POPULAR Computing WEEKLY

35p 9-15 June 1983 Vol 2 No 23

This Week

Vic20 software
Mike Grace looks at a range of Vic20 games including *Traxx*, *Lair*, *Jumpin' Jack* and *Starship Escape*. See page 14.

Spectrum paint
Ian Logan presents a series of programs to 'fill-in' triangles, rectangles and circles on page 20.

Dragon scroll
Peter Chase explains how to scroll and shift blocks of memory and presents a simple demonstration game where you must avoid oncoming coloured blocks. See page 22.

New releases
All the latest games for a host of machines including *3D Combat Zone* from Artic and *Vultures* from J Morrison (Micros). See page 45.

★STAR GAME★
Muncher on 16K ZX81.
See page 10.

News Desk

Wealth of new software at ZX fair

THERE was plenty of interest for the 8,000 visitors to London's 7th ZX Microfair, held last Saturday at the Alexandra Pavilion.

Most of the 140 or so exhibitors were software houses, once again demonstrating the strength of independent support for the Sinclair machines.

Of the companies exhibiting for the first time the Edinburgh-based Protek made the biggest impact with six titles for the Spectrum and ZX81. Other newcomers were Elephant, Electra, Gilsoft and Apocalypse. Vortex and Quest both appeared at a show for the first time with *Gun Law* and *The Black Hole*, respectively.

Romik, best known for its Commodore and Dragon material, launched into the ZX arena with four titles for the Spectrum — *3D Monster*

Continued on page 5

98K Lynx in the high street soon!

A 96K version of the Lynx microcomputer should be in the shops at the end of this month. Camputers hopes to display the new Lynx-96 at the Earls Court Computer Fair beginning on June 16.

The enlarged Lynx will cost £299 and will include some Rom features not available on the 48K machine. It will have printer-driver routines for both serial and parallel interface printers and a number of pre-programmed sound effects. In all the 96K machine will have 20K Rom compared with the Lynx-48's 16K Rom.

It will be possible to upgrade the present 48K Lynx to 96K by sending your machine back to Camputers, but it will cost £89.95. That price includes both the Ram and Rom up-grades.

In August, Camputers hopes to launch its delayed Lynx disc drives. These will be 5¼ inch, single-sided, double-density, 40-track, disc drives.

Continued on page 5

Classified

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DRAGON GAMES by Brother Software. Maze Men, £5; Adventure, £5; Dambusters, £4; Cat and Mouse, £4. Cheque/PO to A. Brown, 25 Augustus Close, St Albans, Herts.

Continued on page 44

Critical review?

"The sound commands on the Oric 1 are, for a computer of this price, very sophisticated. Three music channels, and one noise channel, mean that you can program some fairly complex sounds."

POPULAR COMPUTING WEEKLY

"Oric is everything you hoped it would be. Alive with colour, and zapping with built-in sound effects, the Oric looks like a match for any machine now selling for less than £200"

YOUR COMPUTER

"The 16k Oric – fighting the 16k Spectrum – is £25 cheaper. It feels a good deal more 'professional' than the home-appeal Sinclair. Oric's sound is extremely versatile, and well up to the standard of the £300 or £400 BBC microcomputer made by Acorn."

WHICH MICRO?

"Oric was over twice as fast as the Spectrum. Surprisingly perhaps the Oric, which initially seemed only faster when performing the simplest of calculations, has come back to beat the Spectrum by a small amount. As the problems get more complex the Oric comes into its own. One final point – in entering the benchmark tests – the Oric was certainly the easiest to handle."

WHICH MICRO?

"This slope coupled with the design of the keys makes the Oric an easy machine to touch-type on. All keys have auto-repeat and there are four keys dedicated specifically to cursor control. It is certainly easier to type on than any of Sinclair's offerings."

YOUR COMPUTER

"Oric will soon be selling a Modem so that Prestel will become available. Owners will be able to accept telesoftware – programs loaded straight down the phone line – eventually electronic mail could come into the home by the same route, and with the addition of a tape recorder the Oric with its Modem could become a telephone answerer and message taker."

YOUR COMPUTER

"One good feature of the Oric is an on-screen reminder in the top right hand corner to show that you've engaged all-capitals mode. So much better than the BB's variety of lights in the corner of the keyboard. The Oric is sound, simple to get along with and offers great expansion potential."

WHICH MICRO?

"When compared to the stogginess of the Spectrum's keyboard this is certainly an improvement. I can't see any Orics failing through bad assembly. If only the £2400 IBM were so easy to use."

WHICH MICRO?

"Instead of the Spectrum's 28 look-up single-character error reports, the Oric has 18 self-explanatory messages. If you actually want to do computing, rather than just exploring the world of off-the-shelf games programme entertainment the Oric will be a better buy."

WHICH MICRO?

"A good speaker and built-in noises get the Oric's sound off to a good start. Typing Zap, Ping, Shoot or Explode produces convincing arcade game noises which can easily be incorporated into any program."

YOUR COMPUTER

"The modem is certainly unusual in a machine of this price. Together with the other peripherals, when finally available, it should make for an attractive package for a small business... surely a match for machines costing much more"

POPULAR COMPUTING WEEKLY

ORIC-1

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POPULAR Computing WEEKLY

9-15 June 1983 Vol 2 No 23

SUNSHINE

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How to submit articles
Articles which are submitted for publication should not be more than 3,000 words long. The articles, and any accompanying programs, should be original. It is breaking the law of copyright to copy programs out of other magazines and submit them here — so please do not be tempted.

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 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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Editorial

Robotics looks like becoming the next high technology industry to undergo a 'boom'. Not this month, or next month, or even next year, but soon.

Robotics, for those who are unfamiliar with the term, is the science of robots — machines that can walk, talk, speak, understand commands and otherwise imitate human behaviour.

Robots have been popularised by science fiction authors such as Isaac Asimov and in films such as *Star Wars* but, until recently, there has been little sign that robots would ever become more than fictional characters. Admittedly, industrial robots are becoming increasingly common, particularly in Japan, but they are specialised machines dedicated to particular tasks. They do not possess the intelligence, adaptability or mobility which are the hallmarks of the true robot.

Now, however, companies which have specialised in microcomputers and other high technology areas, are actively looking at 'home' robots. Atari founder Nolan Bushnell has already set up a new company — Androbot — to develop and manufacture such robots.

The microcomputer 'boom' still has a long way to run, but companies such as Sinclair might be well advised to start working on personal robots before they get left behind. But then, who knows? Maybe Sinclair is already developing a 'metal mickey' of his own.

Next Thursday

Play our Star Game and try and line up four counters horizontally, vertically or diagonally. Connect 4 — next week's game for the BBC by M Kendrick.

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WINDOW ON ANOTHER WORLD

NEW RELEASES

STAR JAMMER — Wiping the sweat from my brow, I searched the inky blackness, ahead for signs of enemy fighters. Through Star Jammer was the best ship in the galaxy, my dwindling energy reserves made me doubt I could reach the next stargate . . . (a one-player space arcade game requiring one joystick).

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Salamander Software

ZX microfair

Continued from page 1

Maze, Colour Clash, Galactic Trooper and *Spectra Smash.*

Nearly all of the established houses presented new titles for the Spectrum. Artic showed *3D Combat Zone, 3D Quadracube, Cosmic Debris* and *Sys 64* (a 64 column printer routine). Abersoft had *The Wizard's Warriors*, Lothlorien displayed a new wargame, *Johnny Reb* and PSS showed *Light Cycle.*

Both East London Robotics and Fuller were up-grading 16K Spectrums to 48K on the spot, while FB Electronics demonstrated a 24-line port and motherboard for operating a Colne Robotics Zeaker Micro Turtle.

Adding some controversy to the show, Scimitar and Keysoft both exhibited programs enabling back-up copies of 'protected' software to be made — *Zap 2* and *The Key.*

Descent into the valley!

A ROW has broken out between two software companies, both selling games called *The Valley.*

Magazine publisher Argus Specialist Press is claiming that a program first advertised by

Kayde as *The Valley* — and now called *The Swamp* — is in fact a version of a game published in listing form in the magazine *Computing Today.*

"The Kayde program is definitely a version of the game published in the April 1982 issue for the Pet and TRS-80", claimed Henry Budgett, Argus' Group Software Editor. Since then Argus' software division had produced versions of the game on cassette for the Pet, Vic, Apple, Atari, BBC, Spectrum and Dragon machines.

Kayde put out its program called *The Valley* for the 16K Vic20 in the summer of 1982 and has followed that with versions for the Oric 48K, Spectrum 48K, New Brain, Dragon 32 and Commodore 64.

Following recent heavy advertising of its *Valley/Swamp* program, Kayde has been contacted by Argus who has asked for the titles to be withdrawn.

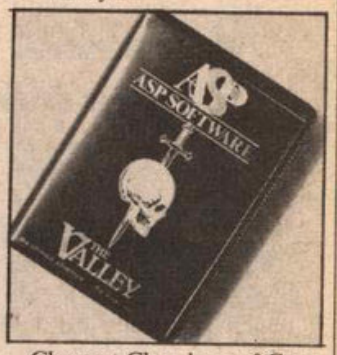
Kayde's Dean French, who confirmed that he had received the communication from Argus, said: "Our response is that we will continue to sell the game. It is true that our programmer took the idea for the game from the magazine, but it is entirely our own conversion. We had the game available for the Vic, long before Argus ever did.

"We have every intention of continuing with the program," he added.

Argus' company secretary, Mike McKenna commented "We have now referred the matter to our legal advisors."

There have been two previous occasions where Argus has argued that the copyright in its *Valley* program has been infringed. In both cases the companies involved have agreed to pay Argus compensation.

The more recent of the two cases concerned the London-based software house Computer Rentals. The program involved, *The Orb*, for the Spectrum, was withdrawn from sale and Computer Rentals paid Argus a "very substantial sum of money".



Clement Chambers of Computer Rentals said: "*The Orb* was created specially for us. We had never seen a copy of *The Valley* and, as soon as Argus contacted us, we agreed to withdraw our title."

98K Lynx

Continued from page 1

The drive comes with its own Lynx operating system. The single disc unit plus operating system and controller card will cost £343.85. Subsequent drives — up to three more can be connected — will not require further controller cards and will be priced at £228.85.

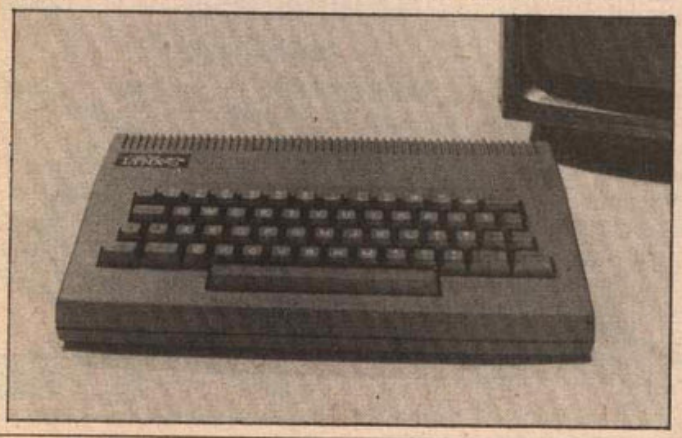
Neither the present 48K machine or the new 96K model are capable of supporting CP/M. For that the 128K Lynx is required. That machine, together with a CP/M card for the disc drive, is planned for the autumn, price tentatively put at around £440.

