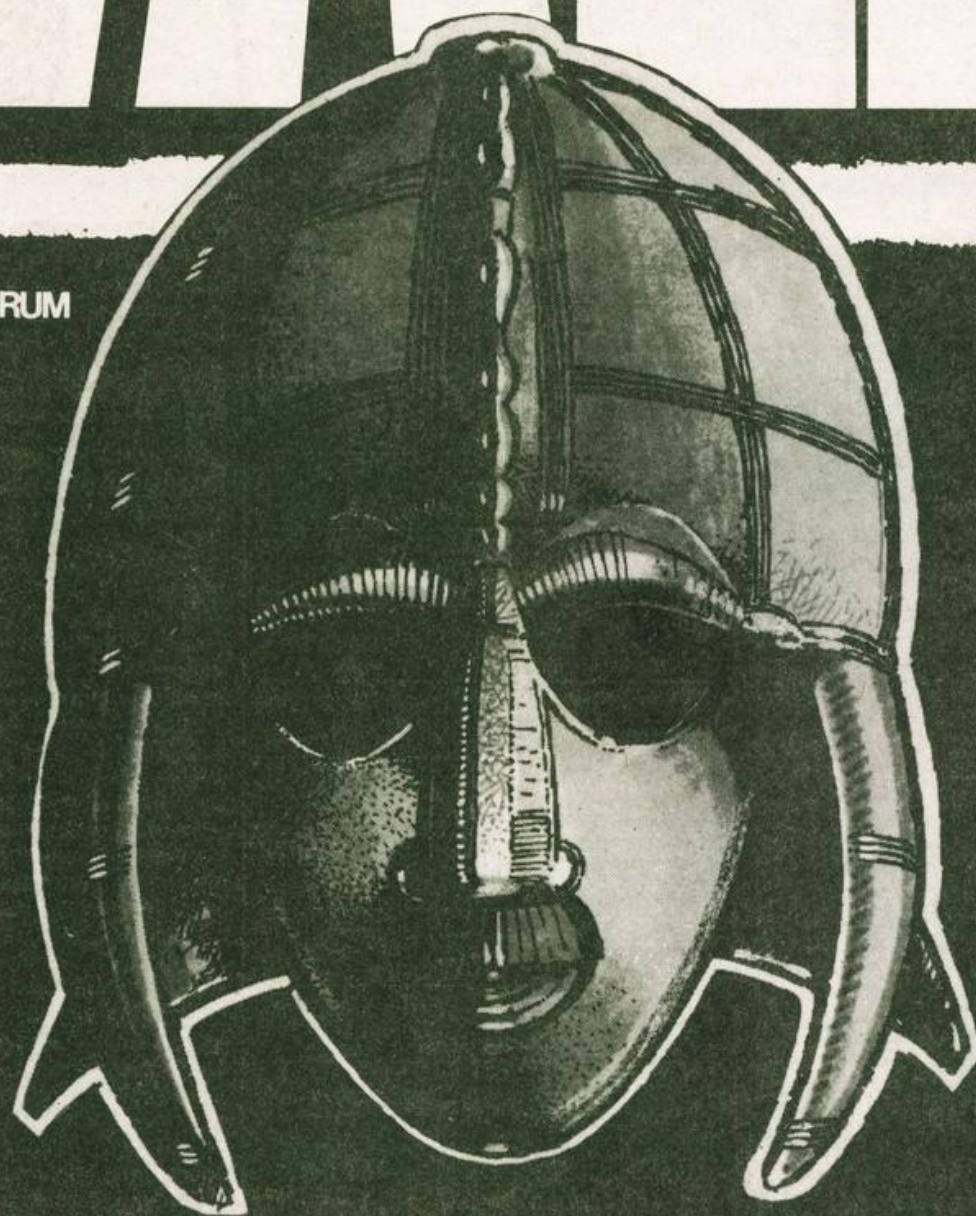
Ashley is not, however, looking for additions to the first four until the New Year: "The whole thing is building up to an enormous pre-Christmas crescendo and at the moment we are concentrating on looking after the people we've got."



Ashley Gray

WALKER

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POP W 44

Questions and answers

Keith and Steven Brain take an educated look at learning programs for the Dragon

Dragon Data promoted the Dragon as the 'family computer'.

The implication being that a Dragon would help you to learn more than just how to improve your reactions and zap the aliens more rapidly.

A number of companies are now offering educational programs of one sort or another for the machine and, as many of these are not easy to find in the high street, and it is always a bit of a gamble buying unseen by mail-order, here is a review of many of the current offerings.

Infant Pack from Shards contains two programs for the very young. *Bottles* teaches and tests counting to the relentless accompaniment of the tune *Ten Green Bottles*. *Alphabet* is designed to teach the alphabet and, although it has some nice ideas, it falls down rather on the education side. Letters are displayed on a small 'tv' in the centre of the screen, with a corresponding word and small picture at the top. Unfortunately, many of the letters are drawn in a strange way which is likely to confuse rather than help small children.

First Letters and Words is a new program from Abacus which is a first-class demonstration of how to really use the educational possibilities of a computer. It is designed to teach young children how to form lower-case letters and words, which it constructs on the hi-res screen exactly as you would write them on paper, at a speed controlled by the user. The first option forms the lower-case letter corresponding

also gives an example of a word beginning with this letter. Option three displays the entire alphabet, option four produces random words, and option five shows random Christian names. The final option allows you to write text on to the screen and then replay it.

Without doubt this program is one of the more impressive educational programs we have seen and we would thoroughly recommend it to anyone with children at this stage. The author, Dr M E Newton, has really got to grips with a difficult problem.

Baby Dragon 1, from Gravesend Home Computers, contains two programs for very small children entitled *Koko* and *Teddy*.

Koko is a simple maths-test program which checks simple addition, subtraction, multiplication or division at one of three skill levels, and it is very well dressed up for small children as a game in which Koko the clown will be dunked in the water if you score 100 per cent. Although only low-res graphics are used, this is combined with interesting sounds and a lot of humour to make an attractive package.

Teddy shows very well how a simple idea can be made interesting so that youngsters can learn as they play. It is essentially a test of counting, but the plot involves saving pots of honey from a line of sleeping bears which are liable to wake up at any moment and eat it. As you might expect this is accompanied by a rendering of *Teddy Bears' Picnic*.

Junior Pack, again by Shards, has two good programs which are games. *Tables*, not surprisingly, tests your knowledge of multiplication tables in a game where you try to guide a cursor to safety. It is intended to help a child to learn his or her tables without realising it.

Jumbler is a word recognition game where you have to fill in missing letters to complete a sentence.

This is quite good fun but rather frustrating as your answer must be exactly right and not just 'possible'. The number of available words is limited so some very strange sentences appear. For example: "The poor man walks to the wooden tent"! Your success seems more likely to be due to ESP or lateral thinking than to actual knowledge.

Tables Tutor from Micro De-Bug is also

designed to teach tables. Although it has a number of options it is not particularly well conceived or executed. It appears that Micro De-Bug are also testing out Dr Goebbels' theories on propaganda as every single line printed has their logo (MDB#) at the start — thus wasting 16 percent of the screen space!

Maths Tutor from Abacus contains *Primary Addition*, *Junior Maths* and a *General Test Routine*. The first is a very simple routine which only involves counting spots on dice and entering the number. If your answer is incorrect the right answer is shown, but no attempt is made to show how the answer was obtained. *Junior Maths* is better as it has 10 skill levels, gives a more detailed breakdown of your performance, and tests addition, subtraction, multiplication and division.

The third choice, *General Test Routine*, allows the teacher (or parent) to set up a test file on tape containing particular questions and answers. In this case, of course, the teacher rather than the computer is always right! After the test has been carried out a record file can be created and later replayed to prove to disbelievers how you got on.

Spelling Tutor is another program from Micro De-Bug, this time teaching spelling. The program loads words from an Ascii file on the tape and the format of the test shows several words displayed together, of which one is incorrectly spelt, and must be corrected. Once again the ubiquitous logo is much in evidence.

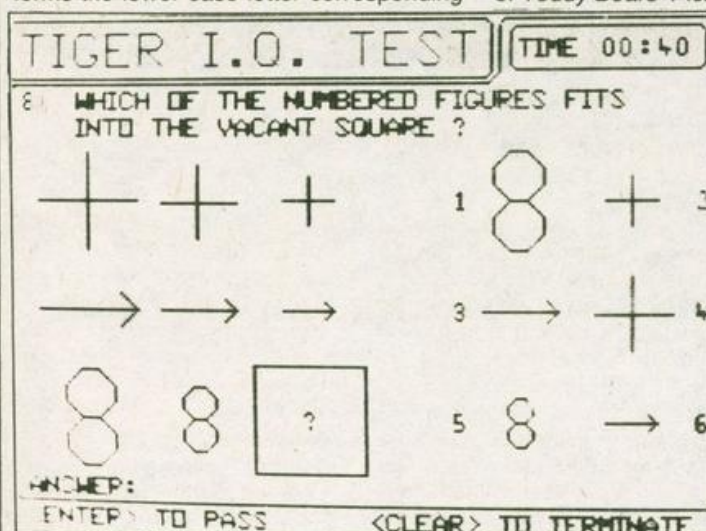
Test your knowledge of animals

Music Tutor from Abacus was designed to aid anyone learning a musical instrument. Abacus claim that by using it you can "learn to write and play music instantly". It offers a wide range of facilities allowing you to create, play, amend, delete, save and load tunes. Music can either be written in more or less normal Dragon *Play* format or in what Abacus calls 'template' mode. Here the notes and the possible length octave and volume options are specified in table-form. It seems strange, however, that no reference is made in the program to conventional notation — minims, crotchets, etc.

The instruction leaflet explaining the facilities is rather brief and it therefore took some time for us to sort out how to use the program. Tunes can be saved in Ascii format and four demonstration tunes are supplied with the tape. It is possible to specify a *MusicPrint* mode where the notes are displayed on a staff in hi-res graphics.

The four-colour *PMode 3* is used, rather than the highest resolution *PMode 4*, so definition is a little fuzzy and we also feel that it would have been more logical to have drawn each note as it was played.

Live and Learn by Shards contains six programs. *Graphics* is a step-by-step tutorial on the hi-res graphics, but it falls down



to a single key press. An important feature is that where a 'downstroke' overwrites an 'upstroke' this is indicated by a change in the colour, which mirrors the action of your pen. As the speed of formation can be altered, the running of the program can be easily adjusted so that the child can copy the letter on paper at the same time.

The second option immediately produces the letter for the key pressed, but

rather as all the words appear separately on the text screen.

Music is a similar attempt to explain sound on the Dragon which suffers from the same problem, and also contains a simple *Organ* program. *Zoo* is a simple database program containing facts and figures about some animals which you can display, or test your knowledge of. A world map is included which shows where the animals live in the wild.

Survive is based on a survival exercise in which you have crashed in the desert and must decide which of the objects at your disposal are of greatest value to you. This is really just an interesting game, as the chances of you needing this information seem rather remote (don't write and tell us that you happen to live in Timbuctu). *Britain* produces a good map of Britain and then displays the location of a number of towns and "citys" (sic), together with some information about them.

This is an interesting idea, but we are a little worried about the accuracy of the information. For example, we hardly think Reading is in the East Midlands, we are not sure what an Anglo-Saxon was, and the information about some of the towns seems to be rather out of date.

The text is displayed one character at a time and is accompanied by an irritating beeping noise which is sure to make you turn the sound off! *Map* uses the same map of Britain to test your geography. You are asked the location of a town and then you are shown the map with a number of possible points marked on it. A flashing cursor must then be moved to the correct point.

This is quite a nice idea but it is a pity that the authors of the program forgot to arrange for the cursor to put back anything it passed over. With so many programs on the tape it takes a long time to load the ones near the end. Also, sad to say, we do not rate the educational value of this selection very highly.

Tell the Time in French, English and German from Abacus first loads a general routine in which you choose in which language you wish to learn the time, and then loads the appropriate language program. A nice display of a clock-face is produced but, once again, you must jump back to the text-screen to enter your answer.

There is quite a long delay before each new time is displayed as the program redraws the clock-face from scratch each time instead of just erasing the old positions of the hands. The program is very particular about how you write the time — for example, you must always use '5 TO 9' rather than 'FIVE TO NINE' or '8.55'.

In the foreign-language versions some explanations of how to write the time are given, but you are advised to write these down on paper which rather seems to defeat one of the objects of using a computer. Surely it would have been better to have designated a *Help* key to call up the list if you get stuck. Although he may

be good at telling the time perhaps the author needs some "practice" (sic) at spelling.

'O' Level *Geography Weather Map Symbols* (again Abacus) is a higher level program, designed for use in school or for home revision. You can choose to learn or test yourself on four groups of weather-map symbols (cloud, weather, wind and front) and within each group there is a further choice.

The graphic display of the map symbols is very clear, but we must criticise the fact that this program does not put any text on to the hi-res display. In test mode, symbols from one group are displayed at random, and your final score reported as a percentage of correct responses. This represents pretty basic use of the computer.

Measuring Instruments also confirms that Abacus' newer programs are marked improvements on their old ones. The first option tests your skill at reading the distance between two arrows pointing to graduations on a ruler. The lowest level always starts from 0, but life is more difficult at the higher levels. If you are wrong then you are asked to read each point separately, and then calculate the difference.

At Level 7 we had great difficulty reading to two decimal points (which we suppose is what they were trying to prove!) and were glad that the computer eventually gave up in disgust and gave us the values to subtract. The second option deals with the vernier calliper, and the third the micrometer screw-gauge, the principles of which are both first explained. The graphic display of the calliper and micrometer are superb and they include close-up views of the actual scale.

Not to be taken seriously

Tiger Grand Prix, by Tiger no less, is described as an educational game which makes learning fun. It consists of a main program and a series of 13 data files, and it comes with a small instruction manual.

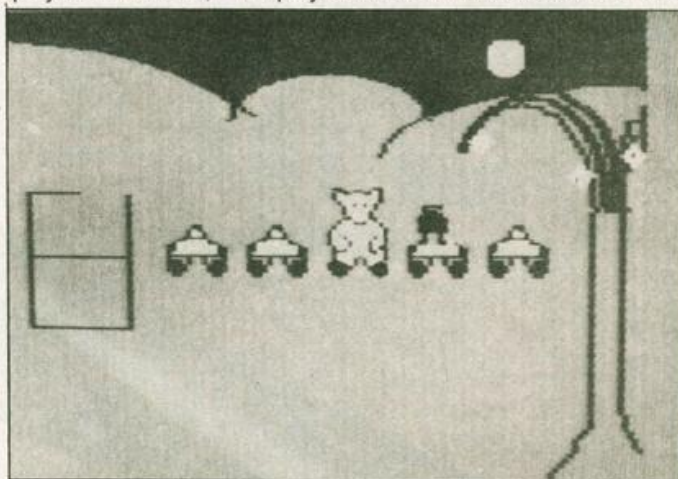
The game consists of a race, where your progress depends on the accuracy of your answers. Questions are picked according to the throw of screen 'dice', and the gremlins are waiting to catch you if you make a mistake. What happens if the gremlins catch you is supposed to be a secret, so we won't spoil it by telling you.

The data files provided are arranged in four stages for different age groups (from 7-10 to 16+) and the questions are very varied. Tiger are preparing a program which will allow you to construct your own

data files to use with this game, which will greatly improve its value to the user. (Tiger even suggest you might put driving test questions on to the Grand Prix program which seems quite apt!)

This is a carefully thought-out idea which has been properly produced and the program should have a long and useful life.