Those with either of the two smaller Lynx models will have to buy an up-grade to run CP/M.

The Lynx is, in theory, infinitely expandable. It incorporates a unique method of switching blocks of 64K Ram, enabling the Z80 processor at the heart of the Lynx to handle more than 64K.

However, whichever model is used, only a portion of the Ram can be addressed by the Lynx Basic. There is only 13.75K Basic Ram available in the 48K machine and 37.5K available in the 96K model.

The screen drive (each pixel on the Lynx screen is dot-addressable in eight colours) take up a further 32K which leaves, in the case of the 48K machine, nothing, and in the case of the 96K model, 24K. This remaining memory on the new model can be used for machine-code storage or to hold another language or operating system loaded from either disc or cassette.



Commodore goes for broke

THE price of the Commodore 64 computer will come down substantially in July.

This will form part of a complete review of Commodore's pricing structure. The Vic20 will stay in its new package together with the data recorder and software at £139.99, but the rest of the range will be repriced.

No details of the new prices are so far available but the cost of the Commodore disc drives and Rom cartridge software will fall in addition to the cost of the Commodore 64.

How far the 64 comes down will depend on how close to the Vic20 price the company can go without affecting sales. The Commodore 64 machine is certainly not selling as well as Commodore would like at its present £345 price.

In the US, the machine sells in a special discount scheme for $239 (around £155).

If the 64 comes down anywhere near that price it will put pressure on manufacturers like Dragon and Computers to reduce their prices further.

Electron goes bi-lingual

ACORN now has a version of BBC Forth running on its new Electron machine.

Still in the prototype stage, Electron Forth required almost no modification from the BBC version. So far there is no indication of when the Electron Forth will be available, or how much it will cost.

● BBC Forth itself is now on sale. It is available on cassette or disc, priced at £16.85 and £19.90 respectively. A manual is also available — price £7.50. BBC Forth occupies about 11K Ram. This means that you cannot run Modes 0 to 3 on a BBC Model B with Forth. To solve this, Acorn is working on a Rom version, which is now well advanced.

DRAGON 32 OWNERS

NEW FROM MICRODEAL

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TELE-TUTOR 1

SPELLING TEST

This programme is designed to give a standard oral spelling test, using the sound track of the tape-recorder, to dictate either single words or words and sample sentences. The responses are then typed using the keyboard, which will subsequently be displayed on the screen and, if required, can be kept as a permanent record using a printer.

WORD DRILL

This programme is designed to give a multiple choice vocabulary quiz. Words and their definitions are entered into the programme using the keyboard or from a previously prepared tape file. The computer will then display randomly selected definitions with a choice of eight words. The correct word must be chosen before the preset timer reaches zero. This programme could be used for words and definitions, a geographical quiz, chemical formulae, etc.

MATHS DRILL

This programme is designed to help children practise addition, sub traction, multiplication and division.

- Programmed for up to 6 students
- Answers are written as on paper
- Division can be written showing "remainder"
- Ten different skill levels
- "Smiley" face and graphics used as rewards
- Skill levels adjust to ability
- Problems timed
- Correct answers are displayed if error made
- Full report at end of test

ESTIMATE

This programme is designed to help children practice their mental arithmetic. A selection of addition, subtraction, multiplication and division is given.

- Programmed for up to 5 students
- Five skill levels
- Time taken to answer is recorded
- Correct answers are displayed if error made
- Full report at end of test

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TELE-WRITER WORD PROCESSOR	£49.95
TELE-TUTOR	£25.00

HARDWARE

JOYSTICKS *pair*	£19.95
LIGHT PEN WITH PROGRAMS	£12.00

Tele-Tutor costs £25 on cassette and is

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Access AMERICAN EXPRESS

LETTERS

A vested interest

Following your editorial concerning Top 10 Charts (12-18 May edition) I really feel you are being incredibly naive in expecting anybody to compile (or believe in) a chart based on manufacturers' actual sales figures. Can you imagine that any of the big software houses would admit that their multi-page, mega-colour advertisements had not each sold a million? Or conversely, after 20 full-colour pages of hype that they have yet to write a program? Manufacturers have a vested interest in promoting their own image and so their figures cannot be relied upon.

For the past year or so the Buffer Shop has had the thankless (and totally unpaid) task of providing the "Sinclair" Top 10 lists to a variety of magazines. The figures are obtained by the simple means of counting the tapes on the shelves each week. Of course our charts are not fully representative because, although we keep a larger range of software for Sinclair micros than anyone else, we stock only the tapes we like or that appear to have some value. We reject those that we consider to be trash, "copy-cats" or that just do not hold our interest, even if they are nationally advertised and stocked by the chain stores.

As with the pop record industry, the most sensible way of judging sales is to average the charts supplied by a number of shops, even though this would mean that the magazines would have to do a little work themselves, for a change. It would also have the beneficial effect that it might relieve us of the stream of attempted bribes, coercions and general incompetence that we fend off every week. On the other hand, how honest can any magazine be when faced with pressure from big, free-spending advertisers? Which magazine will put honesty and integrity before profit and accept advertising only for products which are actually available?

M Howard
Buffer Micro Shop
310 Streatham High Road
London SW16 6HG

If you look closely at our editorial of 12-18 May, you will see that we never expected anyone to compile (or believe in) a chart based on manufacturers' actual sales figures. What the editorial actually said was: "What is needed is an independent chart which accurately reflects the state of the market. But, such a chart could not be compiled by any one magazine, software company or retail chain.

"Ideally, the Computer Trade Association should approach a body such as the British Market Research Bureau and ask it to compile a Top 10 chart."

Since the publication of this editorial we have been in contact with both the CTA, the BMRB and other market research organisations, with a view to compiling just such an independent chart.

Fair play!

With regard to the Softek compiler payments dispute, it should be clear to anyone with a sense of fair play that Softek are wholly justified in demanding royalties on any commercial program which makes use of their compiler. After all, Softek are paying royalties to Sinclair Research for the use made of the Spectrum operating system by Softek programs — aren't they?

Alan Clayton
West View
Blakenhall
Nantwich
Cheshire

Memory gobbler

The letter from C Whitehead (*Popular Computing Weekly* Vol 2 No 15) made a valid point. However, the suggested improvement to "Board Game" gobbles up more memory, when Run, than the original listing. The problem memory user is the dimensioned array (*10 Dim Table (75)*). The original handling takes 400 bytes to write, while the suggested improvement takes only 200 bytes to write — but 600 bytes to Run!

I have enclosed an alternative listing for the *Inkey$* handling, which takes only 140 bytes to Run.

```
550 A$=INKEY$:IF
    A$="" THEN550
560 IF A$="X"THEN
    10
570 V=VAL(A$):IF
    V>0 AND V<8 THEN
    C=20*V+5:F1=1:
    GOTO 750
580 V=ASC(A$):IF
    V>64 AND V<76
    THEN D=(V-64)*
    20+5:F2=1
```

E Wells
129 St Richards Rd
Deal
Kent CT14 9LD

Not letting on!

I have a tape that my dad bought me. The tape is called *Escape*. I found out the secret code in 10 minutes — it was the easiest game I have ever had. When I started again, I timed myself — it took me 11.14 seconds to get out. I know the secret code off by heart, but I'm not telling you!

Michael Lunn (10½)
47 Westbury Drive
Macclesfield
Cheshire
SK11 8LJ

The wrong use

I was disappointed to see Chris Seely's *Pythagoras* program on the Spectrum page of your magazine (*PCW*, Vol 2 No 17).

I have been following the debate on uses of computers for education quite closely, and I feel that this is the wrong use for them. Any pocket calculator could do what that program does.

So I have enclosed a short program which demonstrates Pythagoras' theorem graphically, which I feel is of more educational value than the one shown.

```
  10 PRINT "  This program demon
strates      PYTHAGORAS' THE
ORY"
  11 PRINT AT 21,0;"PRESS ANY KE
Y TO CONTINUE": PAUSE 0: CLS
  20 PLOT 40,40: DRAU 30,0: DRAU
 0,40: DRAU -30,-40
  30 DRAU 0,-30: DRAU 30,0: DRAU
 0,30
  40 PRINT AT 16,7;"A": DRAU 40,
0: DRAU 0,40: DRAU -40,0: PRINT
AT 13,19;"B"
  45 PRINT AT 12,7;"C"
  50 PRINT AT 1,6;"THIS IS A TRI
```

```
ANGLE WITH SQUARES ON TWO OF ITS
 SIDES"
  60 PRINT AT 3,0;"IF WE DRAW SQ
ARE A ON THE THIRD SIDE"
  70 PAUSE 50
  80 DRAW -24,18
  90 DRAW -30,-24: DRAW 24,-38
  91 PRINT AT 6,0;"PRESS ANY KEY
 TO CONTINUE": PAUSE 0
 100 DIM D$(32): FOR I=1 TO 6: P
RINT AT I,0;D$: NEXT I
 110 PRINT AT 1,0;"IF WE NOW DIV
IDE SQUARE B UP IN TO PIECES"
 111 PAUSE 50
 120 PLOT 99,89: DRAW 0,-40
 130 PLOT 99,89: DRAW 26,0
 140 PRINT AT 3,0;"NOW WE CAN PU
T THESE PIECES ON  THE THIRD SID
E."
 150 PLOT 40,49: DRAW -32,24: DR
AW 16,16: DRAW 16,-16
 160 PLOT 55,107: DRAW -16,16
 170 DRAW -16,-24: DRAW 16,-32
 180 PLOT 17,73: DRAW -0,6: DRAW
 12,16
 182 PRINT AT 6,0;"PRESS ANY KEY
 TO CONTIUE"
 183 PAUSE 0
 190 FOR I=1 TO 6: PRINT AT I,0;
D$: NEXT I
 200 PRINT AT 1,0;"SO IT CAN BE
SEEN THAT                (A*A)+(B*B)
=(C*C)"
```

Ian Turton
111 Barden Rd
Tonbridge
Kent

Unnecessary change

Recently the Top 10 list for the Vic20 has had a change of source, from 'The Vic Centre' to 'Boots & Co'. This seems to me an unnecessary and unfair change, since the range of software held by the Vic Centre is far superior to that of Boots. This is from personal experience in trying to find certain products.

The Boots software section consists of Commodore, Bug-Byte, Audiogenic, Imagine and Thorn EMI cassettes and cartridges, whereas the Vic Centre carries all these products and many more including Llamasoft, Rabbit and Interceptor. On many recent occasions, Llamasoft has occupied the top two places and more in your list (on 31 March, five out of the 10 including 1, 2, 3), but since the change in source none of the Llamasoft programs have appeared. Considering the widespread knowledge of *Grid Runner*, this surprises me.

Surely it is sensible to use a source which bases figures on a wider range of software, such as the Vic Centre?

D Smith
20 Down Close
Northold
Middx

Unfortunately, the Vic Centre has closed its retail outlet, hence the switch to Boots, However, we are actively seeking ways of making the Top 10 charts as representative as possible.

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Muncher

A new game for the 16K ZX81 by S Lancaster

This games program for the 16K ZX81 is called *Muncher*. You control the *Muncher* with the cursor keys, eating the dots and dodging the two ghosts which do their utmost to eat you. This game has an added twist which makes it more difficult, because you cannot go back on the trail of black squares you leave behind.

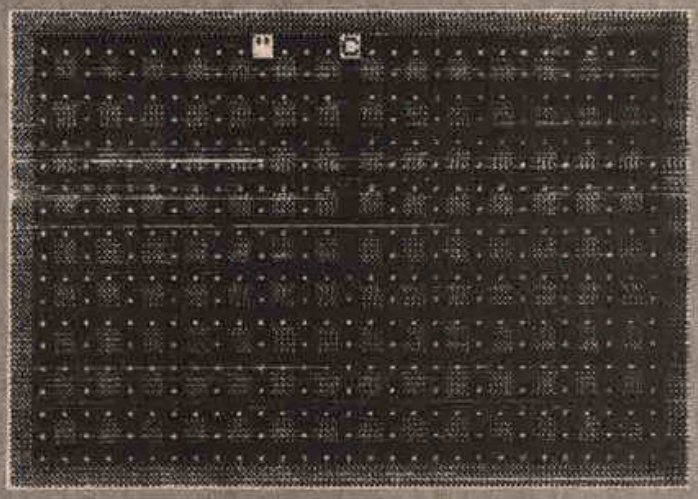
However, the ghosts leave trails of dots which may let you retrace your path, if you are lucky and you last that long. When you are caught by the ghosts your score — the number of dots you have eaten — is given. The game starts again when any key is pressed.

Lines 10+ set up the maze. Lines 20+ set up the score and the positions of the ghost and the *Muncher*. Lines 50-75 allow the *Muncher* to move through the maze without eating it and to score points.

Lines 80-120 allow the first ghost to pursue you and 130-170 do the same for the second. Lines 300-305 give the score and reset the game if a key is pressed. Lines 400 and 401 allow the game to run automatically when it is loaded, but this only works if the game is not *Saved* as usual — Run 400 should be entered before recording it.

This game is challenging, but fun to play. It is quite fast even though it is in Basic and the ghosts are intelligent enough to catch you every time. ■

```
 10 PRINT AT 0,0;"
"
 11 FOR N=1 TO 10
 12 PRINT "
"
 13 PRINT "
"
 14 NEXT N
 15 PRINT AT 20,0;"
"
 20 LET S=0
 21 LET A=10
 22 LET B=15
 23 LET X=1
 24 LET Y=1
 25 LET J=19
 26 LET K=29
 30 PRINT AT A,B;"■";AT X,Y;
"■";AT J,K;"■"
 40 LET C=A
 41 LET D=B
 42 LET M=X
 43 LET N=Y
 44 LET G=J
 45 LET H=K
 50 LET A=A+(INKEY$="6")-
(INKEY $="7")
 51 LET B=B+(INKEY$="8")-
(INKEY $="5")
 55 PRINT AT A,B;
 60 LET P=PEEK (PEEK 16398+
256*PEEK 16399)
 70 IF P=136 OR P=128 THEN
LET A=C
 71 IF P=136 OR P=128 THEN
LET B=D
 72 IF P=155 THEN LET S=S+1
 75 PRINT AT A,B;"O"
 80 LET L=INT (RND*2)
 81 GOTO L+82
 82 LET X=X+SGN (A-X)
 83 LET Y=Y+SGN (B-Y)
 90 PRINT AT X,Y;
100 LET P=PEEK (PEEK 16398+
256*PEEK 16399)
110 IF P=136 THEN LET X=M
111 IF P=136 THEN LET Y=N
112 IF P=40 THEN GOTO 300
120 PRINT AT X,Y;"""
130 LET L=INT (RND*2)
131 GOTO 132+L
132 LET J=J+SGN (A-J)
133 LET K=K+SGN (B-K)
140 PRINT AT J,K;
150 LET P=PEEK (PEEK 16398+
256*PEEK 16399)
160 IF P=136 THEN LET J=G
161 IF P=136 THEN LET K=H
162 IF P=40 THEN GOTO 300
170 PRINT AT J,K;"""
180 GOTO 30
300 PRINT AT 0,11;"SCORE ";S
301 PRINT AT 20,4;"PRESS ANY
KEY TO PLAY"
302 FOR N=1 TO 50
303 NEXT N
304 IF INKEY$="" THEN GOTO
304
305 RUN
400 SAVE "■"
401 RUN
```



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First of a family!

***David Kelly** talks to Michael Lunch – new head of Mattel Electronics (UK)*

Mattel is one of the world's bigger toy companies. Last year the company — based in Hawthrone, Los Angeles — showed a turn-over of just over $1.5bn.

Like other toy manufacturers, Mattel has had to increase the technical complexity of its products to keep pace with young consumers of ever-increasing sophistication.

In 1979 Mattell announced its first 'electronic' product — the Intellivision video games player system — as a direct competitor to Atari's VCs machine launched a year earlier.

Mattel obviously feels that its push into this new area was worthwhile, because it is now on the point of launching another machine — the Aquarius family computer. The Aquarius and the Intellivision will be handled in this country by a new division set up for the purpose, called Mattel Electronics.

To head up the new company, Mattel has chosen the former managing director of consumer electronics for Texas Instruments (UK), Mike Lunch. And to help establish the Aquarius and extend the market for the Intellivision, it has given him over £5m to spend on promotion.

Mike Lunch is a punctilious 35-year-old with a charming smile. He began his career with an unusual degree — joint honours in Industrial Engineering and Management. He then trained as a chartered engineer, before moving across to marketing with an electronic instruments manufacturer. Next, he became marketing manager of a company that made security systems (radio-controlled door systems "just like *The Man from U.N.C.L.E.*") and "by an act of fate" he was then made director of engineering!

Hovering on the fence!

He hovered on the fence until 1979 when he jumped in the direction of marketing again. He joined Texas Instruments to launch the TI 99/4 home computer.

The TI computer was one of the first home computers and, for some 18 months, it was only available in the UK in its NTSC form (the American TV system standard). This meant that the computer had to be supplied with a special TV, the whole package costing over £1,000. "We did ourselves a considerable dis-service by test-marketing the NTSC version. As a result, when the PAL UK version appeared it was regarded as an old product and has suffered from this image ever since."

In spring 1980, Mike was promoted to take charge of the full range of TI electronic goods. The PAL version of the 99/4 computer arrived in July 1981, quickly followed by the 99/4A in November.

"Christmas '81 was really a trial market for us and we sold out — the machine was then in competition with the Atari 400 and the ZX81 — the Vic20 was talked about but didn't arrive."

So TI entered 1982 with a lot of confidence and, in February, Mike was made managing director. In April, however, much of that confidence evaporated with the announcement of the Sinclair Spectrum. "That machine dramatically reduced the price expectation of the consumer. At that stage we were at £299 and we dropped immediately to £199." By this time the Vic had arrived and that also dropped in price, from £199 to £175.

"Still the 99/4A machine didn't sell in the sort of quantities that Texas wanted, so in the autumn we brought it down to £150 — and that worked! That £50 acted like a step function in consumer demand. All the product for the year was sold out within six weeks."

Mike still feels that the 99/4A machine is very underrated: "It had a Sprite capability three years before the Commodore 64. It has 13 digit precision — very accurate for a home computer — and can handle 3-dimensional arrays. That is really a very high spec."

Mike shrugs. The TI 99/4A is no longer his concern. As the newly appointed managing director of Mattel Electronics (UK), his job is to make sure that the new Aquarius home computer sells.

And he seems to have risen to the challenge. Last month, Sinclair cut the price of its 16K Spectrum to under £100. Mattel has responded by fixing the price of the Aquarius at £89.85 — and that is a price that may be discounted still further.

Clearly, the Z80A-based Aquarius is a competitor for the Spectrum, Oric and Vic. "Quite simply, the Aquarius will be the lowest-cost full colour home computer on the market — and what I mean by that is 16 colours, a 40 x 24 character screen with high resolution graphics and a plug-in cartridge capability," says Mike.

And it does not end there. The Aquarius will be launched with a range of software titles, and add-on accessories. A mini-expander adds two extra sound channels, a pair of games controllers and allows two cartridges to be plugged in simultaneously. For example, it is possible to plug in a 16K Ram expansion memory and the *FinForm* spreadsheet cartridge, itself on 20K Rom. There is also an Aquarius 80-characters per second 40-column thermal printer and a data recorder.

Early next year there will be a Maxi-Expander unit, allowing the memory to be expanded to 52K and twin disc drives to be connected. The disc drives — also available early in 1984 — will be 5¼in and CP/M compatible, making the Aquarius the lowest-priced CP/M machine.

Software-orientated

Mattel, however, remains a software orientated company: "It regards the Aquarius as a machine to run its software," says Mike. "One of the reasons that the Aquarius is so competitively priced is so we can sell our software — but first we must get a broad hardware base."

As Mike says, Mattel is prepared, and will develop software for any machine that has a big enough user base. The company has already announced that it will sell material for the Atari, IBM and Apple machines this year, and the Commodore 64 and Texas machines may follow.

Although Mattel will launch its Intellivision add-on computer keyboard — giving it an extra 32K and Basic programming — this year, most eyes will surely be on the Aquarius, to see if it can compete successfully with the Spectrum.

Says Mike: "We are very serious about the product — otherwise we wouldn't have chosen the £89.85 price point.

"The Aquarius is the first of a family of home computers from Mattel where the emphasis will be on upwards compatibility with future generation products. ■

Keep hitting the keys!

***Mike Grace** finds out what life is like on the other side of the Traxx*

Software for the Vic is definitely getting harder. Let's start with what is (for me) an absolutely impossible game to master — *Traxx* from Llamasoft. This cassette costs £6.00, needs at least 8K expansion, and is infuriating. Why do I say this? Because I cannot do it, that's why.

The game sets up a series of grids on the screen, which you need to colour red by moving the joystick (supposedly moving a spaceship which is all the while being pursued by *Bugs* that will destroy you if they catch you). So by moving your ship along, up, along and down, forming a box, you capture that segment of space. But, it isn't as easy as it sounds, for if you backtrack or move along too far (exceptionally easy with my joystick), then all your hard-earned effort at tracing red in that particular square is lost.

If, by some stroke of luck, you do manage to capture four corner squares, then you can eat a few *Bugs*, instead of them eating you, and score some bonus points. Needless to say, I haven't managed this feat yet. You get a variety of skill levels (81 in all), by varying the speed of play, and the number of nasty bugs chasing you.