Tiger IQ Test, again from Tiger, is something rather different. It tries to assess your IQ, but it is rather amusing to read the "Government Health Warning" in the instruction manual which advises you not to take the results too seriously. All the display is on the hi-res screen and looks



impressive.

The tests look at general intelligence using numerical, literal and visual problems and there is a 30-minute time limit. Full instructions are given on-screen. Before the test proper there is a demonstration to show you what to expect. The final assessment reports are interesting, but at first we did not do so well. We were a little upset to be advised that we might be able to "learn some useful tasks under supervision, be able to attend to some personal wants and avoid dangers, and should live in an institution".

Teach-type, from DICOsoft/Gravesend Home Computers, is a specialised program to teach touch typing. Two versions are provided (one using the high-speed *Poke* to speed things up). The program starts by even explaining how you should sit and then the screen display shows a pair of hands and an exercise which you must follow.

The exercises start with one finger and slowly build up to more complex situations. It is quite easy to avoid the usual problem of cheating, by dropping your eyes to the keyboard, as each letter you press instantly appears on the screen immediately below the current point in the exercise. If you make a mistake, that letter is inverted and your speed and accuracy are continuously shown as both histograms and numbers so you can see how you are progressing.

From the start actual words are used for the exercises, which is more interesting than other "gobbledegook" typing practise routines, and you progress to short

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REVIEWS

phrases based on the 150 most frequently-used English words.

One of us has typed with four fingers for the past 20 years, in spite of several well-intentioned attempts at learning to do it "properly", but this is the first system he has tried which he felt he might actually manage to follow for more than a few hours!

The *Teletutor 1* package from Microdeal is a suite of four programs, none of which are available separately. As is so often the case with Microdeal, these are conversions of American programs for the Tandy, but we are pleased to say that all transatlantic idiosyncracies have been carefully removed.

The first program is *Spelling Test* which will either use a demonstration file or is designed to allow you to easily produce your own files. This program scores over its rivals as it uses actual speech on a cassette sound track for the tests. Instructions are available on-screen and a volume check is included before you start. The demonstration voice track features a very well-spoken lady (obviously not an android) who pronounces a word and then puts it in context in a sentence. You then type in your answer, and the sequence is repeated, until the test is complete.

The second program on the first tape is *Word Drill* which gives a definition and a series of alternative options from which to choose. It suffers from the problem of all

tests of this type that the limited number of possibilities available in memory mean that several of the choices are nonsense (eg, the capital of France is Bernard Shaw!). The length of time for each question can be adjusted.

Four first class programs

The second cassette contains two mathematical programs designed for the younger age group. *Math Drill* is a test of addition, subtraction, multiplication and division, with the "reward" of producing a smiling face if you continue to answer correctly. Up to six students can be tested at the same time, with up to 50 questions of different types and skill level.

The program is unusual in that an up arrow indicates your position on the answer line and you are required to enter the answer in the order you would calculate it (eg, for $50 + 50$ you must type the 0, 0 and then 1). This may seem unimportant in simple examples but is very significant when you get to level 10 (try dividing 36097 by 105 in your head). It also allows you to use remainders in division, and calculate each part of a long multiplication separately.

The second maths program is *Estimate* which tests mental arithmetic but is again unusual in that it keeps a record of how close you got to the correct answer.

At first sight the package looks rather expensive, but the cost must be put in context by considering that it consists of four first-class programs and an elaborate manual, and that you can easily adapt it to suit whatever you want to test.

Finally we will take a look at a couple of database programs as these can usefully be used to store and retrieve information by the more advanced student.

Profile from Micro De-Bug comprises a tape and a user manual which describes the structure of a computer filing system quite clearly and then gets down to explaining how to use it. A nice feature is that it gives a picture showing what you should see on the screen at each point (besides the ever-present MDB of course!). It is a pity,

though, that a demonstration file has not been included to experiment with.

The maximum number of records is 100 (although you can start with a small file and enlarge it later). It is not necessary to specify the number at the start, as you simply type "*****" at the start of a record to indicate the end of the file.

The number of fields per record is rather limited as the maximum is four, so it is difficult to even record name, address and telephone number in normal format. The maximum number of characters in each field is 20, which is again rather small, but a scale is provided as you enter characters so you can see if you are running out of space in the field. Unfortunately, there is no indication of which field you are entering data to.

You can edit an entry quite easily, but to add more entries you must use the edit mode, which is rather tiresome. Files can be saved and loaded, and you can *Find* a string provided that you specify the field to be searched. The maximum size of the database is 8,000 characters, and there are no sorting or printing facilities, which further limits the value of this system.

The *Filing System* from Progressive Software is a much more ambitious package which consists of four cassettes and a manual. The system is suitable for the beginner as a *Lesson* tape is provided which uses a voice track and sample files to take you through all the stages involved in using databases.

The system actually contains two different databases. *Version One* is self-contained and free-format, so that it is not necessary to specify field sizes, lengths and so on, in advance. In *Version Two* the maximum number of fields per record is 22 and the maximum number of characters per field is 40, but maths functions can be incorporated to modify records, the screen is mapped, columns can be totalled, an extra screen can be used, and searching and sorting is faster than in *Version One*.

The records can be sorted in numerical or alphabetical order of a specified field. Databases for *Version Two* must be first produced with the *Create* program, but Progressive also provide the facility of converting a *Version One* database to *Version Two*. A printout facility is provided and, although it is not specified, the maximum database size appears to be 13,000 characters.

The manual is comprehensive and clear and although *The Filing System* is twice the price of *Profile* there is no doubt in our minds that it is a very professional (not to say progressive) product which fulfils the majority of standard database functions and is well worth the money.

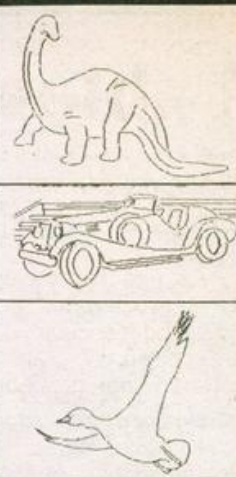
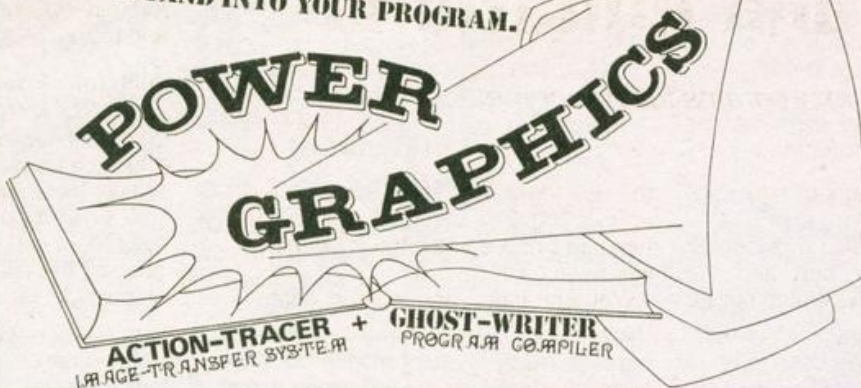
It is interesting to see that Progressive actually give a listing and explain their program instead of trying to protect it! This is obviously useful to anyone who wants to learn or modify the program for a disc system. Our only small gripe is that the quality of the sound track is not as good as that on *Teletutor*. ■

Firm	Program	Price
Abacus Software UK Ltd 21 Union Street Ramsbottom Nr Bury Lancs	<i>Maths Tutor</i> <i>Music Tutor</i> <i>Tell The Time</i> <i>'O' Level Geography</i> <i>First Letters and Words</i> <i>Measuring Instruments</i>	£5.00 £9.95 £6.50 £6.50 £6.50 £6.50
Gravesend Home Computers Ltd 39 The Terrace Gravesend Kent	<i>Baby Dragon 1</i> <i>Teach Type</i>	£5.95 £5.95
Microdeal Ltd 41 Truro Road St Austell Cornwall PL25 5JE	<i>Teletutor</i>	£25.00
Micro De-Bug Consultancy 60 St Johns Road Selly Park Birmingham B29 7ER	<i>Profile</i> <i>Spelling Tutor</i> <i>Tables Tutor</i>	£9.95 £4.95 £4.95
Progressive Software 7 Marsh Street Walsall West Midlands	<i>The Filing System</i>	£19.95
Shards Software 189 Eton Road Ilford Essex IG1 2UQ	<i>Infant Pack</i> <i>Junior Pack</i> <i>Live and Learn</i>	£3.95 £3.95 £6.95
Tiger Software 63 Devonshire Street Monkwearmouth Sunderland Tyne and Wear	<i>Tiger Grand Prix</i> <i>Tiger IQ Test</i>	£7.95 £7.95

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Tables and equations

D H Cox presents two programs for trigonometric tables and quadratic equations

If you find Trig tables boring, here is a short program to bring them to life.

Our old friends sine, cosine and tangent are shown in graphical form and the correct values given below. Watch out for

the user defined graphic symbols A, B, C in lines 200, 210, 220, 290 and 320. These turn into sin, cos and tan once the program has been run.

You can input any angle in degrees or

any of the inverse functions ASN, ACS, ATN to obtain the appropriate answers and picture.

Quadratic Equation

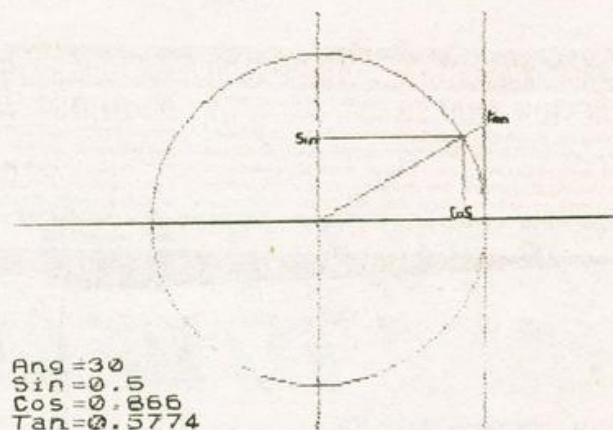
This quick program will draw you a parabola from a quadratic equation of your own choice. Simply input values A, B and C and presto, there's your curve.

The values of A, B and C may then be re-entered and further curves drawn which enables the different effects of these constants to be observed.

```

10 REM *****
20 REM * * * Trigonometry * *
30 REM * * * D.H.Cox * *
40 REM *****
50 REM © 1983
60 REM Set Centre
70 LET X=125: LET Y=89: LET B=
180/FI
80 REM Define Graphics
90 GO SUB 400
100 REM Draw Axes & Circle
110 PAPER 0: BORDER 0: INK 7: C
120 PLOT 0,Y: DRAW 255,0: PLOT
X,0: DRAW 0,175
130 CIRCLE X,Y,70
140 INPUT FLASH 1:"Angle Deg,AS
N,ACS,ATN,A$: LET A=VAL A$: I
F CODE A$=181 OR CODE A$=182 OR
CODE A$=183 THEN LET A=INT (A*B*
100+.5)/100
150 REM Calculate SIN COS TAN
160 LET R=A/B
170 LET S=70*SIN R: LET C=70*CO
S R: IF C=0 THEN GO TO 180: LET
T=70*TAN R
180 PLOT X,Y: DRAW C,S
190 PRINT AT 18,0;"Ang=";A: PAU
SE 200
200 REM Graphics: A=B=C=
210 DRAW -C,0: PRINT AT 10-INT
S/8,15: INK 4: BRIGHT 1:"A": AT 1
9,0:"Sin=";INT (.5+1e4*SIN R)/1e
4: PAUSE 200
220 PLOT X+C,Y+S: DRAW 0,-S: PR
INT AT 10,15+INT C/8: INK 5: BRI
GHT 1:"B": AT 20,0:"Cos=";INT (.5
+1e4*COS R)/1e4: PAUSE 200
230 PLOT 198,0: DRAW 0,175
240 REM Infinite Tan
250 IF C=0 THEN GO TO 350
260 REM Draw Tan
270 LET T=70*TAN R
280 PLOT X,Y: IF ABS T>67 THEN
GO TO 310
290 DRAW 70,T: PRINT AT 10-INT
(T/8),25: INK 6:"C": GO TO 330
300 REM Tangent off screen
310 DRAW 6090/ABS T,87*SGN T
320 PRINT AT (21 AND T<0),25;"C
"
330 PRINT AT 21,0: INK 6;"Tan="
;INT (.5+1e4*TAN R)/1e4
340 PAUSE 0: CLS: GO TO 120
350 PRINT AT 21,0:"Tangent Inf
inite": PAUSE 0: CLS: GO TO 120
400 REM UDG A,B,C
410 DATA 0,0,BIN 11000000,BIN 1
0000000,BIN 11010111,BIN 0101010
1,BIN 11010101,0
420 DATA 0,0,BIN 11000011,BIN 1
0000010,BIN 10111011,BIN 1010100
1,BIN 11111011,0
430 DATA 0,120,BIN 11100000,120
,BIN 10111111,BIN 10101101,BIN 1
0111101,0
440 FOR L=0 TO 16 STEP 8: FOR M
=0 TO 7: READ N: POKE USR "A"+L+
M,N: NEXT M: NEXT L
450 RETURN

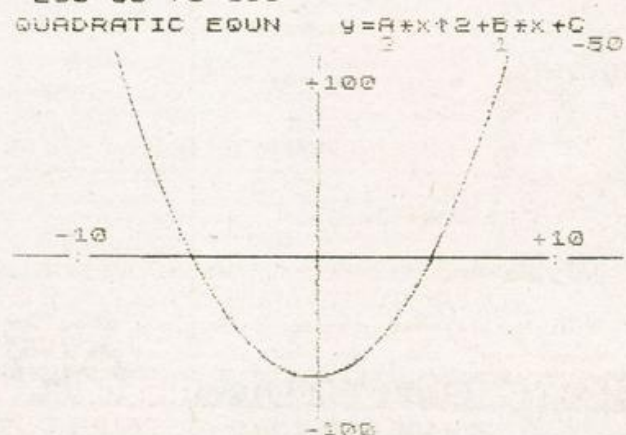
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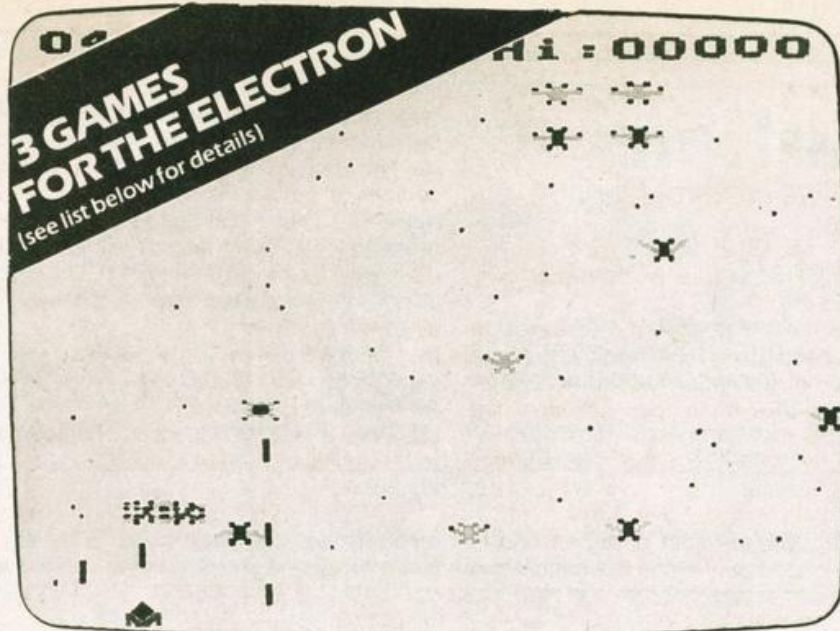


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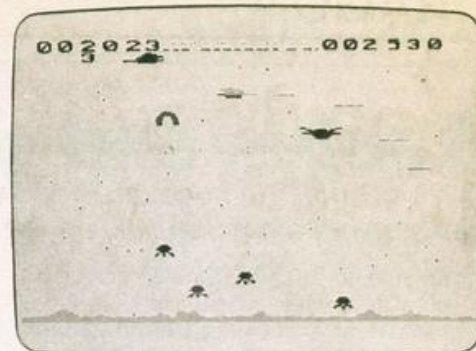
10 REM QUADRATIC BY D.H.COX ©
20 PRINT "QUADRATIC EQUATION y=A
*x^2+B*x+C"
30 REM Draw axes
40 PLOT 0,75: DRAW 255,0
50 PLOT 127,0: DRAW 0,150
60 REM Scale Axes
70 PRINT AT 11,2; "-10"; AT 11,2
7; "+10"
80 PRINT AT 12,3; ":"; AT 12,28;
":"
90 PRINT AT 3,15; "+100"; AT 21
15; "-100"
100 REM Input Constants
110 INPUT "A=";A
120 INPUT AT 1,19;A
130 INPUT "B=";B
140 INPUT AT 1,25;B
150 INPUT "C=";C
160 INPUT AT 1,29;C
170 REM Plot Curve
180 FOR x=-127 TO 127
190 LET y=A*x^2/100+B*x/10+C
200 LET p=x+127
210 LET q=y+75
220 IF q>0 AND q<150 THEN PLOT
P,q
230 NEXT x
240 INPUT a$
250 PRINT AT 1,0;" "
260 GO TO 100