I may have made it all sound impossibly hard — but this is not so in fact. My own children love it, as do their friends, and I find this game to be a firm favourite amongst the younger generation. I think it's good value for money — exceptional in fact. But it *is* hard.

Still smarting from the failure to beat *Traxx*, I turned to an adventure game called *Lair* from Soft Toys which costs £6.00 and needs 16K. This is slightly different from the other adventures I've played, as you are given a map of various caves. The idea is to move around the caves (fighting off various baddies along the way) until you eventually find some treasure. Having found it, you must solve a few riddles to enable you to bring the treasure out again.

The game is dotted with Tolkienesque characters (orcs, sprites, balrogs, etc) all wanting to do you harm of some sort or other. But, the orcs carry magic rings which you need to acquire because you cannot get the treasure without at least five rings.

Thus, the main difference between this and other adventures is that you are really trying to find your way around a series of mazes (drawing you own map is essential), and that you don't really ever have to think too hard to solve a problem. All you have to do when faced with a baddy is choose from a selection (a menu, in fact) whether to flee, fight, pass, trade, or whatever choice you are given.

Despite the lack of original thought, I found the game pretty compulsive, but there are a few nasty surprises. An example of this is the command *Help*, which will tell you where you are in the maze by displaying a map of the level you are on. However, when you press *H* for *Help*, the map is drawn rather quickly on the screen, the symbols are not explained, and before I really had a chance to work out what it all meant, the map had gone again leaving me with 17 fewer points for magic.

. . . splatted by the wheel of a lorry

Still, *Lair* is an exceptionally good game, quite taxing, and I can see I've got quite a while to go before I solve it, so I'll let you find out more about it yourself.

But, just before I move on to the next cassette, a final few words about the presentation. The game is fairly basic when it comes to packaging (although there is an excellent insert of instructions which explains the principles of playing, helpful to the first-time adventurer). Having a birds-eye view of the tunnels does help as you wander through the maze, but it also tends to stifle creativity as most of the time your journeys through the endless caves are more a question of not getting lost than in working out problems or solving puzzles.

One final feature which is indispensable, you can *Save* your game on tape. This means that as you progress it's possible to *Save* your initial wanderings and just reload, saving a lot of tiresome time should events cause your sudden demise.

After the mind-searching problems of an adventure I settled into another version of *Frogger*, this time from Sumlock Electronic Services, and called *Jumpin' Jack* (interesting how all the different versions of basically the same game come up with a variety of different names, isn't it?). Priced at £7.95 (with 50p postage and packing) for the unexpanded Vic, this cassette is attractively packaged with a full-colour picture of a frog being splatted by the wheel of a lorry (in the best of taste, I can assure you) and contains adequate instructions on the cassette cover.

An interesting sidetrack here is the effort now being made by the software companies to package their products more professionally. When I started these reviews, it seemed only Commodore really troubled to consider the importance of presentation, but now the majority of games are arriving with more care and attention in this aspect of production.

Still, back to *Jumpin' Jack*. The blurb on the packet tells me that this game is written entirely in fast machine code, with superb sound effects and Hi-res graphics (these are not my phrases) so that we have a game with a quality and presentation normally associated with arcade machines. Well, someone should have told them about *Frog Runner* by Anirog (reviewed in *Popular Computing Weekly*, 7-13 April) which costs less and is far superior in every aspect, from the graphics and speed through to the skill required.

What *Jumpin' Jack* has got is a fairly slow first stage (handy for those who need to build up their skills slowly), which is easy to master. Having manoeuvred the frog across the usual road between the traffic (not hard at all), then you wait until you hop onto the logs and turtles to arrive home. However, once five frogs are home (you have the customary three lives) the game moves up a notch and now there is a row of fast-moving racing cars to dodge plus fewer logs and turtles.

It's quite playable, but it seems a little expensive for what it offers as a competitor in the *Frogger* market.

Staying with Sumlock for the moment, another of its cassettes is *Starship Escape* for the 16K Vic. This is a real-time 'adventure game' which isn't really an adventure at all, more a test of skill at moving your man about to avoid various hazards.

The idea is that you are a lonely astronaut captured by a mysterious alien craft (a good bit of hi-res graphics to display your capture at the start of the game). For some obviously alien reason, the baddies take your spaceship to bits and distribute various parts all over their own ship. They then put you in the airlock and leave you. Your task is to find the various bits of your own craft, carry them back to the airlock, and then reassemble them.

The only problem is that all over the ship are various alien baddies (varying in speed and hi-res from spiders and androids to a mysterious alien cloud), whose only goal in life seems to be to pick you up and deposit you back in the airlock. Quite why they have this hang-up about the airlock is never revealed (alien minds are hard to

fathom, I suppose). I found the idea appealing (especially the fact I could stop the clock if I wanted by pressing * and look at a map of the ship to see where I was), but there seemed to be several problems when I got around to playing it.

One example was that whenever I pressed the *Fire* button on the joystick to destroy the baddy — nothing happened. As a consequence I was hauled back to the airlock (fairly annoying if you have managed to dodge about 10 aliens successfully and really seem to be getting somewhere at last) and had to start all over again.

The graphics are reasonable (I especially liked my little astronaut who had a cute habit of waving his arms around like mad as he ran about the ship trying to find the right part) and as I said I like the concept, but I found the game impossible to play because of the fact I could not fire my laser, nor could I pick up parts of the ship when I came to them (which should have been possible by pressing the key *J*). Whether this is just a fault in my review copy or whether a fault in my Vic I'm not sure, but anyway it detracted from the enjoyment. This game is priced at £9.95 and is a reasonable price for what it offers.

For sheer joy it's hard to beat!

Let's stay with the space scene for the next cassette, *Star Warp II* for the expanded Vic (16K) from Soft Toys and priced at £7.00. Like their other 16K game *The Lair*, this is exceptional value for money. The best way of describing this game is to say it is a blend of *Subspace Striker* and *Star Trek*. And the combination works exceptionally well, for we have the skill and interest of *Star Trek* with the graphics and battle skills of *Subspace Striker*.

Although I've liked *Star Trek* before, I have felt something to be missing — and now I know what it was. With *Star Warp II* you are the commander of a space ship (you are given the choice at the beginning of choosing one of six different types, all with varying values for crew, torpedoes, combat, etc, which enables you to try and select a good ship) and you have to jet around the galaxy investigating planets on your way. You have the unusual star bases to replenish your stocks, but unlike *Star Trek* you also have to warp over to planets and land on them, as part of your mission. Whereas in *Star Trek* your mission is to seek out and destroy the Klingons, in *Star Warp II* the baddies seek you out whilst you are exploring.

It is in the battle sequences that it starts to get exciting. A ship will appear out of nowhere, displayed on the screen, and with exotic names like a Kougan Whip Wing or an Indrot Haell Dart, and you enter real time for battle. You are given only seconds to decide whether you want to fire torpedoes (by pressing the key *T*) or phasers (by pressing *P*) or retreat (by pressing *R*) and so on. If you don't press you suffer the consequences of enemy fire.

The scope of *Star Warp II* is vast. There are 45 sections to the galaxy. Each section can contain anything from two to five stars and each star can have several planets for you to explore. If you survive all the hazards, you can refuel and take on new crew at the star bases dotted around and, if you come across a star gate, you can warp onto another sector of space.

Star Warp II is excellent value and terrific fun. I can recommend this game for the long winter evenings, providing you like the *Star Trek* concept. Soft Toys seem to be giving good value for money, so it was with a little less apprehension than usual that I turned to the last cassette this time around — a compendium from Soft Toys called *Soft Toys 1* and mainly for the unexpanded Vic. This cassette costs £5.00 and contains seven games in all — must be good value even if some of them (as they so often are) aren't too good.

This cassette is a mix of the general type of games found on 'multiple game' packages. First is *The Deep*, a simple firing game where you are a submarine lying on the sea bed, firing torpedoes at passing ships above you to sink them. Not too difficult (an excellent game for the 5-10 year age group), but the graphics are really something! The submarine looks like a real submarine, the passing ships are of varying shapes and colours, and when they are hit a short display of a sunken ship appears briefly. The whole presentation is excellent, although the game itself somewhat limiting.

Next is *Killer Park*, needing 3K extra expansion, and what a game this one is — I think of all the games I've played for quite a while this one is the most enjoyable! One seventh of a cheap tape and it gives me more pure fun and enjoyment than all the cartridges and 16K tapes I've reviewed for quite a while. Of course, it hasn't the depth of some of the more expensive games, but for sheer joy it's hard to beat.

The essence of the game is simple (aren't the good ones always?), you have to get a little man along a maze to the end. But the problem comes in that as you move him you suddenly and without warning have to take part in another game thrown in at random. This can be *asteroids, rhino, laser rays dropping from the sky, gobblers*; in fact, one of an assortment of very simple and compulsive classics of the micro game stable. Needless to say, if you lose you're taken back to the start.

The rest of the tape contains a version of *Master Mind* called *Code Breaker, Noughts and Crosses, Music Generator, Pontoon,* and *King John* (where you have to estimate the number of tons of corn to plant, eat or feed to the animals to ensure economic survival). This really is an excellent tape, quite a lot of thought has gone into the graphics and presentation of the individual games, and it's well worth the price. In fact, Soft Toys has impressed me with its offerings, and its interesting to note that the only advertisement I've seen for its products (in *Vic Computing*) looked very amateurish and gives no hint of the excellence of its products.

So we're finished with another review. I still cannot do *Traxx*, yet it's the favourite of the bunch for my children (aged 13, nine and five). I'm finding it hard to beat the rhino in the *Killer Park* game on *Soft Toys 1*, and the thought of working through 45 sectors of space in *Space Warp II* is formidable (thank heaven it has a save to tape facility). But, despite all that, I still find computer games addictive, infuriating, and plain, simple fun. I sometimes wonder what it is about them that is so captivating, but that's another symptom of age — what we really need to do is just sit down and enjox them. So, whatever your age out there, keep hitting the keys and moving the joysticks (ouch!). ■

Firm	Program	Price	Value (1-10)
Llamasoft 49 Mount Pleasant Tadley Hants RG26 6BN	*Traxx*	£6.00	8
Sumlock Royal London House 198 Deansgate Manchester M3 3NE	*Jumpin' Jack* *Starship Escape*	£7.95 (+p&p) £9.95 (+p&p)	5 6
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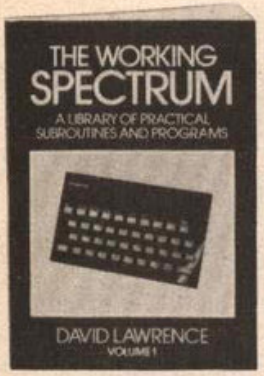

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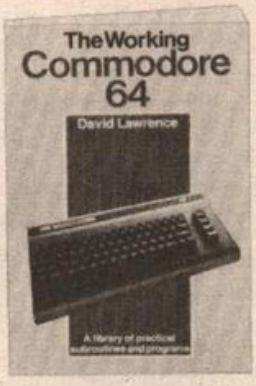

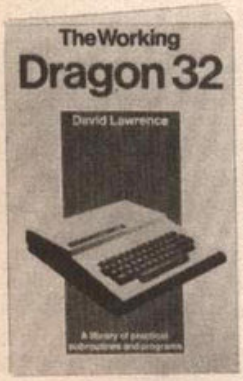

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Speaks for itself!