```

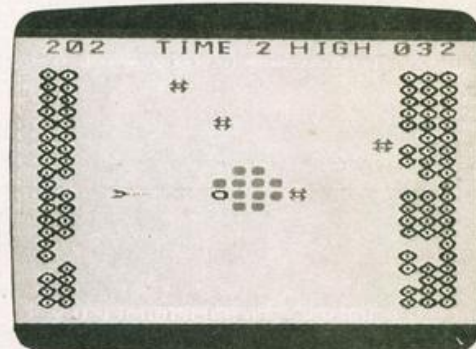




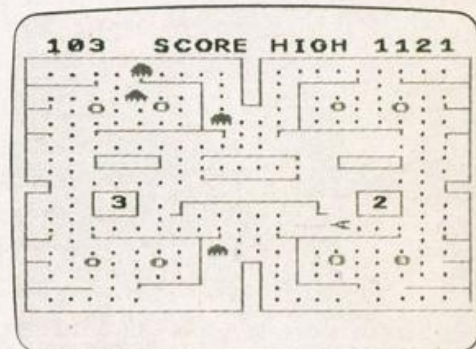
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Heads will roll

C R McGinley demonstrates how a machine code routine can stop headings scrolling off the screen

The auto scroll on the Dragon can be a bit of a problem when using *List* type displays; ie, any headings scroll off as well. This machine code routine scrolls the screen, but leaves the top two lines of the screen alone.

It works by loading locations \$167-\$169 with a *Jump* to the routine. These locations usually hold a 'return' being the location that the print routine jumps to after inputting a character.

The assembly language listing with

notes explains the routine. Some points of interest are:

- (1) *PSHS A,X,Y*, is needed to save the original condition of the registers to be used as the routine is reached by a *JMP*, and not a *JSR*, that does not save the registers.
- (2) Location \$88 holds the next address for screen output.
- (3) If scroll is needed, location \$88 has to be loaded with the start of the second to last line to stop printing on the bottom line

and therefore auto scrolling.

(4) *PULS A,X,Y,PC* restores the registers used to their original state.

(5) No *RTS* is needed, as the program counter is pulled off the stack with the registers. The basic loader and demo program loads the code and executes it. It then goes into a demo program. Pressing the ↑ key scrolls the screen, releasing it stops the scroll.

(6) *Clear* will still clear the whole screen.

(7) You can print to the top two lines using *Print @* or after a *Clear*.

(8) *Poke & H167 & H39* stops operation of routine. *Poke & H167, & H7E* starts it again.

Once executed this routine works automatically and does not need to be executed every time you print to the screen. ■

```

20 '***M/C ROUTINE***
30 CLEAR 200,32700:A=32701
40 DATA 8E,7F,C9,BF,01,68,86,7E,B7,01,67
,39,34,32,BE,00,88,8C,05,E0,25,17,8E,04,
40,10,8E,04,60,A6,A0,A7,80,10,8C,06,00,2
6,F6,8E,05,C0,BF,00,88,35,B2,FINI
50 READ A$:IF A$="FINI"THEN 60 ELSE POKE
A,VAL("&H"+A$)
55 A=A+1:GOTO 50
60 EXEC 32701
100 '***DEMO PROG***
110 CLS:PRINT " address","value":PRINT S
TRING$(32,"-")
120 FOR A=1 TO 65535:PRINT A,PEEK(A)
130 IF PEEK(341)=223 THEN NEXT A ELSE 13
0
    
```

7FBD 8E7FC9	30	LDX ##7FC9	LOADS LOCATION
7FC0 BF0168	40	STX #0168	\$167-\$169 WITH
7FC3 867E	50	LDA #7E	JUMP TO MY
7FC5 B70167	60	STA #0167	ROUTINE
7FC8 39	70	RTS	
7FC9 3432	80	PSHS A,X,Y	SAVES ORIGINAL CONDITION
			OF REGISTERS
7FCB BE0088	90	LDX #88	CHECKS FOR FULL
7FCE 8C05E0	100	CMPX #1504	SCREEN
7FD1 2517	110	BLO @END	END IF SCREEN NOT FULL
7FD3 8E0440	120	LDX #1088	
7FD6 108E0460	130	LDY #1120	SCROLLS THE SCREEN
7FDA A6A0	140	@LOOP LDA ,Y+	EXCEPT FOR TOP TWO LINES
7FDC A780	150	STA ,X+	
7FDE 108C0600	160	CMPLY #1536	
7FE2 26F6	170	BNE @LOOP	
7FE4 8E05C0	180	LDX #1472	LOADS PRINT POSITION
			PIONTER
7FE7 BF0088	190	STX #88	WITH START OF 2nd TO LAST
			LINE
7FEA 35B2	200	@END PULS A,X,Y,PC	RESTORES REGISTERS TO
			ORIGINAL CONDITION
			AND RETURNS

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Bubbling under

Michael Batty explains sorting procedures in the second of a three part series

Last week we presented a program to draw perspective views of a house. The program transformed the original 3-dimensional object to a 2-dimensional screen image which, although useful for exploring the geometry of perspective, produced rather unrealistic pictures. Each plane of the object was plotted without eliminating lines which lay behind its visible surfaces and thus the effect of depth created by the perspective was confused.

Removing hidden lines is a major problem in computer graphics, but it is made considerably easier where such lines can be covered up by 'painting' the object with blocks of colour. Here we will show such a technique which uses one of the classic sorting procedures of computer programming.

An effective way of hiding unwanted lines involves plotting each plane of the object so that those furthest from the viewpoint are plotted first. As each plane is plotted, it is coloured in, and thus the last plane plotted will be nearest the viewpoint and will hide all the detail which is behind it.

The technique is very effective on simple objects with few plane surfaces such

as the house of last week, but it involves sorting the planes with respect to their distance from the viewpoint. Such a sorting procedure is referred to as a *depth-sort* and involves sorting so that the furthest plane is ranked first, the nearest last.

Many sorting procedures exist, but perhaps the simplest and best known which works reasonably well on a small number of elements in a pile is known as a *bubblesort*. As the name suggests, elements are sorted so that the largest 'bubble' goes to the top, the next largest to the next place and so on.

The algorithm works by systematically exchanging pairs of elements which are out-of-order. When the pile is entered and two elements out-of-order encountered, these are exchanged. The search then moves back up the pile exchanging until the order is correct, and then re-enters the pile at the next lowest level, to reorder those not dealt with so far. Details of one such sort are available in Roy Atherton's *Structured Programming with BBC Basic* (Ellis Horwood, 1983).

The average distances of each plane from the viewpoint are calculated, these are bubblesorted, and the object then

plotted plane by plane according to the new order. Each plane is plotted in black and its edges outlined in white. As the planes are built up, those nearer which overlap ones behind will hide the frame of the object, eventually leaving just the surfaces visible from the viewpoint. The sequence of planes plotted for the wire frame house of last week is shown in the figure.

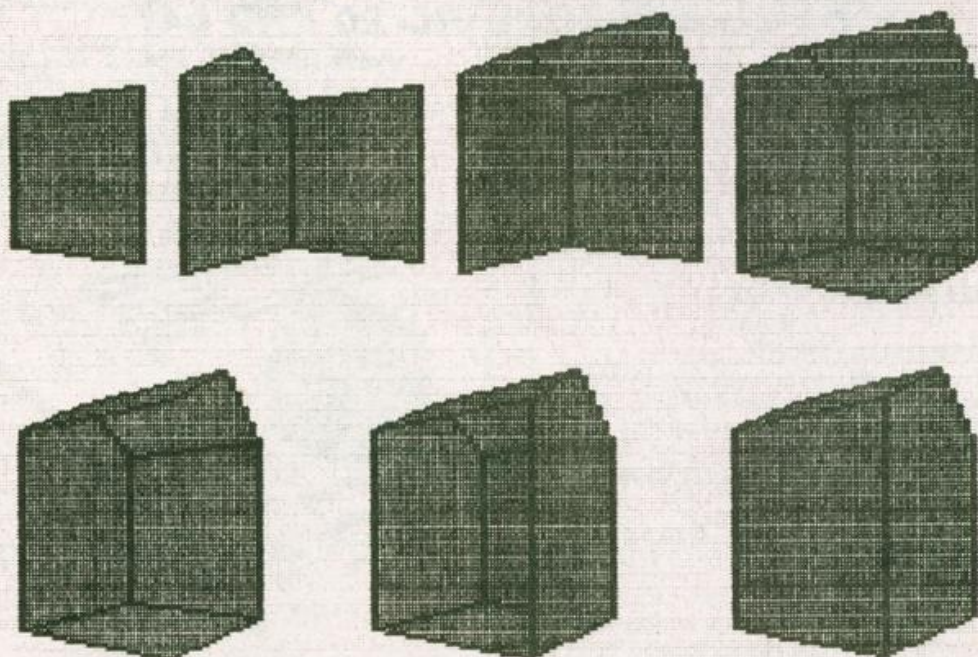
The form of the program is based on last week's except that *Proframe* is replaced by *Procsolid* which accomplishes depth sort using *Procdepth* and *Procsort*. Two filling procedures are used to fill 4 and 5 point planes respectively using the *Plot85* fill routine, and edging each plane in white.

When you run the program, start with a view distance of about 1000, a screen distance of 500, and after each plane is plotted, press any key to continue. In this way, the picture will build up and hidden lines will be overplotted as the sequence in the adjacent figure shows.

Explore various effects by altering the parameters of the viewpoint and systematically move around and over the house. We are now in a position to use this solid object as a building block for creating something more dramatic. The obvious thing to do with a house is to generate many of them to form streets.

Next week we will conclude by showing how to do this, creating some interesting and evocative scenes.

```
VIEW DISTANCE ? 1000
SCREEN DISTANCE ? 500
HORIZONTAL ANGLE ? 35
VERTICAL ANGLE ? 90
```



```

10 REM Graphical Sorting based on Depth Sort
20 REM (c) Michael Batty, October, 1983
30 MODE1
40 DIM W(10,3),S(10,2),P%(7,5),NP%(7)
50 DIM V(7),VV(7),NV%(7),C%(7)
60 VDU19,0,2,0;19,1,4,0;19,2,0,0;
70 VDU28,0,5,39,0:VDU24,0,0;1279;830;
80 NX=10:MX=7:VDU29,640;400;
90 COLOUR 128:GCOLOR,129
100 CLS:CLG:COLOUR 2
110 FOR I%=1 TO NX
120   READ W(I%,1),W(I%,2),W(I%,3)
130   NEXT I%
140 FOR I%=1 TO MX
150   READ NP%(I%):NEXT I%
160 FOR I%=1 TO MX
170   FOR J%=1 TO NP%(I%)
180     READ P%(I%,J%)
190     NEXT J%:NEXT I%
200 FOR I%=1 TO MX
210   READ C%(I%):NEXT I%
220 INPUT TAB(1,1)"DISTANCE FROM VIEW",
  RHO
230 INPUT TAB(1,2)"DISTANCE FROM SCREEN",
  DIS
240 INPUT TAB(1,3)"HORIZONTAL ANGLE",TH
250 INPUT TAB(1,4)"VERTICAL ANGLE",PH
260 TH=RAD(TH):PH=RAD(PH):PROCSETUP
270 REM Transforms and Plots Solid Objects
280 REM Removing Hidden Lines
290 FOR I%=1 TO NX
300   PROCTRANS(I%)
310   NEXT I%
320 PROCSSOLID
330 AA=GET:CLS:CLG:GOTO 220
340 END
350 DEFPROCSETUP
360 S1=SIN(TH):C1=COS(TH)
370 S2=SIN(PH):C2=COS(PH)
380 XR=RHO*S2*C1:YR=RHO*S2*S1:ZR=RHO*C2
390 ENDPROC
400 DEFPROCTRANS(I%)
410 X=W(I%,1):Y=W(I%,2):Z=W(I%,3)
420 X1=-X*S1+Y*C1
430 Y1=-X*C1-C2-Y*S1*C2+Z*S2
440 Z1=-X*S2-C1-Y*S2*S1-Z*C2+RHO
450 D=DIS/Z1:S(I%,1)=D*X1:S(I%,2)=D*Y1
460 ENDPROC
470 REM Sorts Object Planes by Depth from
480 REM Viewpoint using a Bubblesort Algorithm
490 DEFPROCDEPTH
500 PROCDEPTH:PROCSORT
510 FOR I%=1 TO MX
520   IF C%(NV%(I%))=1 THEN PROCFILL1(NV%(I%))
530   IF C%(NV%(I%))=0 THEN PROCFILL2(NV%(I%))
540   AA=GET
550   NEXT I%
560 ENDPROC
570 DEFPROCDEPTH
580 FOR I%=1 TO MX
590   V(I%)=-EXP(50):VV(I%)=EXP(50)
600   NV%(I%)=I%
610   FOR J%=1 TO NP%(I%)
620     K%=P%(I%,J%)
630     D1=(W(K%,1)-XR)^2:D2=(W(K%,2)-YR)^2
640     D3=(W(K%,3)-ZR)^2:D=SQR(D1+D2+D3)
650     IF D>=V(I%) THEN V(I%)=D
660     IF D<=VV(I%) THEN VV(I%)=D
670     NEXT J%:NEXT I%
680 FOR I%=1 TO MX
690   V(I%)=(V(I%)+VV(I%))/2
700   NEXT I%
710 ENDPROC
720 DEFPROCSORT
730 FOR I%=2 TO MX
740   FOR J%=I% TO 2 STEP -1
750     IF V(J%)<=V(J%-1) THEN GOTO 800
760     T=V(J%):F%=NV%(J%)
770     V(J%)=V(J%-1):NV%(J%)=NV%(J%-1)
780     V(J%-1)=T:NV%(J%-1)=F%
790     NEXT J%
800   NEXT I%
810 ENDPROC
820 REM Plots and Fills Object Planes
830 DEFPROC FILL1(I%)
840 GCOLOR,2
850 PROCMMOVE(I%,1):PROCMMOVE(I%,2)
860 PROCMPLOT(I%,3):PROCMMOVE(I%,1)
870 PROCMPLOT(I%,4):PROCLINE(I%)
880 ENDPROC
890 DEFPROC FILL2(I%)
900 GCOLOR,2
910 PROCMMOVE(I%,1):PROCMMOVE(I%,2)
920 PROCMPLOT(I%,3):PROCMMOVE(I%,1)
930 PROCMPLOT(I%,4):PROCMPLOT(I%,5)
940 PROCLINE(I%)
950 ENDPROC
960 DEFPROCMMOVE(I%,J%)
970 K%=P%(I%,J%):MOVE S(K%,1),S(K%,2)
980 ENDPROC
990 DEFPROCMPLOT(I%,J%)
1000 K%=P%(I%,J%):PLOT85,S(K%,1),S(K%,2)
1010 ENDPROC
1020 DEFPROC LINE(I%)
1030 GCOLOR,3:PROCMMOVE(I%,1)
1040 FOR J%=2 TO NP%(I%)
1050   K%=P%(I%,J%):DRAW S(K%,1),S(K%,2)
1060   NEXT J%:K%=P%(I%,1)
1070 DRAW S(K%,1),S(K%,2)
1080 ENDPROC
1090 REM Coordinate, Point & Plane Data for House
1100 DATA 200,-200,-200,200,-200,200
1110 DATA 200,200,200,200,200,-200
1120 DATA -200,200,-200,-200,200,200
1130 DATA -200,-200,200,-200,-200,-200
1140 DATA 0,200,300,0,-200,300
1150 DATA 4,4,4,5,5,4,4
1160 DATA 1,2,3,4,1,8,5,4,5,6,7,8
1170 DATA 4,3,9,6,5,1,2,10,7,8
1180 DATA 2,10,9,3,7,10,9,6
1190 DATA 1,1,1,0,0,1,1

```

Play the numbers game

Nigel Littlewood presents a simple quiz game for the unexpanded Vic20

This is a simple number quiz for the Vic20; all the user has to do is orientate the numbers one to eight in the grid displayed on the screen.

However, the numbers must be placed so that no consecutive numbers are next to each other either vertically, hori-

zontally or diagonally.

There are four possible solutions to the quiz, which the computer will test for.

Upon getting a correct solution, your number of attempts will be displayed together with the amount of time you took.

Program notes

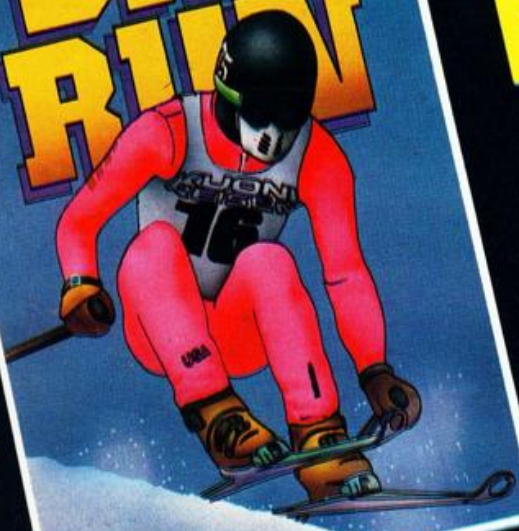
10-30	Initialisation of variables and instructions
40-240	Displays the grid
310-416	Number entry routine and correct sequence check
462	Error display
600-635	Correct sequence display
700-710	Data statements for positioning of answers and correct number sequences

```

0 GOTO 10
1 *****
2 BY NIGEL LITTLEWOOD
3 NUMBER QUIZ (C)
4 DATE 15/7/83.....
5 *****
10 TI$="000000":S1=36876:POKE$1+2,15:POKE$1+3,8:PRINTCHR$(14)"  "
11 PRINT"
12 PRINT"THE OBJECTIVE OF THE GAME IS TO ARRANGE THE NUMBERS 1 TO 8 SO THAT";
13 PRINT"NO CONSECUTIVE NUMBERS ARE NEXT TO EACH OTHER EITHER VERTICALLY, HORIZON-
TALLY, ";
15 PRINT"DIAGONALLY OR IN REVERSE ORDER.":PRINT"ANY KEY TO CONTINUE."
30 GETA$:IFA$=""THEN30
40 PRINTCHR$(142)" "
100 PRINT"NUMBER QUIZ"
101 PRINT"
204 PRINT"
208 PRINT"
210 PRINT"
212 PRINT"
216 PRINT"
220 PRINT"
224 PRINT"
228 PRINT"
232 PRINT"
236 PRINT"
240 PRINT"
300 POKE198,0:POKE$1,0:RESTORE:FORC=1TO8:POKE$061,C
310 GETF$:IFF$<"1"ORF$>"8"THEN310
312 A(C)=VAL(F$):READB:POKEB,48+A(C):NEXTC:W=W+1:FORQ=1TO4:L=0:FOR=1TO8:READK
415 IF A(E)=KANDQ<5THENNEXT:IFL=0THEN600
416 L=L+1:NEXT:IFL>0ANDQ<5THENNEXT
462 PRINT"WRONG":POKE$1,128:FORX=1TO1500:NEXT:PRINT"
:GOTO300
600 PRINT"THAT IS CORRECT"
605 PRINT"IT TOOK YOU" W "GUESSES"
606 PRINT"YOUR TIME WAS :- " HOURS ";LEFT$(TI$,2)
607 PRINT" MINS ";MID$(TI$,3,2)
608 PRINT" SECS ";RIGHT$(TI$,2)
610 PRINT"WOULD YOU LIKE TO TRY AND GET ANOTHER OF THE SOLUTIONS."
612 FORO=1TO4:POKE$1-1,200:FORY=1TO300:NEXT:POKE$1,200:FORY=1TO300:NEXT
613 POKE$1,0:NEXT:POKE$1-1,0:FORR=130TO254:POKE$1,R:FORK=1TO40:NEXTK,R:POKE$1,0
615 PRINT"N' TO EXIT."
630 GETU$:IFU$=""THEN630
631 IFU$="N"THENPRINT"BYE FOR NOW !!":END
635 RUN
700 DATA7798,7801,7861,7864,7867,7870,7930,7933
710 DATA4,6,7,1,8,2,3,5,3,5,7,1,8,2,4,6,5,3,2,8,1,7,6,4,6,4,2,8,1,7,5,3

```

SKI RUN



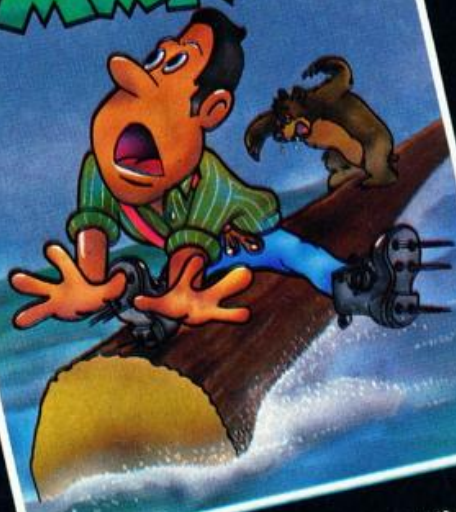
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(3) SCUBA DIVERS DON'T LIKE SHARKS. FIRST CHANCE THEY GET THEY STICK ONE ON YOU.

(4) SOME BOATMEN CARRY DEPTH CHARGES. IF A SINGLE CHARGE REACHES THE SEA BED THEN IT'S FISH AND CHIPS.

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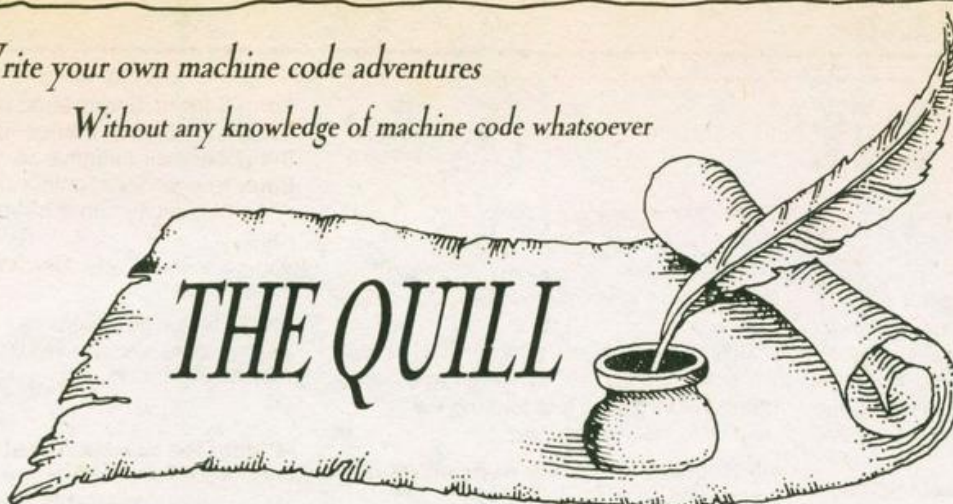
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Bit by bit

Pete Gerrard guides you through the intricacies of hi-res graphics on the 64

As you know, the screen display on your Commodore 64 is 40 columns wide, and 25 rows deep. Since each character space is made up of an eight pixel by eight pixel grid, this gives a maximum resolution of (40 × 8) wide and (25 × 8) deep, or 320 by 200.

To use the high resolution screen, obviously we are going to have to manipulate every pixel on the screen, and determine whether each pixel is to be turned on or off. On this depends the colour that will be displayed in that particular pixel location.

To keep track of this requires a lot of memory: 8,000 bytes for each screen display in fact, as we have to control 320 × 200 pixels, or 64,000 of them! As there are eight bits in a byte, this gives us our figure of 8,000 bytes per screen.

Basic versus Machine Code

One drawback of using bit mapping from Basic is that everything is so slow. With nearly 8K to control, this is hardly surprising, and most of the work in bit mapping is best done from machine code. However, since delving into machine code straight away can be a little terrifying, we'll start with Basic.

What we are attempting in this article is basically to transfer an 8K section of your computer's memory directly on to the screen, thereby determining whether each bit on the screen is on or off.

Standard Bit Mapping

As with all normal character displays on the screen, standard mode trades off colour in favour of greater resolution: the full 320 by 200 in fact, but with only two colours per eight pixel by eight pixel grid. Bit map mode is turned on with the following command:

Poke 53265, Peek (53265) OR32

and turned off with:

Poke 53265, Peek (53265) AND223

Obviously we're going to have to get the information from somewhere, and for this we'll have to clear out a section of memory. The usual area used is from memory location 8192 upwards, so to clear out our 8K we must:

For I = 8192 To 8192 + 7999: Poke I,0: Next I

Now we have to select some colours, and the colour displayed on the screen in this mode is determined not by the colour memory, but by the actual content of each screen memory location. The value *Poked* into a screen location produces the background colour by using the lower four bits of the value, and the pixel colour from the upper four bits. Thus each screen character space can have two colours in it, and

throughout the screen we can use any of the 16 colours.

Before printing anything on the screen, we need to tell the screen where our bit map is stored, and this is done using:

Poke 53272, Peek (53272) OR8

which puts the bit map at locations 8192 through to 16191.

If we don't tell the screen where to go though, interesting things happen! For instance, *Poke 53265,59* will show the top half of the screen containing the bit map for the first 4096 memory locations, and the bottom half the bit map from the character generator area. You can actually watch it all change up at the top, as page zero continues to monitor what's happening. The following line:

For I = 8192 To 8511 Step 8: Poke I,255: Next I

will now produce a hi-res line across the top of the screen, given that we are still looking at locations 8192 and above for our hi-res area. Or again:

For I = 1024 To 2023: Poke I,4: Next I

will produce a purple hi-res screen.

To determine whether any particular pixel is to be on or off, we will need to find it on the screen, and the following formula will show you where any pixel is located, assuming we want it to be at X location horizontally, and Y location vertically:

R = INT (Y/8) find the row
C = INT (X/8) find the character position
L = Y AND 7 the line of that character position
B = 7 - (X AND 7) the bit of that byte

Putting them all together gives us the byte where any pixel with the co-ordinates X,Y is situated:

*Byte = 8192 + R * 320 + C * 8 + L*

and to turn any X,Y co-ordinate bit on in that eight by eight space we:

Poke Byte, Peek (Byte) Or (2 to the power B)

We will now use some of these ideas to get the 64 to draw a hi-res cos wave.

```
5 POKE 53272, PEEK (53272) OR8
7 POKE 53265, PEEK (53265) OR32
10 FOR I = 8192 TO 8192 + 7999: POKE I,0: NEXT I
12 FOR I = 1024 TO 2023: POKE I,1: NEXT I
15 FOR X = 0 TO 319
20 Y = INT (100 + 80 * COS (X/10))
25 C = INT (X/8): R = INT (Y/8): L = Y AND 7
30 BYTE = 8192 + R * 320 + C * 8 + L
40 B = 7 - (X AND 7)
50 POKE BYTE, PEEK (BYTE) OR (2 to the power B)
60 NEXT X
70 POKE 1024,16:END
```

Multi-Colour Bit Mapping

This is similar to multi-colour mode in ordinary graphics, in that we are allowed to have up to four colours per eight pixel by eight pixel grid, but we have to suffer a halving of the horizontal resolution available, down to 160 by 200 pixels.

Again, we are using an 8K section of memory, and our four colours are chosen

from: screen background colour, register 53281; character screen position, where the upper four bits give us one colour, the lower four another; colour memory.

To turn multi-colour bit mapping on, we must:

Poke 53265, Peek (53265) OR32: Poke 53270, Peek (53270) OR16

and to turn it off again:

Poke 53265, Peek (53265) AND223: Poke 53270, Peek (53270) AND239

Moving the Screen About

It is possible to move the screen either horizontally or vertically in either direction, one pixel at a time.

The 64 normally displays a screen that is 40 columns across and 25 rows down, but in order to scroll in either direction we can change this into a 38 by 24 display, in order to give the screen information somewhere to go to, and somewhere to come from.

To get the 38 column screen display, we must enter:

Poke 53270, Peek (53270) AND247

and to switch it off we must:

Poke 53270, Peek (53270) OR8

To get to a 24 row screen display, we must enter:

Poke 53265, Peek (53265) AND247

and to go back to 25 rows again:

Poke 53265, Peek (53265) OR8

You will see the screen border expand and shrink accordingly, in order to accommodate the screen manipulation. To scroll horizontally, we must:

Poke 53270, (Peek (53270) AND248) + X

where X is the screen position from 0 to 7, and to scroll vertically:

Poke 53265, (Peek (53265) AND248) + Y

where Y is the Y position of the screen from 0 to 7. To illustrate these features, here are a few examples.

Values in the range 24 to 31 actually control the vertical position of the characters on the screen, so:

For J = 24 TO 31: Poke 53265,J: Next J

will set the screen moving downwards, leaving an empty space near the top. *Poke 53265,27* to get back to normal.

To illustrate 24 column mode, type *Poke 53265,19*, which cuts the top and bottom lines in half; this is the basis of all these scrolling operations. Switch to a 24 character screen, move everything up slowly, then jump back to a 25 character screen again, and so on.

Finally, to turn the screen off completely, type *Poke 53265,11*. *Pokeing 53265* with 27 always sets everything back to normal again.

Obviously there is a lot to learn and I have found the best way to understand it all is just to play around, taking notes of everything you do and the results that follow. Next week we'll take a look at the other important graphics feature of the Commodore 64 — Sprites.