***Mark Martin** sounds off about an illustrative program for the Vic20*

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The program proper starts at line 60000 onwards, so it should fit in your program quite happily without interfering with other routines. However, care is needed to ensure that the variables used in the routine are not repeated within the main program.

To make the routine work, assign *X$* with a sentence and *Gosub 60000* (lines 10 to 30 give an example of this and may be deleted if necessary). Each word must be separated by a space (not a shifted space) to make this work and punctuation must be followed by a space.

One of the major features of this routine is that a *Bleep* is sounded for each syllable. This is far easier than most people think, if you break down a word. For example, take the word *Program*. It has two syllables thus:

PRO/GRAM

Each syllable in the word *Program* has one vowel within it. But, how about the word *Routine*? This is separated as follows:

ROU/TINE

The first syllable has two vowels which are joined in a group. As a general rule, each syllable has a vowel or a group of vowels. By producing a *Bleep* for each vowel or group of vowels the effect of sounding out each syllable is created.

Program notes

60000-60090 SEARCH X$ FOR WORD
60100-60310 PRINT HEAD
60320-60400 PRINT WORD AND CHECK FOR VOWELS
60410-60520 PRONOUNCE VOWELS

Variables

M1$ = POSITION CURSOR AT MOUTH
M2$ = POSITION CURSOR AND CLEAR LINE
X$ = MESSAGE TO BE PRINTED
WD$ = WORD FROM X$
ZZ$ = CHARACTER FROM WD$
NX$ = NEXT CHARACTER FROM WD$
SR$ = CHARACTER FROM X$
PO = LAST POSITION OF CURSOR
NT = NOTE TO BE PLAYED
DE = DELAY

```
5 REM BY MARK MARTIN
10 X$="THIS IS AN EXAMPLE OF THE PROGRAM
   'SPEAKING OF' FOR THE VIC"
20 GOSUB60000
30 END
60000 M1$="
60010 M2$=M1$+"
60020 PRINT"
60030 PS=0:PRINTM1$;:PO=POS(0)
60040 WD$=""
60050 PS=PS+1:SR$=MID$(X$,PS,1):
      WD$=WD$+SR$
60060 IFPS>LEN(X$)+1THENPRINT"
      :RETURN
60070 IFSR$<>" "ANDSR$<>""THEN60050
60080 IFPO+LEN(WD$)<21THENGOSUB60320:
      GOTO60040
60090 PRINTM2$;:PO=POS(0):GOSUB60320:
      GOTO60040
60100 PRINT"
60110 PRINT"
60120 PRINT"
60130 PRINT"
60140 PRINT"
60150 PRINT"
60160 PRINT"
60170 PRINT"
60180 PRINT"
60190 POKE36878,0:POKE36876,0
60200 RETURN
60210 PRINT"
60220 PRINT"
60230 PRINT"
60240 PRINT"
60250 PRINT"
60260 PRINT"
60270 PRINT"
60280 PRINT"
60290 PRINT"
60300 POKE36878,15:POKE36876,NT
60310 RETURN
60320 GOSUB60100
60330 FORLN=1TOLEN(WD$)
60340 ZZ$=MID$(WD$,LN,1)
60350 NX$=MID$(WD$,LN+1,1)
60360 IFZZ$="A"ORZZ$="E"ORZZ$="I"ORZZ$=
      "O"ORZZ$="U"ORZZ$="Y"THENGOSUB
      60410
60370 PRINTM1$;TAB(PO);ZZ$;:PO=POS(0)
60380 NEXT
60390 POKE36878,0:POKE36876,0
60400 RETURN
60410 IFNX$="A"ORNX$="E"ORNX$="I"ORNX$=
      "O"ORNX$="U"ORNX$="Y"THENRETURN
60420 IF(NX$=" "ANDZZ$="E"ANDLEN(WD$)>4)
      THENRETURN
60430 IFZZ$="A"THENNT=180:DE=200
60440 IFZZ$="E"THENNT=195:DE=150
60450 IFZZ$="I"THENNT=210:DE=100
60460 IFZZ$="O"THENNT=200:DE=250
60470 IFZZ$="U"THENNT=180:DE=250
60480 IFZZ$="Y"THENNT=185:DE=200
60490 GOSUB60210
60500 FORX=1TODE:NEXT
60510 GOSUB60100
60520 RETURN

READY.
```

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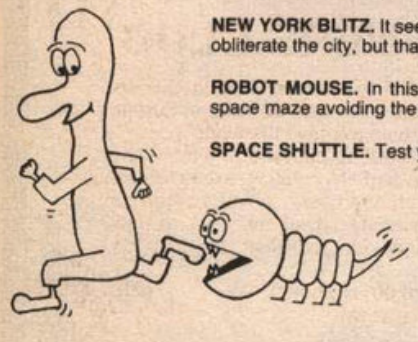

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Paint it black!

***Ian Logan** presents a series of routines to 'paint' triangles, rectangles and circles*

This article contains a series of Basic programs that explore the 'filling-in' of triangles, rectangles and circles. These programs will be of greatest interest to Spectrum owners but, nevertheless, owners of other microcomputers should find much of interest.

The Spectrum has three commands that can be used to outline a figure:

PLOT x,y –sets a pixel at position x,y

DRAW x,y –sets a line of pixels from the 'last position' to a point x,y distant (The *Draw x,y,z* command that draws curved lines was discussed in *PCW*, 12-18 May).

CIRCLE x,y,z –draws a circle with centre x,y and radius z.

There are, however, no commands for 'filling-in' areas and such actions have to be programmed — either in Basic or machine code.

First the assumptions. Figure 1 shows a representative triangle. It has an origin, *StartX, StartY,* a *height* and a *width.* The triangle is right-angled and is formed to the right-hand side of the *Height.*

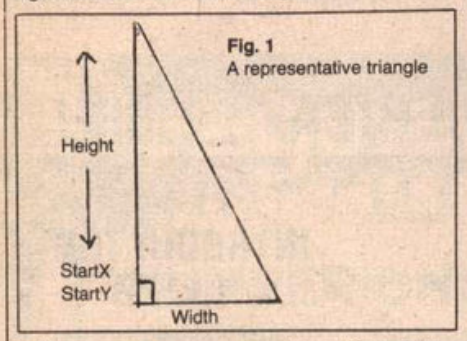

Fig. 1
A representative triangle

There are several ways in which all the pixels lying within the area of the triangle can be set. The idea of considering all pixels and *Plotting* only those that occur in the triangle is a non-starter; as is the approach of *Drawing* lines radially — very pretty but rather slow.

A better way is to construct the triangle from a series of horizontally *Drawn* lines. The *Drawing* of a line is reasonably fast in the Spectrum and the set of horizontal lines includes all the necessary pixels. The length of a horizontal line is given by the formula:

Width — Steps/Height * Width

where *Steps* is the required line number, with the line through the origin being *Step zero.* Figure 2 shows this stage of the discussion.

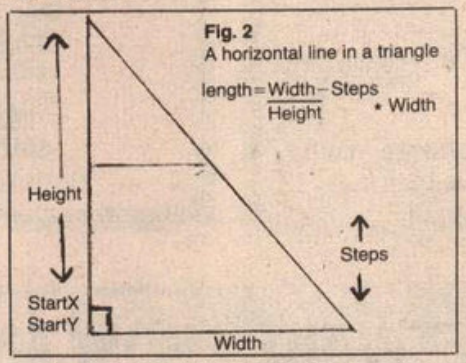

Fig. 2
A horizontal line in a triangle

The *'Filled-in Triangles'* program shows the finished algorithm. The program allows for triangles to be *Drawn* in any quadrant. Note that the top line, a single pixel, is best considered by itself — and, as written, all triangles are of the same colour.

It is, in fact, easier to fill-in rectangular areas than to fill-in triangles, as the line length will be constant. Again, the origin of the rectangle is taken as *StartX, StartY;* and the rectangle has both *Width* and *Height.*

The *Filled-in Rectangles* program shows the full algorithm. This time the figures come in random colours and the user is repeatedly prompted to enter the next rectangle. Care must be taken to ensure that the parameters entered are valid, otherwise the program will stop (see the section on 'error trapping').

The filling-in of circular areas gives the programmer the chance to develop rather more complicated algorithms. A circle has an origin, *StartX, StartY;* and a radius. But, there are then many ways in which the lines of the areas can be described.

In the accompanying algorithm the 'length of a line' is found by using simple Pythagorean arithmetic. Then, to save the repeated evaluation of line lengths, the line from the upper semi-circle is reflected to the lower semicircle. Figure 3 illustrates the algorithm.

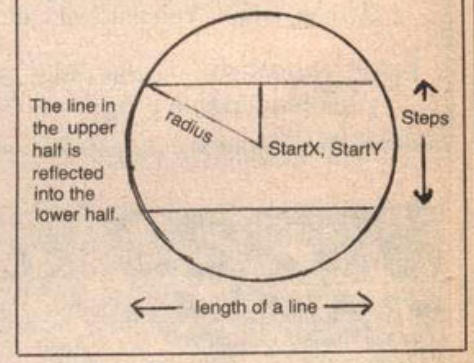

Fig. 3
The horizontal lines of a circle

The *Filled-in circles* program shows the complete algorithm. In the program it is the 'square of the radius', *Rad2,* that has to be available throughout. Also note the use of the expression:

EXP (1/2*LN (RAD2-Steps*Steps))

as this explains more fully how the Spec-

```
10 REM   FILLED-IN TRIANGLES
20 INPUT "Enter start (X &
   Y)";StartX;" ";StartY
30 INPUT "Enter width and
   height ";Width;" ";Height
40 LET Steps=Height
50 PLOT StartX,StartY+Steps
60 GO TO 100
70 REM The loop for the lines
80 PLOT StartX,StartY+Steps
90 DRAW Width-Steps/Height*Wid
   th,0
100 IF NOT Steps THEN STOP
110 LET Steps=Steps-(Steps>0)
    +(Steps<0)
120 GO TO 80
```

```
10 REM   FILLED-IN RECTANGLES
20 INPUT "Enter start (X & Y)
   ";StartX;" ";StartY
30 INPUT "Enter width and heig
   ht ";Width;" ";Height
40 LET Steps=Height
50 LET Col=RND*6.5
60 REM The loop for the lines
70 PLOT INK Col;StartX,StartY+
   Steps
80 DRAW INK Col;Width,0
90 IF NOT Steps THEN GO TO 20
100 LET Steps=Steps-(Steps>0)
    +(Steps<0)
120 GO TO 70
```

trum evaluates its square roots.