SPECTRUM SOFTWARE

SUPER SOFTWARE PACK: 25 super programs for the 48K Spectrum — machine code arcade-type games, adventures, dungeons and dragons, puzzles and ball games including Breakout (taking you through nine skill levels), Star Wars, Amazing 3D Mazes, 3D Noughts and Crosses, Corridors of Doom, Trap It, Housebreak and Yahtzee. All 25 on one compendium pack. **£9.95**

GAMES PACK 1: Four 'super fast' machine code action games — Specman: gather money bags avoiding the monster and mines; Snake-Byte: collect eggs on a small island, but be quick or they turn bad, all the time the snake grows longer and moves faster. Also Blitz and Breakout. **16K. £5.95**

GAMES PACK 2: Two arcade-type games and two games of strategy — War of the Worlds: a task force of 20 aliens is approaching your planet. Each alien will try to land and build a city. If they are not stopped they will take over and liquidise all resident life forms. Also 3D Noughts and Crosses, Smilies and Battleships. **16K. £5.95**

SPECMUNCH: Pacman at its best, superior maze, intelligent ghosts, bonus graphical fruit, on-screen scoring, smooth animation, great graphics, different levels of difficulty, fruity music and high score (machine code of course). **16K. £5.95**

BANDIT: Superior fruit machine with graphical fruit, random hold, each-way nudge, gamble feature and realistic spinning reels (machine code). **48K. £5.95**

ALIEN MINE: Your mission: to replenish gold supplies. Dig your paths to the energy base, watch out for a deadly patrolling robot. There are laser beams to avoid, a tank attacking your spacecraft and rock falls to hinder your progress, also many an intrinsic secret to discover. A great arcade adventure game with wonderful graphics. **16K. £5.95**

BACKGAMMON: The computer uses machine code to decide its moves in about five seconds. Plays according to official rules, prevents cheating. Eight-colour high-resolution board. **48K. £5.95**

REVERSI: An exciting board game of strategy, which is easy to learn but hard to master. Pit your wits against the computer. Standard game or if you dare — Lightning Reversi. **48K. £5.95**

PLAY AS YOU LEARN: Five games pack — 48K Maths, co-ordinates, compass points and the alphabet are fun to learn with these educational games for the 5-11 year age range. **£4.95**

ARTY 'THE SPECTRUM ARTIST': 48K. A very useful aid in the creation of screen displays. This program will save many hours of planning time, 45 minutes practice to master the commands. All input commands are saved in memory and can be printed out or saved to tape for inclusion in other programs. Or just watch the re-run of all the stages of your creation for fun. **£5.95**

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INCLUDED FREE WITH EACH ORDER are two short utility's which will assist any would-be games programmers.

1. The first is called 'KEY' gives direct access to arrow keys.
2. The second called GPI, allows smooth and fine movement of a small graphics shape. Both of these utilities can be used within a basic or M/C code programme.

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Open Forum is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed. We will pay the *Program of the Week* double our new fee of £6 for each program published.

Nasty Ned

on Spectrum

The object of this game is to catch the

falling bombs before they hit the ground and explode, using a bucket of water, held by your bomb experts!

You have three lives to catch as many bombs as possible, but every so often Ned

gets nastier and rips off part of the bank giving you less time to intercept the falling bombs!

Run 100 before playing, to initialise the UDGs.

Program Notes

1-50	Select instructions
100-160	Build UDG set
170-240	Initialise variables + Build Bank and Score Table
250-290	Movement Routine
300	Increase Level
400-420	Player Killed Routine
500-540	Instructions

```

1 REM      A Nasty Ned A
2 REM
3 REM      A © Mark Bullen A
4 REM
5 REM      A 21st November 1983 A
6 REM
7 LET hi=0
10 BORDER 7: PAPER 7: BRIGHT 0
: INK 2: OVER 0: INVERSE 0: FLAS
H 0: CLS: PRINT AT 1,8: "A Naste
y Ned A": AT 1,10: OVER 1:
20 PRINT AT 8,5: INK 4: "Would
you like": AT 10,7: "instructions
?": AT 10,9: INK 2: "Y": INK 0:
: YES: HI 15.2: INK 2: "N": INK
0: "N": HI 0
30 IF INKEY$="Y" OR INKEY$="Y"
THEN GO TO 500
40 IF INKEY$="n" OR INKEY$="N"
THEN GO TO 160
50 GO TO 30
100 RESTORE FOR 1-UDR "S" 10
USA "S":7: READ 2: POKE 1,2: NEX
T 1: GO TO 10
110 DATA 2,6,8,56,124,124,124,5
120 DATA 24,24,16,26,19,41,41,1
130 DATA 0,0,0,0,255,255,255,0
140 DATA 24,24,8,56,200,148,148
150 DATA 255,255,129,129,129,25
5,255,255
160 BORDER 5: PAPER 7: BRIGHT 0
: INK 0: CLS: DIM a(14,2)
170 LET men=0: LET sc=0
180 LET level=1
185 LET a(1,1)=level+4: LET a(1
,2)=7: LET c=1: LET b=1: FOR j=2
TO 14: CLT a(1,2)-a(1,1)-1:2)-4+IN
T (RND*8): LET a(1,1)=level+4: I
F a(1,2)<4 THEN LET a(1,2)=a(1,2
)+5
187 IF a(1,2)>16 THEN LET a(1,2
)=a(1,2)-5
188 IF a(1,2)=a(1-1,2) THEN LET
i=i-1: NEXT 1
190 NEXT 1: PRINT AT 5,21: INK
0: "NED'S GETTIN' NASTIER!": INK
4: FLASH 1: INVERSE 1: SCORE: IN
VERSE 0: FLASH 0: INK 0: "AT 7
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Percentage Rate

on Dragon

When a sum of money (PV) is repaid by n monthly instalments of P , at monthly interest i , the variables are related like this:

$$P = PV \frac{i}{1 - (1 + i)^{-n}}$$

If all these are known except the interest rate, you cannot rearrange the equation so that the unknown, i , appears on one side only. The program finds the equivalent annual rate by trial and error. Readers with a building society mortgage will know that societies have an idiosyncratic way of

applying their notional rate. It is interesting to see what your 'true' mortgage rate is!

Program notes

50	Sets a starting point for annual rate and trial difference.
60-90	Convert APR into monthly (decimal) rate.
100-130	Test the expression against the known value of P and adjusts rate accordingly.

```

1 'PROGRAM TO FIND A.P.R.
2 'PETER STORY
10 CLS
20 INPUT "TYPE THE MONTHLY INSTALMENT";P
30 INPUT "TYPE THE TOTAL BORROWED";PV
40 INPUT "TYPE THE NUMBER OF MONTHS";N
50 I=15:DIFF=15
60 I1=I/100
70 I2=1+I1
80 I3=I2^(1/12)
90 I4=I3-1
100 P1=PV*I4/(1-I3^(-N))
110 IF P1-P<0.0001 AND P1-P>-0.0001 THEN PRINT I:STOP
120 IF P1<P THEN PRINT I:P1:P:I=I+DIFF:DIFF=DIFF/2:GOTO60
130 IF P1>P THEN PRINT I:P1:P:I=I-DIFF:DIFF=DIFF/2:GOTO60

```

Percentage Rate by Peter Story

Apple Munch

on Vic20

This game will run on the unexpanded Vic. The program uses user defined graphics and sound. Rems can be left out.

Program notes

0-4	Rems
-----	------

7	Disables the Commodore key
8-12	Do you want instructions?
15-65	Hi-res graphics
66-110	Sets up screen
150	Sets timer
160-210	Key press check
220	Gets correct subroutine
1000	Congratulations
10000	Failed
20000	Player stuck

30000 Instructions

Variables

I	Main loop variable
O	Checks for crash and player using ammo
AS	Movement
V	Subroutine variable
A	Read variable
TIS	Internal clock

NB. Maximum for crashes and ammo is five.

```
0 REM PHILIP BIDWELL,  
1 REM    20, HOUGH LANE,  
2 REM    LEYLAND,  
3 REM    LANCS.  
4 REM    PRS 1SD.  
5 PRINT "J"  
6 POKE 36878, 15  
7 PRINT CHR$(8)  
8 POKE 36879, 27  
9 PRINT "XXXXXXXXXXXXXXXXXXXXXXXXXXXX";  
10 PRINT "DO YOU WISH TO SEE THE INST  
RUCTIONS(Y/N)"  
11 PRINT "                "  
12 INPUT Y$  
13 IF Y$ = "Y" THEN GOSUB 30000  
14 PRINT "J"  
15 POKE 36869, 255  
25 POKE 52, 24 : POKE 56, 28 : CLR  
30 FOR I=1 TO 32 : READ A : POKE 7167+I, A : NEXT  
40 DATA 255, 255, 255, 255, 255, 255, 255, 255  
50 DATA 60, 126, 90, 126, 60, 36, 102, 0  
60 DATA 8, 16, 124, 250, 242, 246, 124, 56  
65 DATA 0, 0, 0, 0, 0, 0, 0, 0  
66 PRINT "XXXXXXXXXXXXXXXXXXXXXXXXXXXX"  
70 FOR I=1 TO 250 : POKE 36876, 200 : FORT=1 TO 15  
: NEXT : POKE 36876, 0  
80 LET Q=INT(RND(1)*506)+1  
90 POKE 7680+Q, 0 : POKE 7680+Q+30720, 0  
100 NEXT  
110 FOR I=8164 TO 8185 : POKE I, 32 : FOR J=8164  
TO 8185 : POKE J, 3 : NEXT
```

```

120 A=7680:B=8175:C=30720:D=38895
130 POKEA,2:POKEA+C,5
140 POKEB,1:POKEB+C,2
150 TI$="000000"
160 GETA$:IFA$=""THEN160
170 IFA$="■"THENV=1
180 IFA$="Z"THENV=2
190 IFA$="C"THENV=3
200 IFA$="*"THENV=4
210 IFA$="←"THENV=5
220 ONV GOSUB300,400,500,600,20000
230 IFPEEK(A)=1THENGOTO1000
240 GOTO160
300 IFPEEK(B-22)=0THENGOSUB800
310 POKEB,3:D=D-22:B=B-22:POKEB,1
320 POKEB,1:POKEB,2:GOSUB2000:RETURN
400 IFPEEK(B-1)=0THENGOSUB800:RETURN
410 POKEB,3:B=B-1:D=D-1
420 GOTO320
500 IFPEEK(B+1)=0THENGOSUB800:RETURN
510 POKEB,3:B=B+1:D=D+1:GOTO320
600 G=G+1:IFF>1THENRETURN:O=O+1:POKE368
78,15:FORI=170TO240STEP3:POKE36876,I:NE
XT I
601 POKEB-22,32:POKEB-22,3
610 POKE36876,0
800 POKE36877,225:FORI=15TO0STEP-.7:POK
E36878,I
810 FORW=1TO99:NEXTW,I:POKE36877,0:POKE
36878,0:O=O+1:IFO=>5THENGOTO10000:RETUR
N

```

```

899 GOTO 160
1000 POKE36869,240:PRINT"JWELL DONE!
YOU HAVE SUCCESSFULLY MUNCHED THE AP
PLE."
1005 S=VAL(TI$)
1010 PRINT"& TOOK JUST ";S;"UNITS OF TI
ME."
1020 PRINT:PRINT
1030 PRINT"DO YOU WISH TO PLAY
AGAIN?"
1040 GETR$:IFR$=""THEN1040
1050 IFR$="Y"THENRUN
1060 IFR$="N"THENPOKE36879,27:PRINT"J":
END
2000 POKE36878,15:FORP=1TO19:POKE36876,
185:NEXT:POKE36876,0:POKE36878,0:RETURN
10000 POKE36869,240:PRINT"JWELL DONE!"
10010 PRINT"I'M VERY SORRY BUT YOUUSED
UP ALL YOUR AMMO OR CRASHED TOO MANY
TIMES."
10015 PRINT"-----"
10020 GOTO1020
20000 POKE36869,240:POKE36879,25:PRINT"
J"
20010 POKE36878,15
20020 K$="TOUGH LUCK! I BET YOU THOUGHT
IT WAS GOING TO BE EASY DID'NT YOU."
20030 FORI=1TOLEN(K$)

```

```

20040 L$=MID$(K$,I,1):IFL$="" THEN20070
20050 PRINT"*";
20060 POKE36875,235:FORH=1TO20:NEXT:POK
E36875,0:FORH=1TO10:NEXT
20070 PRINTL$:NEXT
20080 PRINT"X"
20090 GOTO1020
30000 PRINT"J8 APPLE MUNCH"
30010 PRINT"-----"
30020 PRINT"THE OBJECT OF THE GAMEIS TO
TRY TO EAT THE JUICY APPLE AT THE TOP";
30030 PRINT"LEFT OF THE SCREEN.IF YOU F
IND THAT AN OBSTRUCTIONS IS"
30040 PRINT"BLOCKING YOUR PATH THEN
GET RID OF IT BY PRESSING '*'
30050 PRINT"MOVEMENT:--"
30060 PRINT"J"
30070 PRINT"JF1=UP J2=RIGHT"
30080 PRINT"J"
30090 PRINT"JC=LEFT J4=STUCK"
30100 PRINT"J PRESS A KEY TO PLAY"
30110 GETVV$:IFVV$=""THEN30110
30120 RETURN
33332 REM(C) P.BIDWELL
33333 REM**THE END**

```

Apple Munch
by Philip Bidwell

Refraction

on Spectrum

Andrew Thompson's program for the re-

fraction of light (PCW 30 June - 6 July) inspired this program. This particular version draws the interface between the two media (lines 210 and 220), the normal to the surface (lines 230 to 250), the incident ray (lines 260 and 270), the refracted ray

(lines 280 and 290), marks them in with arcs (lines 300 to 330) and labels them (lines 340 and 350).

It is a simple matter to colour the different rays in order to make them easily distinguishable.

REFRACT - ION OF LIGHT

```

10 REM REFRACTION
20 PRINT "IN THE FOLLOWING ENT
ER N,I AND R"
30 PAUSE 500
40 CLS
50 PRINT "ENTER 0 FOR THE UNKN
OWN VALUE"
60 PAUSE 500
70 CLS
80 PRINT "INPUT REFRACTIVE IND
EX": INPUT N
90 CLS
100 PRINT "INPUT ANGLE OF INCID
ENCE": INPUT I
110 CLS
120 PRINT "INPUT ANGLE OF REFRA
CTION": INPUT R
130 CLS
140 IF N*I*R<>0 THEN GO TO 20
150 LET I=I*PI/180
160 LET R=R*PI/180

```

```

170 IF N=0 THEN LET N=(SIN I)/(
SIN R)
180 IF I=0 THEN LET I=ASN (N*SIN
R)
190 IF R=0 THEN LET R=ASN (SIN
I/N)
210 PLOT 0,87
220 DRAW 255,0
230 FOR Z=50 TO 125 STEP 5
240 PLOT 127,Z
250 NEXT Z
260 PLOT 127,87
270 DRAW -80*SIN I,80*COS I
280 PLOT 127,87
290 DRAW 80*SIN R,-80*COS R
300 PLOT 127,117
310 DRAW -30*SIN I,-30*(1-COS I
),I
320 PLOT 127,57
330 DRAW 30*SIN R,30*(1-COS R),
R
340 PRINT AT 5,INT ((127-21*SIN
I)*31/255);"I"
350 PRINT AT 17,INT ((127+27*SIN
R)*31/255);"R"
360 LET I=I*180/PI
370 LET R=R*180/PI
380 PRINT AT 18,0;"N=";N
390 PRINT AT 19,0;"I=";I
400 PRINT AT 20,0;"R=";R

```

Refraction
by Graham Young

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Snake

on Lynx

Snake is a two player game written for the Lynx. The instructions are included in the program. Note that if you reverse direction, doubling back on yourself, then you hit your own tail and lose the round. The scoring system is such that the less points

you have, the better. The number of points gained depends on the time taken to crash into something, so the sooner you can force your opponent to crash, the more points you gain.

If you wish to move diagonally, then press and hold down two keys together. This works because the program reads the keyboard by means of the *Inp* function, as *KeyN* and *Key\$* do not allow multiple

key presses to be detected.

The procedure which is probably of most interest to users is *Proc point*. It finds the colour of the point with co-ordinates (x, y) and returns this value in variable c.

It works by calling *Rom* routines to read the three colour banks comprising the screens memory, and combining the contents of these banks to obtain the colour number.

PROGRAM OF THE WEEK

```

100 PROC INSTR
110 REPEAT
120   LET G=0,U=0
130   REPEAT
140     PROC SETUP
150     WHILE d=GREEN AND e=GREEN
160       PROC MOVE
170       PROC DIRECTION
180       PROC INCR
190       PROC CHECK
200     WEND
210     BEEP 2000,100,63
220     LET N=3000 DIV t
230     IF d=GREEN THEN LET W=1,G=G+N
240     ELSE LET W=2,U=U+N
250     INK BLACK
260     PRINT @ 12,30;"Player "W;" wins
    ?";
270     PRINT @ 33,5;G; @ 90,5;U;
280     PAUSE 30000
290     UNTIL G>99 OR U>99
300     BEEP 200*W,200/W,63
310     PRINT @ 3,45;"Player "W;" is the
overall winner ?";
320     PAUSE 50000
330 UNTIL FALSE
340 DEFPROC MOVE
350 INK RED
360 DOT A,B
370 INK YELLOW
380 DOT E,F
390 DOT E+1,F
400 INK BLUE
410 DOT P,Q
420 INK CYAN
430 DOT T,U
440 DOT T+1,U
450 BEEP 74,10,63
460 ENDPROC
470 DEFPROC DIRECTION
480 LET J=H,M=K,N=X,Z=Y
490 LET H=INT((NOT(INP(&0080) BNAND &001
0) DIV &0010)-(NOT(INP(&0080) BNAND &002
0) DIV &0020))
500 LET K=INT((NOT(INP(&0280) BNAND 8) D
IV 8)-(NOT(INP(&0280) BNAND &0010) DIV &
0010))
510 LET X=INT((NOT(INP(&0980) BNAND &002
0) DIV &0020)-(NOT(INP(&0980) BNAND 4) D
IV 4))
520 LET Y=INT((NOT(INP(&0880) BNAND 8) D
IV 8)-(NOT(INP(&0780) BNAND &0020) DIV &
0020))
530 IF H=0 AND K=0 THEN LET H=J,K=M
540 IF X=0 AND Y=0 THEN LET X=N,Y=Z
550 ENDPROC
560 DEFPROC INCR
570 LET E=C,F=D,C=A,D=B
580 LET A=A+H,B=B+K
590 LET T=R,U=S,R=P,S=Q
600 LET P=P+X,Q=Q+Y
610 LET t=t+1
620 ENDPROC
630 DEFPROC CHECK
640 PROC POINT(A,B)
650 LET d=c
660 PROC POINT(P,Q)

```

```

670 LET e=c
680 ENDPROC
690 DEFPROC SETUP
700 WINDOW 3,123,15,245
710 VDU 2,MAGENTA,4,2,GREEN,23,30
720 FOR B=1 TO 22
730   PRINT
740 NEXT B
750 LET t=0
760 LET A=19,B=128,C=A,D=129,E=A,F=130
770 LET P=234,Q=130,R=P,S=129,T=P,U=128
780 INK RED
790 DOT C,D
800 INK BLUE
810 DOT R,S
820 LET H=0,K=-1
830 LET X=0,Y=1
840 LET d=GREEN,e=d
850 VDU 1,BLACK,2,MAGENTA
860 PRINT @ 3,5;"Player 1: "G; TAB 20;"
Player 2: "U;
870 ENDPROC
880 DEFPROC INSTR
890 WINDOW 3,123,5,245
900 TEXT
910 PRINT TAB 17;CHR$(24)"SNAKE";CHR$(2
5);
920 INK BLUE
930 PROTECT YELLOW
940 PRINT @ 9,35;"The object of the gam
e is to surround"
950 PRINT "your opponent, forcing him to
hit your"
960 PRINT "tail, his tail or the border.
"
970 PROTECT BLACK
980 VDU 1,RED,31
990 PRINT TAB 15;"CONTROLS:"
1000 VDU 1,YELLOW,31
1010 PRINT "PLAYER 1:"
1020 PRINT "Cursor down..Left"
1030 PRINT "Cursor up....Right"
1040 PRINT "S.....Up"
1050 PRINT "Z.....Down"
1060 VDU 1,CYAN,31
1070 PRINT "PLAYER 2:"
1080 PRINT "Cursor left..Left"
1090 PRINT "Cursor right.Right"
1100 PRINT ";.....Up"
1110 PRINT "/.....Down"
1120 VDU 1,MAGENTA,31
1130 PRINT TAB 9;CHR$(18)"PRESS ANY KEY
TO START";CHR$(18);
1140 LET A$=GET$
1150 ENDPROC
1160 DEFPROC POINT(x,y)
1170 LET a=x DIV 8+32*y,b=2*(7-x MOD 8)
1180 CALL &0063,&0000+a
1190 LET c=(HL BNAND b) DIV b
1200 CALL &0063,&C000+a
1210 LET c=c+(HL BNAND b) DIV (b/2)
1220 CALL &0070,&C000+a
1230 LET c=c+(HL BNAND b) DIV (b/4)
1240 ENDPROC

```

Snake
by Chris Cytera

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Decay

on Spectrum

This program will demonstrate radioactive decay and was written by me in conjunction with a physics 'A' level syllabus. The program can be run on any ZX Spectrum (either 16 or 48K) and will produce a table of results either on a ZX printer or on the screen.

Program notes

10-20 Print out introduction letter by letter with

30 sound effects to make it more interesting.
 Sets dimensions for array (c) used to store number of atoms remaining — used to plot graph.
 40 Fills the screen while number of atoms etc are entered.
 50-80 Enter number of dice and number of sides each.
 90 Sets a\$ to hold column titles.
 100-150 Decide if output is on TV or printer.
 160 Prints title.
 170 And column titles.
 180 And initial values.
 190 Sets variables.
 200-215 Main loop.

220-260 Print results with correct spaces etc.
 270 See if loop needs to be done again.
 280 Closes "printer only" channel.
 290-340 Draw graph on screen (sideways to fit on all values with ink-paper the same colour so it is invisible, then graph is "copied" onto printer.

Note: screen display can be made visible by entering the following For N = 22528 To 23296: Poke N,56: Next N

Variables

a\$ introduction + column titles.
 B\$ choice of printer/tv output.
 A loops B number decayed C array F time N loops Y number of sides/dice Z initial number of dice.

```

1 REM Radioactive Decay
2 @ JAMES TIMMS 1983
10 LET A$="This is a computer
simulation of an experiment to
show radio-active decay. In the
original experiment, a number
of dice, each having only one
side coloured are thrown.
If the coloured side of a
die lands uppermost, it is re-
moved and said to represent a
atom that has decayed. The num-
ber of atoms decayed and the time
are recorded. The throws
are repeated until all of the at-
oms can be said to have decayed."
20 FOR A=1 TO LEN A$: PRINT A$
(N);: BEEP .01,10: NEXT A: PAUSE
750: CLS
30 DIM C(150)
40 FOR N=1 TO 11: PRINT ; PAPE
R 2; INK 6; FLASH 1; " RADIO
ACTIVE DECAY "
50 INPUT "How many atoms? "; Z
60 IF Z<0 THEN GO TO 50
70 INPUT "How many sides to di-
ce? "; Y
80 IF Y<4 THEN GO TO 70
90 LET B$="TIME DECAYED"
100 PRINT "A PRINTER NEEDS TO B
E CONNECTED TO OBTAIN A GR
APH": BEEP .1,5: PAUSE 100: CLS
110 POKE 23558,3: REM SCREEN
120 INPUT "Do you want the resu-
lts put on the printer? (Y/N)
"; B$
130 IF B$="Y" THEN PRINT AT 10,

```