Once again, the user can make the figures appear in different colours, or with random sizes.

Everyone who has used *Plot, Draw* or *Circle* on a Spectrum will have found that an 'error report' is given, and the program stops, whenever the edge of the tv screen is reached. It is, however, possible to trap this situation by altering the system variable *Err—Sp* and thereby continue with the program.

The system variable *Err—Sp* is the pointer to the return address *1303h* that, if acted upon, returns the interpreter to the main execution loop and produces an 'error report'. The address on the machine stack below the *1303h* (ie, added later) is the address *Stmt—Ret, 1B76h,* that always leads to the next statement being considered by the operating system.

In the case of an error occurring that the user wishes to trap, then it is a straightforward matter to surround the error-giving statement with the necessary statements to change the value of *Err—Sp* (*Err—Nr* needs resetting also as 'no error' has occurred). The program *Showing Err—Sp* illustrates these addresses on the machine stack.

As a suggested protocol, the program *Error Trapping* gives the necessary steps. The flag, *F,* becomes set only when an 'error' has been trapped.

This article has tried to give the reader a few ideas that can be developed. The *Finale* program has been written, not to develop any new material, but only to consolidate the concepts that have been mentioned. The *Finale* program is a 'sit & watch' program and I hope that you like it — please find yourself a colour tv for it! ■

```
10 REM   FILLED-IN CIRCLES
20 INPUT "Enter centre (X & Y)
   ";StartX;" ";StartY
30 INPUT "Enter the radius ";S
   teps
40 LET Steps=ABS INT Steps
50 IF NOT Steps THEN STOP
60 LET RAD2=Steps*Steps
70 REM The loop for the lines
80 LET Steps=Steps-1
90 IF Steps<0 THEN STOP
100 LET XL=EXP (1/2*LN (RAD2-
    Steps*Steps))-1
110 LET Line=XL+XL
120 LET StartL=StartX-XL
130 IF StartL<0 THEN LET Line=
    Line+StartL: LET StartL=0
140 REM Draw an upper halfline
150 PLOT StartL,StartY+Steps:
    DRAW Line,0
160 REM Draw a lower half line
170 IF StartY-Steps<0 THEN GO
    TO 80
180 PLOT StartL,StartY-Steps:
    DRAW Line,0
190 GO TO 80
```

```
10 REM SHOWING ERR_SP
20 LET ERRSP=PEEK 23613+256*PE
   EK 23614
30 FOR a=ERRSP+1 TO ERRSP-2 ST
   EP -1
40 PRINT a,PEEK a
50 NEXT a
```

```
10 REM ERROR TRAPPING
20 POKE 23613,PEEK 23613-2
30 DRAW 300,0
40 LET F=0: IF PEEK 23610<>255
   THEN LET F=1
50 POKE 23610,255: POKE 23613,
   PEEK 23613+2
60 PRINT "Error trapped succes
   sfully" AND F;"No error"
   AND NOT F
```

```
10 REM   FINALE...
20 LET StartX=8*INT (RND*25)
30 LET StartY=8*INT (RND*18)
40 LET Steps=7+8*INT (RND*10)
50 LET Width=7+8*INT (1+RND*15
60 LET Col=INT (RND*8)
70 POKE 23613,PEEK 23613-2
80 PLOT INK Col;StartX,StartY+
   Steps
90 LET F=0: IF PEEK 23610<>255
   THEN LET F=1
100 POKE 23610,255: POKE 23613,
    PEEK 23613+2
110 IF F THEN GO TO 20
120 POKE 23613,PEEK 23613-2
130 DRAW INK Col;Width,0
140 POKE 23610,255: POKE 23613
    ,PEEK 23613+2
150 IF Steps<1 THEN GO TO 20
160 LET Steps=Steps-1
170 GO TO 70
```

Shifting sands . . .

***Peter Chase** presents a series of machine code scrolling routines*

This is the last in my series on machine code for the Dragon — it deals with scrolling and shifting blocks of memory. All the routines can be used by Basic or assembly language programs.

Listing One contains three routines that can perform most shifts and scrolls. *@UL* shifts a block of memory *Length*2* bytes long that starts at *From* to the block starting at *TO*. As it starts shifting at the lowest address (*From*) it is used to scroll either left or up.

@DR shifts a block of memory *Length*2* bytes long that ends at *From* to the block ending at *To*. It shifts from the highest address and is used to scroll right or down.

@BLANK is not a shift routine. It stores the byte in *CHARACTER* in *COLUMNS* separate addresses starting at *FIRST* with a gap between addresses *GAP*. It has a number of uses, including clearing small areas of screen, clearing memory and, most importantly, stopping wrap around in horizontal scrolls (wrap around is the effect when the far edge of the screen appears on the other side after scrolling).

All the variables I have mentioned (in capitals so far) are stored in addresses *&H7FF0* to *&H7FFB*. By altering these, most scrolls can be performed. Table one gives examples of suitable values to assign to the variables while Listing Two shows how to enter the values in a Basic program to produce, for example, upward text scrolling.

Listing Three is a very simple demonstration game, using one scrolling routine and the *@Blank* routine. You use the up and down arrow keys to avoid the advancing coloured blocks. Such a game should be written in machine code, to match the speed of the scrolling routine, but Basic is used here for conciseness.

Notice that the game displays 10 colours on the screen at once, not the claimed nine. In fact, the Dragon has 12 colours (the extras are light orange, dark red and deep green) and 11 can be displayed at one time on a text or mode 24 screen without using machine code. ■

TABLE ONE

SCROLL	'LENGTH' &H7FF0		'FROM' &H7FF2		'TO' &H7FF4		'FIRST' &H7FF6		CHARACTER' &H7FF8	'GAP' &H7FF9	COLUMNS' &H7FFA		EXEC
Text Up	0	240	4	32	4	0							@ UL only
Text Down	0	240	5	223	5	255							@ DR only
Text Left	1	0	4	1	4	0	4	31	32*	32	0	16	@ UL (+ @ BLANK)
Text Right	1	0	5	254	5	255	4	0	32*	32	0	16	@ DR (+ @ BLANK)
PMODE 0 — Up	2	240	6	16	6	0							@ UL only
PMODE 0 — Down	2	240	11	239	11	255							@ DR only
PMODE 1 or 2 UP	5	240	6	32	6	0							@ UL only
etc													

All values decimal unless stated otherwise.
*Or other appropriate character.

Listing One-Memory Shift(scroll)Routines

```
7000                    31      PRT
7000 FC7FF0             50 @UL  LDD  &7FF0
7003 10BE7FF2           50      LDY  &7FF2
7007 FE7FF4             50      LDU  &7FF4
700A 4C                 50      INCA
700B AEA1               50 @SHIFT1 LDX  ,Y++
700D AFC1               50      STX  ,U++
700F 5A                 50      DECB
7010 26F9               50      BNE  @SHIFT1
7012 4A                 50      DECA
7013 26F6               50      BNE  @SHIFT1
7015 39                 50      RTS
7016 FC7FF0             60 @DR  LDD  &7FF0
7019 10BE7FF2           60      LDY  &7FF2
701D FE7FF4             60      LDU  &7FF4
7020 4C                 60      INCA
7021 AEA3               60 @SHIFT2 LDX  ,--Y
7023 AFC3               60      STX  ,--U
7025 5A                 60      DECB
7026 26F9               60      BNE  @SHIFT2
7028 4A                 60      DECA
7029 26F6               60      BNE  @SHIFT2
702B 39                 60      RTS
702C BE7FF6             70 @BLANK  LDX  &7FF6
702F FC7FF8             70      LDD  &7FF8
7032 10BE7FFA           70      LDY  &7FFA
7036 A784               70 @BL  STA  ,X
7038 3A                 70      ABX
7039 31A2               70      LEAY ,-Y
703B 26F9               70      BNE  @BL
703D 39                 70      RTS
703E                    80      END  @START
```

Listing Two

```
20 CLEAR200,&H6FFF
30 I=&H6FFF
40 I=I+1:READA$:IF A$<>"Ø"THENPOKEI,VAL(
"&H"+A$):GOTO40
50 DATAFC,7F,F0,10,BE,7F,F2,FE,7F,F4,4C,
AE,A1,AF,C1,5A,26,F9,4A,26,F6,39,FC,7F,F
0,10,BE,7F,F2,FE,7F,F4,4C,AE,A3,AF,C3,5A
,26,F9,4A,26,F6,39,BE,7F,F6,FC,7F,F8,10,
BE,7F,FA,A7,84,3A,31,A2,26,F9,39,Ø
110 FORI=&H7FF0 TO&H7FF5:READA:POKEI,A:N
EXT
120 DATAØ,240,4,32,4,00
130 FORI=1TO100:EXEC&H7000:NEXT
140 PRINT"SCROLLING":GOTO130
```

Listing Three

```
10 POKE65494,0
20 CLEAR200,&H6FFF
30 I=&H6FFF
40 I=I+1:READA$:IF A$<>"Ø"THENPOKEI
   ,VAL("&H"+A$):GOTO40
50 DATAFC,7F,F0,10,BE,7F,F2,FE,7F,
   F4,4C,AE,A1,AF,C1,5A,26,F9,4A,
   26,F6,39,FC,7F,F0,10,BE,7F,F2,
   FE,7F,F4,4C,AE,A3,AF,C3,5A,26,
   F9,4A,26,F6,39,BE,7F,F6,FC,7F,
   F8,10,BE,7F,FA,A7,84,3A,31,A2,
   26,F9,39,Ø
110 FORI=&H7FF0 TO&H7FFB:READA:
   POKEI,A:NEXT
120 DATA1,240,4,1,4,0,4,31,32,
   32,0,17
130 FORI=1TO100:EXEC&H7000:
   EXEC&H702C:NE
XT:POKE65495,0
140 P=1056
150 SCREEN0,1
160 EXEC&H7000
170 POKEP,159:POKEP-32,153:
   POKEP+32,150
180 EXEC&H702C
190 IFPEEK(P+1)>128ORPEEK(P-31)>
   128ORPEE K(P+33)>128THENCLS:
   POKE65494,0:END
200 K$=INKEY$:P=P-32*(P<1470ANDK$=
   0))+32*(P>1056ANDK$=  CHR$(1
   CHR$(94))
210 S=S+1:IFRND(1000)>5 THEN230
220 POKE1055+32*RND(15),127+RND(8)
   *16
230 POKEP,32:POKEP-32,32:POKEP+32,
   32:GOT O160
```

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Turning turtle . . .

***Boris Allan** looks at the ins and outs of turtle graphics*

Turtle graphics have a long history in mathematics (in the guise of polar geometry and vector algebra), but have been developed as a programming tool and teaching aid by Seymour Papert and co-workers at Massachusetts Institute of Technology.