```

0; "Output is now on the printer."
10 OPEN #2,"P": GO TO 160
140 IF B$="N" THEN CLOSE #2: GO
TO 160
150 GO TO 110
160 PRINT AT 19,0;"RADIOACTIVE
DECAY SIMULATION"
170 PRINT AT 20,0:A$
180 PRINT TAB 3;"0";TAB 11;"0";
TAB 22;Z
190 LET B=0: LET F=0
200 FOR A=B TO Z
210 IF INT (RAND*Y)+1=Y THEN LET
B=B+1: BEEP .01,0
215 NEXT A
220 LET F=F+1
230 POKE 23692,255: REM SCREEN
240 PRINT TAB 3;F;TAB 11;B;TAB
20;Z-B
250 IF F=21 AND B$="N" THEN PR
INT AT 0,0,A$;AT 21,0;"
260 IF F<150 THEN LET C(F)=Z-B
270 IF B<Z THEN GO TO 200
280 CLOSE #2
290 PAUSE 300: CLS
300 PAPER 7: INK 7: PLOT 0,167:
DRAW 255,0: PLOT 0,0: DRAW 0,17
5
310 PRINT AT 0,10;"ATOMS REMAIN
ING"
320 LET A$="TIME": FOR A=10 TO
13: PRINT AT A,0,A$(A-9): NEXT A
330 FOR A=1 TO 150: PLOT 0+C(A)
/(INT Z/250),167-A: NEXT A
340 LPRINT "Y AXIS": COPY : I
NK 9

```

Decay

by James Timms

Microradio

GW6JJN



Satellites

Each time I sit down to write this column, I think of some new computer application in the field of radio. There are so many, from electronic design to keeping QSL records — the card a station sends you to acknowledge your contact. Even big stations like local radio or the BBC will send you a card if you let them know when and where you heard them. This week though, I promised to talk about satellites — tracking them is one of the most in-

teresting microcomputer applications I can think of.

So what is a satellite? Well, the moon is a satellite and to many amateurs, is an important means of communication. The EME or Earth Moon Earth system involves bouncing signals off the moon in the hope they will reach some exotic location.

We can track the moon quite easily, at most times it can be easily seen. It is with the man-made satellites that a computer can help most. The latest of these, OSCAR 10, was launched only a month or two ago. OSCAR stands for Orbiting Satellite Carrying Amateur Radio, but these are not the only kind whizzing around. There are weather satellites, military satellites and even one called UOSAT (OSCAR 9) featured in PCW, 21-27 April, and in the care of the Universi-

ty of Surrey. UOSAT is of particular interest since it transmits data, both pictures of the Earth's surface in a form that can be displayed on an ordinary TV, and speech from a voice synthesiser that can be heard with a VHF receiver. I have found it several times myself — a disembodied voice from space.

So how do we use a computer to find a satellite? Well, without a computer you must look up tables and work it out with a great deal of mathematical effort. By the time you've worked out its position it's moved and you have to start again.

At this point I must mention AMSAT UK. This is the UK version of the Amateur Satellite Organisation and they publish a marvellous book called *Satellite Tracking Software for the Radio Amateur*. The

book consists of listings, applicable to most micros, to track most satellites. It costs less than £5 and is available from: AMSAT UK, 94 Herongate Road, Wanstead Park, London E12 5EQ. AMSAT will also supply newsletters and information for the cost of membership which is currently £6.

Not much space to continue this week so keep your letters coming and if you have any ideas relevant to the column, or listings, then let me know. Views on commercial software packages for microradio would also be interesting.

Ray Berry GW6 33N

This series of articles is designed for radio and microcomputer enthusiasts alike. If you have any queries that you want answered, hints and tips to share, or topics that you would like to see covered, write to: Ray Berry, Microradio, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.

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Tony Bridge's Adventure Corner



Adventure Int.

Back in 1978, microcomputing was an expensive hobby, and the devotees a small band. One of them worked at a Florida firm called Stromberg-Carlson, making telephone digital switches. Like many other people surrounded by large mainframe computers, he counted the hours until he could get down to some serious after-hours games-playing.

He discovered Adventure, the classic game by Willie Crowther and Don Woods. Intrigued by the unique blend of fantasy and logic, he wanted to share his delight with his friends — but they, of course, were not allowed near the sacrosanct machines.

Back home, therefore, the intrepid Adventurer sat down at his TRS-80 and translated the mainframe program to the micro, via an interpreter program that he wrote for the task.

His wife, meanwhile, was extremely fed up with the late nights, the long hours at work, and the early mornings spent hunched in front of the TRS-80. Grabbing the disk of the newly-written Adventure, she threw it in the oven.

Fortunately for the rest of us, she had forgotten to switch it on — and the couple are now several million dollars better off as a result.

The wife was Alexis Adams, her husband was Scott, and the program was *Adventureland*.

The first cassettes were mailed out in the Adams baby's bottle-liners — the quantities at first did not warrant special packaging, and manufacturers were not interested in the small numbers. This state of affairs, of course, did not last long! Soon, Scott Adams Computers opened the first shop in their retail chain, which is now known as Adventure International.

Alexis Adams, far from remaining anti-Adventure, actually went on to write, in part, the second program, *Pirate Adventure*, and most of the succeeding *Mystery Fun House* and *Voodoo Castle*.

Mrs Adams is not a programmer, and it was only possible for her to accomplish this with the aid of Scott's interpreter, which is at the core of AI's success. This program is a skeleton structure, which is fleshed out with the details of the individual Adventure. Information on rooms, including the text, together with objects, exits and riddles, is fed into the main program, and what emerges is the full-blown Adventure. This is how many of the larger software houses write a series of Adventures.

Back in Florida at the end of the '70s, the Adams series was translated to the Apple, a trend that has persisted to this day. Now the series is available for the Commodore machines as well as the Atari and the original Tandy and Apples.

No word yet of versions for some of the other popular micros, but AI surely cannot wait around much longer — they will be assured of a thousand-fold increase in sales, in the UK at least!

AI have not stood still on home ground, however. There are now several divisions, which include mail order, retail and business software, as well as the Expo Division, which organises computer fairs. The staff of 60 is presided over by Alexis, who has become Alexis Adams Inc.!

Adams himself, apparently still loves Adventure, and his personal favourites are *The Count* and *Mystery Fun House* — which are yours?

Scott Adams has brought joy to many thousands of Adventure enthusiasts with his programs, which he describes as fantasy computer novels, in which the player controls the development of events. Long may he continue to delight and frustrate us!

Alan Hunt has recommended several Adventures for the Vic20 that he has played and enjoyed. First of all, the Mysterious Adventure series, from Leisuresoft. The titles include *The Golden Baton*, *The Time Machine* and *Arrow of Death* (Parts 1 and 2). These are advertised by Leisuresoft, and also by Digital Fantasia — I imagine that they are the same programs!

Alan reckons that *Time Machine* is the best that he has tried so far. The series, which was written originally for the TRS-80 and Video Genie, has been added to recently with the release of *Escape From Pulsar 7*, *Circus* and *The Feasibility Experiment*.

Another Adventure that Alan has tried, and seems to like, is *Rescue From Castle Dread*, from Terminal Software (I hope the name is not taken too literally!), and is one of three Adventures from them.

This one must be written in Basic, as Alan has been able to alter the program to correct a small bug near the end — but he reckons that all these programs are good value for the Vic20.

Finally, this week, The Hobbit Hall of Fame.

1. Steve Howard.
2. Robert Woods who agrees with other people that this is the best Adventure yet — this is not one of the world's best-kept secrets, Robert!
3. Richard Bourne who is also having trouble with the rope in *Planet of Death* — at the start, Richard, you should find a sharp flint. Try using that, it may help!

Not too many names this week, but with the recent release of *The Hobbit* for the Oric-1, Commodore 64, and BBC machines, I'm looking forward to getting a flood of names shortly to add to the HHOF — although I'm sure that many people will be asking about the Goblin's Dungeon! Just remember, a friend in need . . .

This series of articles is designed for novice and experienced Adventurers alike. Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter. So, if you have an Adventure you want reviewed, or if you are stuck in an Adventure and cannot progress any further, write to: Tony Bridge, Adventure Corner, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.

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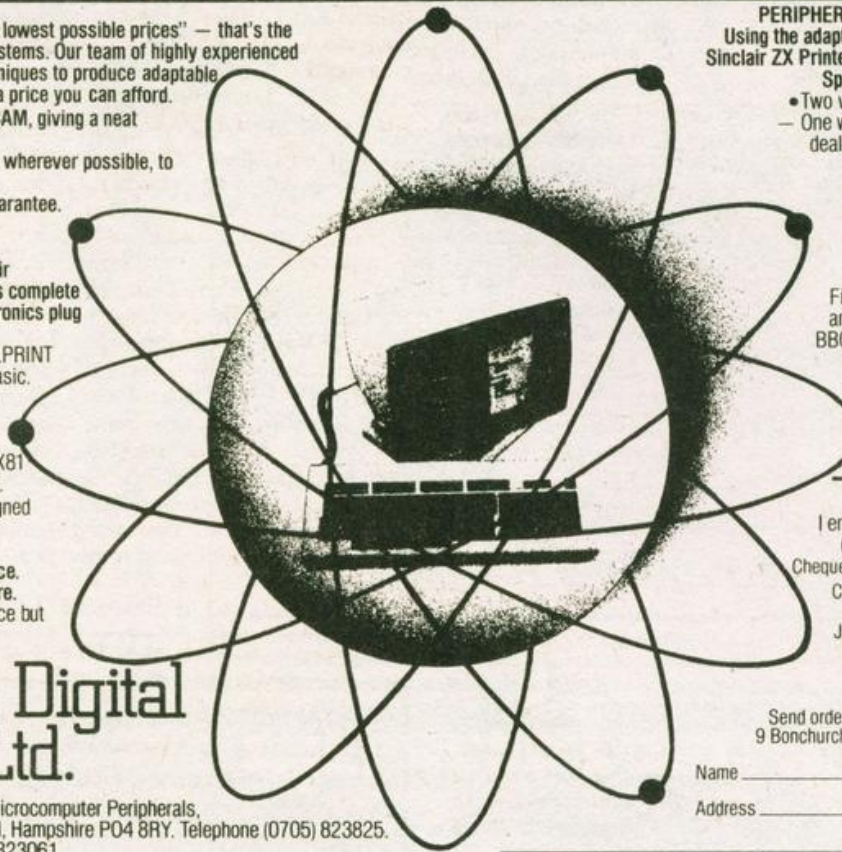
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BREAK DISABLE

E A Duncan-Dunlop, of Dan-y-Lan, Aberkonfig, nr Bridgend, writes:

Q I wish to disable the Break key on my Spectrum. I thought I could do it if I Load — Ld A,9 Ld I,A, IM2 and then move the interrupt up to 65129, where I might convert the key press so that it would be ignored if I pressed Break. But this does not work. Which part of the system tests for Break?

A A good guess, but in some routines the Break key is accessed directly and not via an interrupt. In routines such as Save, Load and Print this is so; of course if you are not using the keyboard scan you are going to get nowhere by moving the interrupt. Only if you are using Input and Inkey\$ can you disable the Break key in the way you describe.

PLUGGED PRINTER

Andrew Bell of Taywood Road, Thornton, Cleveleys, writes:

Q I own a 16K Spectrum, and have recently bought a printer. I would like to leave my printer plugged in all the time, but when I Load some games which auto-Run, the printer prints out the screen display. Could you please tell me why this happens, and how I can prevent it?

A I doubt that you can prevent it. If you do not want to un-plug the printer then you might have to resort to taking out the paper carrier, so there is nothing for it to print on.

I doubt whether the prob-

lem is as simple as the software house leaving a Copy command in the program, it is far more likely that for some reason they have diverted channel #3. This channel is used for such things as Lprint and Llist.

SPECTRUM JOYSTICK

Michael Hart of Broadway, Dunscoft, Doncaster, South Yorkshire, writes:

Q I am taking an O-Level technology course, and as a project I am building a programmable joystick interface for my 48K Spectrum.

My problem is this — how can I use the port at the rear to send information into the keyboard buffer so as to simulate a key being pressed? I cannot make head or tail of the diagram in the manual, or understand how the keyboard buffer is used.

A The Spectrum does not have a keyboard buffer. A key is 'pressed' or read by the computer when both the data line and the address line return the value of 0. The Spectrum has 40 keys, which are read by five data lines and eight address lines. These form a grid, so that any key can only have one way of returning the value 0 along address and data lines.

If you want to access this from the port you will have to use Port FE. Only if you input here will the keyboard scan be accessible. The address lines you need to deal with are A15 to A8, and the data lines from D0 to D4. To simulate a key press you will have to put a value of 0 on the appropriate data and address lines.

ACOUSTIC MODEM

Bruce Whitfield of Oldfield Park, Westbury, Wiltshire, writes:

Q I own a Vic20 and I am thinking of buying an acoustic modem for it. Will I need to buy a special port, as the user port on the Vic includes an RS232, which seems to be usable with any modem. How much will it cost in extra phone bills? Will I be able to dial any computer bulletin board in the UK, and will the

software be included with my modem to do this?

A The Vic interface is an RS232, but not an RS232C. The RS232 on the Vic can only deal with 0V to 5V, a modem needs a range from negative voltage up to +12V. While the one on the Vic can handle TTL chips, a full 12V will be a two and a half times increase on its maximum rating — the result might be burnt-out chips. You would therefore need a full RS232C if you want to use a modem with your Vic.

If you did have a modem then in theory you would be able to access any computer in the UK. However, in practice the amount of information you would need in terms of phone numbers, passwords, etc, would make it very difficult to enter more than a handful of bulletin boards.

COPY COMMAND

Phillip Adcock of Penn House, East Hanling, Norwich, Norfolk, writes:

Q I own a BBC model 'B' 1.20S and have a word-wise chip. I find it easy enough to Print using control B and C, to get listings. But after coming from a ZX81, I find I miss an equivalent to the ZX81's Copy command. Is there a way round this? I have an Epson Dot Matrix printer, an FX80.

And J Rundle of Longmeadows, Frimley, Surrey, writes:

I own a BBC B and a Centronics 739 parallel printer, can you tell me where I can get hold of a screen dump? All the ones I have seen are for Epsoms. Does nobody own a Centronics?

A The Sinclair Copy command is very useful but is only made possible because of the dedicated printer, and special control lines. You will need a conventional screen dump routine for this. Fortunately, there is an article on

the Epson in the June '83 edition of *Laserbug* which has various demonstration programs, including a screen dump.

You might also be interested, that because of mistakes in the manuals, Epson has published an errata sheet, which is available if you send an SAE to them. The leaflet has a lot of information directed especially at the BBC user.

As for the Centronics — there are other people who use a Centronics printer with their BBC, and it is the same issue of *Laserbug* to the rescue. There is a Centronics screen dump on page 20.

FULL SPACEBAR

D J Ridell of Caulker Bush, Southwick, Dumfries DG2, writes:


Q I have a 48K Spectrum and wish to get a full keyboard with a spacebar for it. Could you tell me who makes one? Also will the Interface 1 for the microdrive be incompatible with such a keyboard?

A I know of two keyboards with a full space bar, the Fuller FDS and the Fox keyboard. Both require you to remove the Spectrum circuit board from the existing case and fix it inside the new keyboard. This means that you will not be able to connect Interface 1.

None of the other solutions are ideal. Fuller can provide a buffer extension for their keyboard at extra cost, alternatively, you could buy the Maplin ZX81 keyboard and fix different legends to the keys (DK'Tronics might sell you some) since this one is connected to the computer by a ribbon cable.

In short, exactly what you require is not yet available, but I cannot see such an obvious gap in the market remaining unfilled for long.

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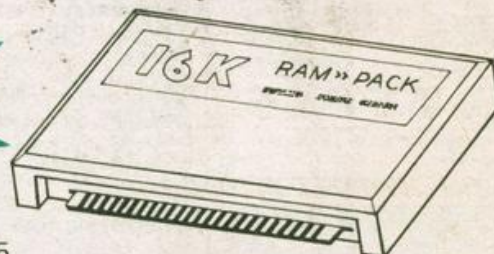
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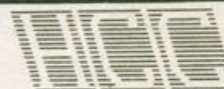
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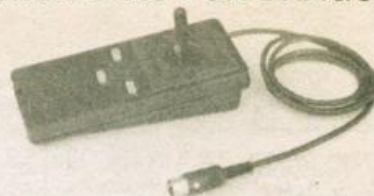
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Back Issues

Almost all the copies of PCW that you missed can still be bought as back issues for only 50p, including postage and packing.

An **index** of the contents of the 36 issues published in 1982 is now available from the Publishers for only £1.20. It includes full details of all the programs, routines, reviews and news that you might have missed.

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Please return to Back issues, PCW, 12-13 Little Newport Street, London WC2R 3LD.

NEW RELEASES

FORCE FIELD



Silversoft have just released four new titles, their first new ones in quite a while. All are for the Spectrum and are a mixture of 'shoot 'em up' and maze-style games.

Mission Impossible is a variant of *Lunar Lander* where you must move your spaceship through various asteroid belts to a safe landing and then blast your way back to the mother ship.

Things become difficult after the first couple of successes by the addition of a force field which you must blast through within a few seconds in order to escape.

The game is fairly addictive and perhaps that's what really matters; graphically, though, it is not up to the standard of the recent Quicksilver releases or *Ultimate Play the Game*.

Program *Mission Impossible*
Price £5.95
Micro Spectrum 16/48K
Supplier Silversoft
271/273 Kings Street
Hammersmith

DEADLY SPIT

No prizes for guessing where *Metagalactic Llamas Battle at the Edge of Time* comes from.

The proud llama has achieved its pre-eminence via Jeff Minter's other Vic20 games. *Metagalactic* (I'm not repeating the whole title again) continues the proud tradition.

Highly evolved llamas are used to defend the last outposts of earth. Using your joystick you must move your

llama and make it spit. The spit is deadly and must be bounced around the screen into the vicious arachnid mutants who will otherwise quickly evolve into even more deadly Weeviloids.

Program *Metagalactic Llama Battle at the Edge of Time*
Price £5.50
Micro Vic20
Supplier Llamasoft Software
49 Mount Pleasant
Tadley
Hants

DEACTIVATE

Alice in Wunderlab is an adventure game for the Commodore 64. The game pits you against a nuclear reactor which is melting down — a clock on the screen ticks away the seconds.

Your task is to deactivate the reactor. This involves finding your way around the power plant and solving various problems, like a drunken professor, before time runs out and you (and countless thousands more) are blown to bits.

There are three skill levels depending on how much of your lifetime you are prepared to spend on the game. The simplest level takes at least three hours.

Program *Alice in Wunderlab*
Price £7.50
Micro Commodore 64
Supplier Arthur Loosley
18 Longland Road
Sidcup
Kent

BUG-EYED

Fantasy Software, which is the new guise of Quest Microsystems has launched its first program — *The Pyramid*.

As Quest, the programmers built up a good reputation with arcade-style games like *Black Hole* and *Violent Universe*.

With *The Pyramid*, all the classic arcade features are retained, with at least the veneer of classic adventure themes.

A (highly simplified) version of the (highly ridiculous) plot is that you must fight your way through the 120 chambers of a mysterious pyramid.

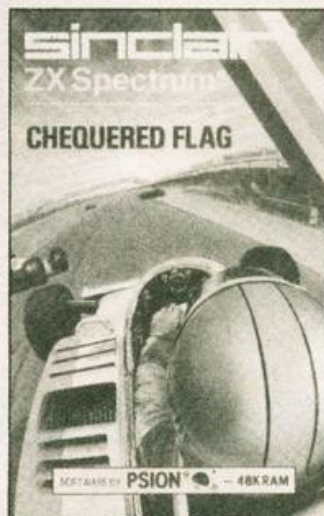
Each chamber is guarded by various kinds of alien from the fairly conventional bug-eyed monsters, to more arcane types like galactic tweezers.

To escape each chamber, you must survive long enough to collect an energised crystal and repeatedly drop it through the exit force fields, until they become deactivated.

As you pass through more and more chambers, so you will accumulate numbers which are revealed (almost) every time you leave a chamber. The numbers will form the basis of a competition to be announced later.

Program *The Pyramid*
Price £5.50
Micro Spectrum 48K
Supplier Fantasy Software
Falconberg Lodge
27A St Georges Road
Cheltenham
Glos GL50 3DT

LAP RECORD



Chequered Flag is the latest game to come from the Psion/Sinclair partnership.

A sort of ground-based *Flight Simulation*, it has the impressive graphics we've come to expect, with a smooth scrolling race track complete with trees and lamp-posts.

You can choose from a range of circuits and car types as you try to beat the lap record. Hazards include oil and water spillages which can cause you to spin off the track.

The only regret must be there are no other cars on the road to compete with — perhaps it was a problem of memory restrictions — but quite enthralling, nonetheless.

Program *Chequered Flag*
Price £6.95
Micro Spectrum 48K
Supplier Sinclair Research
Stanhope Road
Camberley
Surrey GU15 3PS

GURU

The big problem with running adventure games on the Vic is memory, most of the really compulsive games need at least 16K.

Romik have, however, managed to fit their range of text adventures into only 3K additional memory expansion.

The Sword of Hrakel appears to have all the classic ingredients — country under a curse which only you can lift, spells, sorcery, and mysteriously an enigmatic meditating guru in a dark gloomy forest.

Program *Sword of Hrakel*
Price £5.95
Micro Vic20
Supplier Romik Software
24 Church Street
Slough SL1 1PT

MUSHROOM

Caterpillar, sometimes known as *Snake*, has been around for a very long time and several versions of it have been printed in this magazine, amongst others.

Although addictive, the game is so simple in essence, that anyone trying to sell one had better ensure it is a cut above the rest.

The game involves moving a caterpillar around a garden eating food. As it eats it gets bigger — this is a problem, because the caterpillar must also avoid poisonous mushrooms that gradually fill the screen.

Gemini has a version of the game for the BBC B that retains the original scenario, but adds to it in the form of another snake which must also be avoided.

Program *Caterpillar*
Price £9.95
Micro BBC B (32K)
Supplier Gemini Marketing
18a Littleham Road
Exmouth
Devon EX8 2QG

GOTHIC HORROR



Battle the Ants in the Walled city of Antesch, it says on the box of Quicksilver's *Ant Attack* — they're not kidding.

Escher's nightmarish world of geometrical impossibilities coupled with monumental Gothic edifices is faithfully reproduced in *Ant Attack*.

The program gives you a three-dimensional view of the walled city — all grey walls and crenellations, and you can

change your viewpoint on the city, as though switching from one monitor to another, by simply pressing a key.

Forbidding as the city sounds, you must enter it to rescue a member of the opposite sex who has foolishly got her/his self trapped there (you can choose the sex of the victim!).

The ants will try to stop you of course — a few of their bites and that's it. An excellent piece of visually stunning Gothic horror from a company whose Spectrum programs seem to be getting better and better.

Program *Ant Attack*
Price £6.95
Micro Spectrum 48K
Supplier Quicksilver
Palmerston Park House
13 Palmerston Road
Southampton SO1 1LL

X-WORD

Crossword Puzzler is a program which generates crossword puzzles. It is divided into two sections: *Xword-Gen*, which builds up a datafile of

the words you have chosen and their positions, and *Word-Play*, which uses the data file you have created to create the actual crossword.

The program, designed for the BBC B, comes with a manual and three sample puzzles, including one based on the first crossword puzzle ever designed.

Program *Crossword Puzzler*
Price £5.00
Micro BBC B
Supplier National Extension College
18 Brooklands Avenue
Cambridge CB2 2HN

COWBOYS

Saloon Sally is the first BBC release from Psion that isn't adapted from an original version of the Spectrum.

One of its key features is having a heroine rather than a hero as its chief protagonist.

As Sally the saloon owner, you must protect your saloon from brawling cowboys and collect gold.

Also ventured is a highly appropriate soundtrack in the form of the saloon pianist's accompaniment.

Sally can defend herself from the brawling hordes by throwing chairs and tables — completing a screen, by collecting all the gold, moves you on to the next screen.

Program *Saloon Sally*
Price £7.95
Micro BBC A + B (32K)
Supplier Psion
2 Huntsworth Mews
Gloucester Place
London NW1 6DD

21 GAMES

Don't blink. You might miss another book coming out for the Electron. Whatever uncertainties some of the computer press may have expressed about its place in the market, the book publishers are in no doubt.

21 electrifying games for your Electron is almost what it says, 21 not bad by book standard, games with some vaguely useful notes on the various techniques involved in each.

Not, therefore, bad value, but wait a year and it'll be 50

games for half the price.

Book *21 Games for the Electron*
Price £5.95
Micro Electron
Supplier Granada Publishing
8 Grafton Street
London W1X 3LA

CRACK UNIT



Wintersoft's *Ring of Darkness* is considered by many to be the best ever game for the Dragon 32. It's perhaps surprising then, that the company has decided to issue its next program *Operation Gremlin* on the Oric.

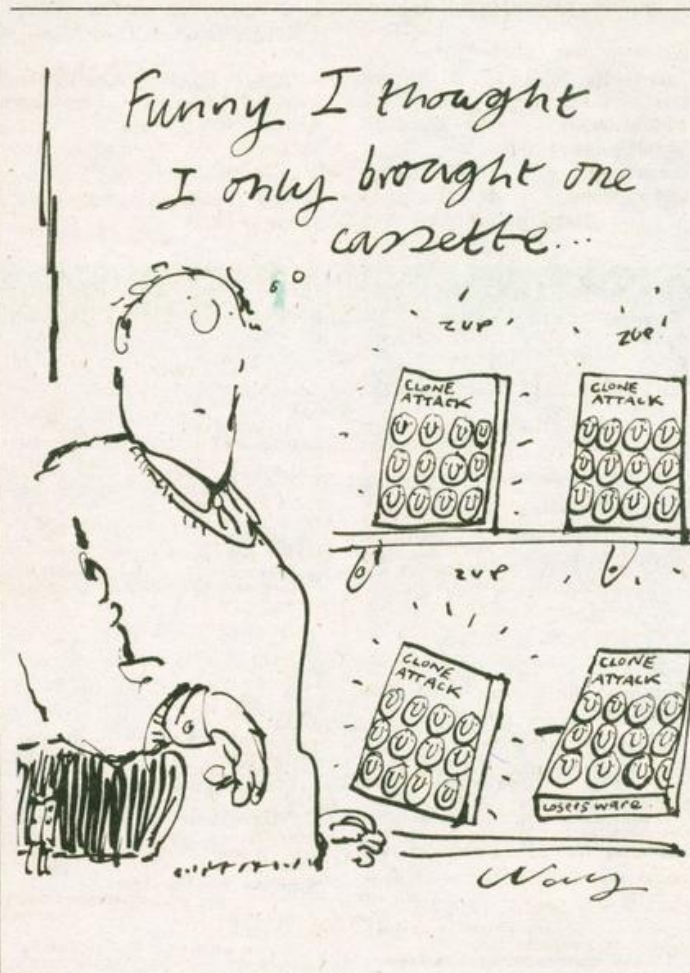
Described as a kind of arcade adventure mix, your objective is to clear the space city of Syron of the hordes of gremlins who have swarmed over it.

Using single key instructions you command a crack unit of troopers who must be supplied with weapons for their battle — you must also get them safely out of the city once the battle is won.

You will need a mixture of quick reactions and strategy to do well.

Program *Operation Gremlin*
Price £6.95
Micro Oric 1
Supplier Wintersoft
30 Uplands Park Road
Enfield
Middx EN2 7PT

New Releases is designed to let people know what software is coming on to the market. If you have a new game or utility which you are about to release send a copy and accompanying details to: New Releases, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.



Ziggurat



A slice of the cake

Many moons ago, I wrote a few pieces in this column on the growth of microcomputer ownership.

One of my points was that to extrapolate from present trends to the future was a difficult and risky occupation. I also mentioned the "logistic" curve.

The logistic curve, for those new to the term, is a growth curve which is based on the idea that the probability that a person will buy an item will depend upon the proportion of people already with that item.

Or, to put it another way, the more people there are with a computer, the more likely it is that a person without a computer will decide to buy one. However, as the number remaining without dwindles, although the proportional rate of purchase is increasing, the actual numbers involved are getting smaller.

In short, the market becomes saturated and the rate of purchase slows.

In mathematics, the number of items bought will be proportional to $p^*(1-p)$, where p is the proportion of individuals who have one of the items (assuming that, unlike me, most people only have one computer).

The shape of the logistic curve is an elongated "S".

The curve starts fairly flatly, ie, it takes some time for the growth in numbers of items to pick up. If the curve was extrapolated at this stage then the resulting prediction would be far too low. I remember reading an editorial in *Practical Computing* sometime in 1980 in which there was a prediction that by the end of 1983 there

would be 300,000 computers in the UK. Sinclair alone has sold far more than that. That prediction was made at the flat point of the curve.

After this part of the curve the slope gets steadily steeper and steeper, and it is in this portion of the curve that growth appears explosive.

The rapid growth continues for a time, but soon a third phase is reached in which the growth begins to slow, as the market begins to saturate.

I believe that microcomputers are now in this third phase, with the fastest of the growth being in the past. (I believe it has been passed for some months, but there are no figures to check.)

Soon we will enter the final phase, in which there will be next to no growth. Nearly everyone who might want a computer will already have one. Then the pattern will change. People will begin to replace their old computer with either a new version of their old model or a more advanced machine. In this period, the absolute number of computers will not grow greatly, but (as with the car industry) computer manufacture will continue steadily, being based on the exchange market.

If I am correct, the market for cheap introductory computers is about to decline. Any new manufacturer with a low-cost computer has no chance at all, and most of the later manufacturers of cheap computers seem to be on a knife-edge. Sinclair and Commodore, being among the first, seem somewhat safer.

A few months ago, at the time when the market seemed to be exploding, the clamour to have a piece of the action led to proliferation in companies supplying the ancillaries to computers — software, hardware add-ons, the specialist shops and the magazines.

Everyone seemed to behave as if the then projected (and inaccurate) growth rate would continue indefinitely.

Now computer manufacturers are losing money, are becoming bankrupt, software houses are folding, and one computer shop I have seen is selling BMX bikes as well!

Companies are now fighting, ever more fiercely, for a share of a smaller cake.

And the number of casualties is rising.

Boris Allan

Puzzle

5th November

Puzzle No 80

Jamie, Sue and Ben were standing outside the corner shop, examining the fireworks they had just bought.



Each had chosen a different selection of five fireworks, and each had spent exactly £1. The fireworks were priced as follows:

Golden Waterfall.....	12p
Krakatoa Cascade.....	14p
Fairy Fireglow.....	18p
Mine of Serpents.....	32p
Depth Charge.....	48p

If Jamie had at least one Golden Waterfall and Sue had at least one Depth Charge, which fireworks did each buy?

Solution to Puzzle No 75

The distance, D , walked across the heath (in yards) is equal to $\sqrt{(1320^2 + a^2)}$, where $a = 1760 - N$ and N equals the distance, in yards, travelled along the road. The time taken (in hours) is given by $(N/(4 * 1760)) + (D/(3 * 1760))$.

The program tries different routes, the times for which are entered into the dimensioned array, $A(N)$, and checked to find the shortest.

```
10 DIM A(1760) 20 FOR N = 1 TO 1760 30 LET D =
SQR((1320 * 1320) + (1760 - N) * (1760 - N)) 40
LET A(N) = (N/(4 * 1760)) + (D/(3 * 1760)) 50 NEXT N
60 LET T = 1 70 FOR N = 1 TO 1760 80 IF A(N) < T
THEN GOSUB 200 90 NEXT N 100 PRINT "
SHORTEST ROUTE — LEAVE ROAD", "AFTER "M;
"YARDS" 110 STOP 200 LET M = N 210 LET T =
A(N) 220 RETURN
```

Running the program shows that the quickest route is to leave the road 263 yards from Longfield.

Winner of Puzzle No 75

The winner is: Tim Clapp, Haseley Knob, Warwick, who receives £10.

Top 10

- BBC***
- (1) Planetoids (Acornsoft)
 - (2) Killer Gorilla (Program Power)
 - (3) Hopper (Acornsoft)
 - (4) Philosopher's Quest (Acornsoft)
 - (5) Snapper (Acornsoft)
 - (6) Arcadians (Acornsoft)
 - (7) 3D Bomb Alley (Software Invasion)
 - (8) Dr Who, The First Adventure (BBC Soft)
 - (9) Alien Swirl (Program Power)
 - (10) Rocket Raid (Acornsoft)
- *All Model B
(Figures compiled by Micro Management, Ipswich 0473 59181)

Top 10

- ZX81***
- (1) Flight Simulation (Psion)*
 - (2) Football Manager (Addictive Games)
 - (3) 1K Chess (Artic)*
 - (4) 1K Games (Artic)*
 - (5) Asteroids (Quicksilva)
 - (6) QS Scramble (Quicksilva)
 - (7) Defender (Quicksilva)
 - (8) Geography (ICL)
 - (9) Espionage (Artic)
 - (10) Space Raiders (Psion)
- (Figures compiled by Websters & Co.)
*Runs in 16K. †1K.

Top 10

- Dragon**
- (1) Talking Android Attack (Microdeal)
 - (2) Mined Out (Quicksilva)
 - (3) The King (Microdeal)
 - (4) Cuthbert Goes Walkabout (Microdeal)
 - (5) Frogger (Microdeal)
 - (6) Ring of Darkness (Wintersoft)
 - (7) Space War (Microdeal)
 - (8) Wizard War (Salamander)
 - (9) Caterpillar Attack (Microdeal)
 - (10) Dragon Trek (Salamander)
- (Figures compiled by Boots & Co., London)

Top 10

- Vic20**
- (1) Grid Runner (Limasoft)
 - (2) Arcadia (Imagine)
 - (3) Wacky Waiters (Imagine)
 - (4) Catcha Snatcha (Imagine)
 - (5) Laser Zone (Limasoft)
 - (6) Escape MCP (Rabbit)
 - (7) Abductor (Limasoft)
 - (8) Paratrooper (Rabbit)
 - (9) Frantic (Imagine)
 - (10) Bonzo (Audiogenic)
- (Figures compiled by Boots & Co., London)

- Atari**
- (1) Blue Max (Showcase)†§
 - (2) Ultimate II (Sierra on-line)‡
 - (3) Miner 2049er (Big Five)*
 - (4) Arcade Machine (Broderbund)‡
 - (5) Shadow World (Showcase software)†
 - (6) Bolders and Bombs (CBS)*
 - (7) Repton (Sirus)‡
 - (8) Preppie (Adventure International)
 - (9) Bug Off (Adventure International)
 - (10) Arrow of Death (Channel 8)
- *Cartridge. ‡32K cassette. †48K disc. §32K disc.
(Figures compiled by Calisto Computers, Birmingham 021-632 6458)

Books

- (1) Advanced User Guide for the BBC Micro, Bray, Dickens and Holmes (Cambridge Micro Centre)
 - (2) BBC Micro Book, Basic Sound and Graphics, McGregor and Watt (Addison-Wesley)
 - (3) Advanced Graphics on the ZX Spectrum, Angell and Jones (Macmillan)
 - (4) Commodore 64 Programmers Reference Guide, Commodore (Commodore)
 - (5) Spectrum machine language for the absolute beginner, Tang (Melbourne House)
 - (6) Master your ZX Microdrive, Pennell (Sunshine)
 - (7) Structured Programming with BBC Basic, Atherton (Horwood)
 - (8) 6809 Assembly Language Programming, Leventhal (Osbourne)
 - (9) A Hundred Programs for the BBC Micro, Gordon (Prentice-Hall)
 - (10) Supercharge your Spectrum, Webb (Melbourne House)
- (Figures compiled by Watford Technical Books, Watford 0923 23324/Prestel 28844)
(Last weeks position in brackets)

Spectrum

- (1) Zzoom (Imagine)*
 - (2) Jet Pac (Ultimate)
 - (3) Flight Simulation (Psion)*
 - (4) Terror-dactyl 4D (Melbourne House)*
 - (5) Tranz-Am (Ultimate)
 - (6) Psst (Ultimate)
 - (7) Zip Zap (Imagine)*
 - (8) Kong (Ocean)*
 - (9) Horace and the Spiders (Psion/Melbourne House)
 - (10) Arcadia (Imagine)
- *Requires 48K
(Figures compiled by W H Smith and Son, London)

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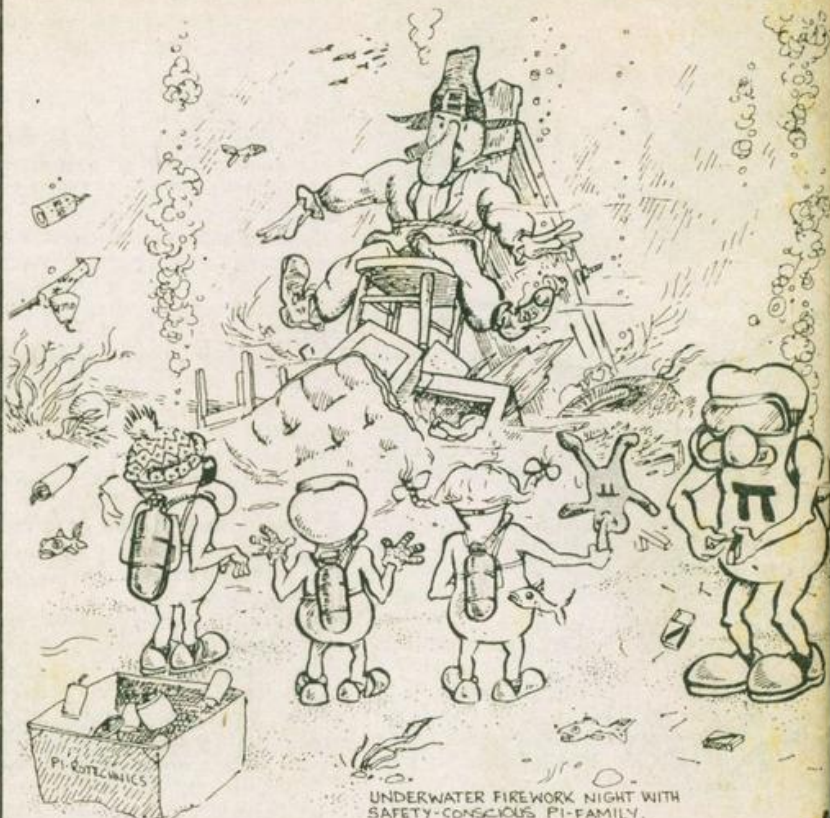
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