These routines can be used by pupils to investigate vector/polar geometry, but will probably find greatest use as the basis of systems which are rather more user-friendly. The language Logo (of increasing prominence in primary education) uses a special version of turtle graphics and can be connected to a robotic turtle — it is not difficult to use my *Turgra* routines as the basis for a Logo-type emulator in BBC Basic. As the UCSD Pascal system also uses turtle graphics, but non-interactively, I have given equivalents of all the UCSD commands (plus certain others). *Turgra* however, can be used interactively.

The "Turtle" in turtle graphics is an imaginary beastie which faces in a certain direction (*Angle* in the program). It has certain co-ordinates (*X* and *Y*), and drags a pen which can either be up or down (eg, *Move* or *Draw*). The Turtle starts at the centre, facing up the display screen. In program order the routines are:

+ *Proclrscr* which clears the graphic screen and the next screen.
+ *Procclg* sets the graphics foreground, and background, colours (*Pen* is normally 0). The graphics screen is set to leave a space at the bottom (*Vdu 24*), the screen is cleared (*CLG*), and the origin is set at the centre (*Vdu 29*).
+ *Proccls* sets the text colours (to the reverse of the graphics colours), sets the text screen to four lines at the bottom, and clears the new text screen.
+ *Proccol* is a procedure which allows the user to set the colour of the Turtle's pen (0 is black, and 1 is white), though this is rarely used by the user.
+ *Proccentre* resets the Turtle to the centre, facing upwards.
+ *Procrestart* clears the graphics, and re-centres, without affecting the text space.
+ *Procstart* uses *Pencol* to set the pen colour to black, clears both the graphics screen and the text screen, and re-centres.
+ *Procinvert* changes the pen colour from black to white (and vice versa), without changing the graphics background — this is used for drawing over previous lines.
+ *Procturn* turns the Turtle through *A* degrees, where a positive value is counter-clockwise, and a negative value is clockwise, and the resulting direction (always between 0 and 359) is saved as *Angle*.
+ *Procturnto* turns the Turtle to that angle (again normalised by *Fnangle*).
+ *Procloc* is an environmental enquiry which gives the user the co-ordinates and orientation of the Turtle.
+ *Procmove* moves the Turtle forward by *Distance* in the present direction. Whether the pen draws or not is set by *Style* — if *Style* is 1 then the line is drawn, otherwise the pen is moved without drawing.
+ *Procmoveto* is a move to a specified pair of co-ordinates, also finding the required angle.
+ *Fnangle* takes an input and returns a value between 0 and 359.
+ *Procnew* clears the screen, by re-setting the cursor and clearing the screen.

The routines are designed to be used in *Mode 4*, so before using the routines the mode needs setting (eg, by typing in *Mode 4* in instant mode).

It is worth experimenting with the procedures to get a feel for them. A good one to try is:

```
PROCSTART: PROCMOVE(200,1)
PROCTURN(90): PROCMOVE(200,1)
PROCTURN(90): PROCMOVE(200,1)
PROCTURN(90): PROCMOVE(200,1)
```

and various other little exercises. It is also easy to produce a procedure to draw a square:

```
3000 DEF PROCSQUARE(S)
3010 LOCAL I : FOR I=1 TO 4
3020 PROCMOVE(S,1): PROCTURN(90)
3030 NEXT I
3040 ENDPROC : REM SQUARE
```

and to produce squares of different sizes, try some random values and turns, eg:

```
4000 DEF PROCCIRCLE
4010 LOCAL I : FOR I=1 TO 360
4020 PROCMOVE(5,1) : PROCTURN(1)
4030 NEXT I : ENDPROC : REM CIRCLE
```

■

```
1000REM----------------------------
1010REM----------------------------
1020REM
1030REM
1040REM TURTLE-GRAPHICS ROUTINES
1050REM
1060REM
1070REM (c) BORIS ALLAN, 1983
1080REM
1090REM
1100REM
1110REM----------------------------
1120REM----------------------------
1130DEF PROCCLRSCR
1140PROCCLS: PROCCLG
1150ENDPROC : REM CLRSCR
1160REM----------------------------
1170REM----------------------------
1180DEF PROCCLG
1190GCOL0,PEN:GCOL0,129-PEN
1200VDU24,0;128;1279;1023;
1210CLG
1220VDU29,640;566;
1230ENDPROC : REM CLG
1240REM----------------------------
1250REM----------------------------
1260DEF PROCCLS
1270COLOUR 1-PEN: COLOUR128+PEN
1280VDU28,0,31,39,28:CLS
1290ENDPROC : REM CLS
1300REM----------------------------
1310REM----------------------------
1320DEF PROCCOL(PE)
1330PEN=PE
1340ENDPROC : REM COL
1350REM----------------------------
1360REM----------------------------
1370DEF PROCCENTRE
1380MOVE0,0:ANGLE=0: X=0:Y=0
1390ENDPROC : REM CENTRE
1400REM----------------------------
1410REM----------------------------
1420DEF PROCRESTART
1430PROCCLG: PROCCENTRE
1440ENDPROC : REM RESTART
1450REM----------------------------
1460REM----------------------------
1470DEF PROCSTART
1480PROCCOL(0): PROCCLRSCR:
    PROCCENTRE
1490ENDPROC : REM START
1500REM----------------------------
```

Continued on page 27

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```
1510REM----------
1520DEF PROCINVERT
1530PEN=1 - PEN: GCOL 0,PEN
1540ENDPROC : REM INVERT
1550REM----------
1560REM----------
1570DEF PROCTURN(A)
1580ANGLE=FNANGLE(ANGLE+A)
1590ENDPROC : REM TURN
1600REM----------
1610REM----------
1620DEF PROCTURNTO(A)
1630ANGLE = FNANGLE(A)
1640ENDPROC : REM TURNTO
1650REM----------
1660REM----------
1670DEF PROCLOC
1680PRINT"COORDINATES ARE ";X,Y'
    "ANGLE IS ";ANGLE
1690ENDPROC : REM LOC
1700REM----------
1710REM----------
1720DEF PROCMOVE(DISTANCE,STYLE)
1730LOCAL XC,YC
1740XC=DISTANCE*SIN(RAD(ANGLE)):
    YC=DISTANCE*COS(RAD(ANGLE))
1750X=X-XC : Y=Y+YC
1760IF STYLE=1 THEN DRAW X,Y ELSE
    MOVE X,Y
1770ENDPROC : REM MOVE
1780REM----------
1790REM----------
1800DEF PROCMOVETO(XN,YN,STYLE)
1810LOCALXDIF,YDIF: XDIF=XN-X:
    YDIF=Y-YN
1820IF YDIF()0 THEN PROCTURNTO(DEG(
    ATN(XDIF/YDIF))+180*(YN(Y
    )) ELSE PROCTURNTO(SGN(-XDIF)
    *90)
1830X=XN : Y=YN
1840IF STYLE=1 THEN DRAW X,Y ELSE
    MOVE X,Y
1850ENDPROC : REM MOVETO
1860REM----------
1870REM----------
1880DEF FNANGLE(A)
1890IF A)0 THEN =A MOD 360 ELSE =A
    MOD 360 +360 : REM ANGLE
1900REM----------
1910REM----------
1920DEF PROCNEW
1930VDU26: CLS
1940ENDPROC : REM NEW
1950REM----------
1960REM----------
```


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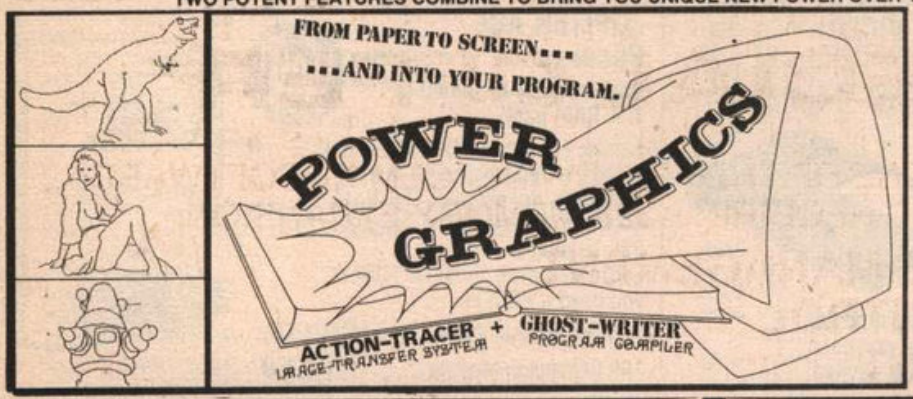

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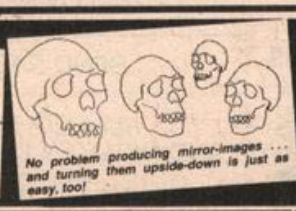

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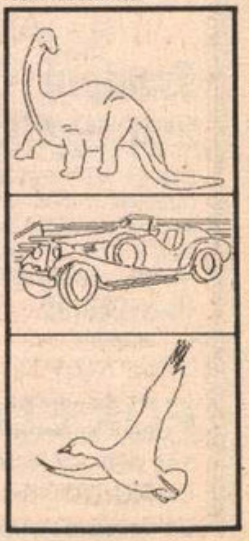

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Invaders

on Vic20

This is an Invader-type game. Full instructions are included in the program. If it is too hard or too easy then the amount of time between each jump is easily changed. This is done by changing the number in line 502 (smaller makes it harder and bigger makes it easier). The program uses 95 percent of the memory available on the standard machine and it should be a simple job to convert to joystick.

Program notes

Lines

5-160	Give instructions
170-235	Set up game
240-280	Movement of man + access to bird's movement
300-350	Man fires
500-540	Move seahawk (left/right)
550-570	Move seahawk down
600-660	Seahawk fires
900-910	Add to score + place new seahawk on the screen
1000-1090	User definable graphics
2000-2010	Take of life when hit + when no lives left goto the end
2020-2150	Finish game + print comment on score + print high score

```
5 PRINT"□":HI=0:Q=0
10 POKE36879,238OR126
30 PRINTTAB(7)"SEAHAWK"
40 PRINTTAB(7)"-------"
45 PRINT
50 PRINT"■KILL THE SWOOPING      SEAHAWK!BUT BE
   WARNED OUT OF ITS DEATHPLACE WILL
60 PRINT"COME  ANOTHER."
65 PRINT"■"
70 PRINT"■WATCH OUT FOR ITS DD'S(DEADLY DROPPINS)
   GET HIT 3 TIMES AND YOU'RE**DEAD**"
75 PRINT
80 PRINT"■WHEN IT GETS TO THE   BOTTOM YOU'RE
   KILLED  AS WELL!!"
90 PRINT"■■■■  HIT ANY KEY !       ";
91 POKE198,0:WAIT198,1:POKE198,0
100 PRINT"□"
101 PRINT"■YOU DO HAVE ONE THING ON YOUR SIDE YOU
   CAN  FIRE BACK AT IT WITH  YOUR ARROWS."
102 PRINT"■■YOU HAVE AN UNLIMITED SUPPLY OF THESE."
103 PRINT:PRINT
105 PRINT"■THE CONTROLS ARE :-"
110 PRINT"■■F -FIRES THE ARROW"
120 PRINT"■, -MOVES TO THE LEFT"
130 PRINT"■. -MOVES TO THE RIGHT"
135 PRINT"■■■PLEASE WAIT!!"
140 GOTO1000
150 PRINT"□■PRESS ANY KEY TO START";
160 POKE198,0:WAIT 198,1:POKE198,0
170 LI=3:SC=0
180 PS=7712:MA=8130
190 PC=38432:MC=38850
195 PRINT"□"
200 POKE36879,25
210 FORI=0TO43:POKE8142+I,63:POKE38862+I,3:NEXT
220 POKEPS,59:POKEPS+1,60:POKEPC,2:POKEPC+1,2
230 POKEMA,61:POKEMC,6
235 PRINT"■";SC;"          ";LI
236 POKEMB,32
240 A=PEEK(197)
250 IFA=29THENMA=MA-1:MC=MC-1:POKEMA+1,32:IFMA<=
    8120THENMA=8120:MC=38840
260 IFA=37THENMA=MA+1:MC=MC+1:POKEMA-1,32:IFMA>=
    8141THENMA=8141:MC=38861
265 IFA=42THENGOTO300
270 POKEMA,61:POKEMC,6
275 GOTO500
280 GOTO235
300 M1=MC-22:MB=MA-22
305 M1=M1-22:MB=MB-22
310 POKEMB+22,32:POKEMA,61
320 POKEMB,30:POKEM1,0
330 IFPEEK(MB-22)>=59THENGOTO900
340 IFMB<=7724THENGOTO275
350 GOTO305
500 A=INT(RND(1)*2)+1
501 Q=Q+1
502 IFQ=10THENGOSUB550
510 IFA=1THENPS=PS+1:PC=PC+1:POKEPS-1,32:IFPS=
    7723THENPS=7722:PC=38442
520 IFA=2THENPS=PS-1:PC=PC-1:POKEPS+2,32:IFPS=
    7702THENPS=7703:PC=38423
530 POKEPS,59:POKEPS+1,60:POKEPC,2:POKEPC+1,2
534 B=RND(1)
535 IFB>.9THENGOTO600
540 GOTO280
550 Q=0
555 PC=PC+22
560 PS=PS+22:POKEPS-22,32:POKEPS-21,32:POKEPS,59:
    POKEPS+1,60
565 POKEPC,2:POKEPC+1,2
566 IFPS=>8120THENGOTO2020
570 RETURN
600 PB=PS+22:P1=PC+22
610 PB=PB+22:P1=P1+22
620 POKEPB-22,32:POKEPS,59
630 POKEPB,62:POKEP1,7
640 IFPB>=8142THENPOKEPB,32:POKEPB,63:POKEP1,3:
    GOTO280
650 IFPEEK(PB+22)=61THENLI=LI-1:GOSUB2000:GOTO280
660 GOTO610
900 R=INT(RND(1)*3)+1:PS=PS+R:PC=PC+R:SC=SC+1
901 POKEPS,59:POKEPS+1,60:POKEPC,2:POKEPC+1,2:
    POKEMB,32:POKEPS-R,32:POKEPS-R+1,32
902 POKE36878,15:POKE36877,250:FORI=1TO250:
    NEXT:POKE36877,0
910 POKE36878,0:GOTO235
1000 POKE52,28:POKE56,28:CLR
1010 FORI=7168TO7679:POKEI,PEEK(I+25600):NEXT
1020 POKE36869,255
1025 A=7640
1030 FORI=ATOA+39:READU:POKEI,U:NEXT
1040 DATA57,29,15,7,3,3,7,5
1050 DATA156,184,240,224,192,192,224,160
1060 DATA0,36,36,60,24,24,126,102
1070 DATA0,24,80,118,60,24,8,0
1080 DATA255,255,255,255,255,255,255,255
1090 GOTO150
2000 FORI=255TO200STEP-1:POKE36878,15:POKE36877,I:
     NEXT:POKE36878,0:POKE36877,0
2005 POKEPB,32
2006 IFLI=0THEN2020
2010 RETURN
2020 PRINT"□SORRY THE SEAHAWKS   HAVE GONE AND
     GOT YOU"
2030 PRINT"YOU MANAGED TO KILL";SC;
2040 PRINT"SEAHAWKS."
2045 IFSC=HIGOTO2085
2050 IFSC>HITHENPRINT"■■YOU'RE THE NEW  SEA-
     HAWK CHAMPION KILLER":HI=SC:GOTO2090
2060 IFSC=0THENPRINT"■■YOU'RE PATHETIC !!":GOTO2100
2070 IFSC<HI/2THENPRINT"■■NOT VERY GOOD":GOTO2100
2080 IFSC>HI/2THENPRINT"■■NOT BAD":GOTO2100
2085 IFSC=HITHENPRINT"■JOINT CHAMP!!":SC=HI:N$=J$
2090 INPUT"■■YOUR NAME CHAMP";N$
2100 PRINT"PRESENT CHAMP IS ";N$
2105 PRINT"CHAMPS SCORE IS ";HI
2110 PRINT"■■■DO YOU WISH TO PLAY   AGAIN (Y/N)!!
2120 GETA$:IFA$=""THEN2120
2130 IFA$="Y"THENGOTO170
2140 IFA$="N"THENPRINT"□":END
2150 GOTO2120
```

Invaders
by Paul Hampson

Stories

on Dragon 32

This is a word game. You are given a choice of three basic stories from which to choose.

You are then asked for various words according to different parts of speech, noun, verb, etc.

You will then see the story you have created on the screen. The program form is very simple and self-explanatory.

```
1 '**********************************
2 '******      STORIES      ******
3 '******    BY J.HUGHES    ******
4 '**********************************
5 CLS
6 PRINT:PRINT:PRINT"*************************************"
7 PRINT"THE COMPUTER WILL ASK YOU TO    INPUT A KIND OF WORD."
8 PRINT"PUT IN YOUR WORD AND PRESS ENTERAFTER ALL YOUR WORDS
  HAVE BEEN  INPUT YOUR STORY WILL COME UP   ON THE SCREEN."
9 PRINT"*************************************"
10 PRINT:PRINT"PRESS ANY KEY TO START"
11 A@=INKEY@:IF A@=""THEN11
12 CLS:PRINT:PRINT"(1) CREATURES":PRINT"(2) SHAKESPEAR":
   PRINT"(3) LETTERS"
13 PRINT:PRINT"INPUT YOUR NUMBER AND ENTER IT "
14 INPUTQ@:ON VAL(Q@)GOTO15,36,59
15 CLS
16 PRINT:PRINT:INPUT"COLOUR ";B@
17 INPUT"VERB ";D@
18 INPUT"GROUP WORD(EG.CROWD) ";F@
19 INPUT"PART OF THE BODY ";H@
20 INPUT"PLURAL NOUN ";J@
21 INPUT"BABY ANIMAL ";L@
22 INPUT"A CREATURE ";A@
23 INPUT"NUMBER+MEASUREMENT                (EG. 1 FOOT) ";C@
24 INPUT"VERB ";E@
25 INPUT"PART OF THE BODY ";G@
26 INPUT"LIQUID ";I@
27 INPUT"PLURAL NOUN ";K@
28 GOSUB78
29 CLS
30 PRINT A@;"'S ARE "B@" AND ROUGHLY":PRINT C@" IN SIZE."
31 PRINT" THEY TEND TO "D@" VERY":PRINT"QUICKLY RATHER THAN "E@
32 PRINT" THEY MAY SOMETIMES BE FOUND IN":PRINTF@;"'S ON THE "G@"
   OR AT ":PRINT" THE BASE OF THE "H@
33 PRINT" THEY ARE "I@" SUCKING CREAT-":PRINT"URES. THE EGGS ARE
   LAID ON":PRINTK @" WHERE THEY HATCH TO ":PRINT"FORM IMMATURE "
   ;L@"S WHICH":PRINT"IN TURN BECOME ADULT "A@"S"
34 A@=INKEY@:IF A@=""THEN34
35 GOTO5
36 CLS
37 PRINT:INPUT"NAME ";A@
38 INPUT"NATIONALITY ";C@
39 INPUT"NAME ";E@
40 INPUT"PART OF THE BODY ";G@
41 INPUT"NOUN ";I@
42 INPUT"NOUN ";B@
43 INPUT"NATIONALITY ";D@
44 INPUT"NOUN ";F@
45 INPUT"NAME ";H@
46 INPUT"SOMETHING YOU WEAR ";J@
47 GOSUB78
48 PRINT"PISTOL--WHAT IS THY NAME?":PRINT"KING--";A@" LE "B@
49 PRINT"PISTOL--LE "B@", A "C@" NAME?"
50 PRINT"KING--NO, I AM A "D@" MAN."
51 PRINT"PISTOL--KNOW'ST THOU "E@
52 PRINT"KING--YES"
53 PRINT"PISTOL--TELL HIM I'LL KNOCK HIS":PRINT"    "F@" ABOUT HIS "G@
54 PRINT"    UPON SAINT "H@;"'S DAY"
55 PRINT"KING--DO NOT WEAR YOUR "I@
56 PRINT"    IN YOUR "J@" THAT DAY ":PRINT"LEST HE KNOCK THAT ABOUT
   YOURS."
57 A@=INKEY@:IF A@=""THEN57
58 GOTO5
59 CLS
60 PRINT:INPUT"MAKE UP A WORD ";A@
61 INPUT"TECHNICAL WORD ";C@
62 INPUT"NUMBER ";E@
63 INPUT"LENGTH OF TIME(EG.DAY)";G@
64 INPUT"PLURAL NOUN ";I@
65 INPUT"PART OF AN ENGINE ";B@
66 INPUT"NUMBER ";D@
67 INPUT"NOUN ";F@
68 INPUT"SPEECH VERB(EG.SHOUT)";H@
69 GOSUB78
70 PRINT:PRINT:PRINT"     DEAR SIR,"
71 PRINT"          I HAVE RECENTLY ":PRINT"BOUGHT A "A@" HOME
   COMPUTER":PRINT"SYSTEM, BUT FIND THAT THE ":PRINTB@" "C@;"S ARE
   FAULTY. "
72 PRINT" IT IS A "D@"K SYSTEM WHICH":PRINT"I BOUGHT FOR "E@" POUNDS."
73 PRINT" I THINK IT MAY HAVE BECOME":PRINT"FAULTY AFTER THE "F@" FELL"
74 PRINT"ON IT. ALSO I WOULD LIKE TO ":PRINT"START A CLUB FOR THOSE
   OWNERS OF";:PRINTA@" COMPUTERS, WE COULD ":PRINT"GET TOGETHER EVERY
   "G@:PRINT"AND "H@" ABOUT OUR "I@
75 A@=INKEY@:IF A@=""THEN75
76 GOTO5
77 END
78 CLS:PRINT@229,"YOUR STORY IS COMING UP":PLAY"ADEFG":CLS:RETURN
```

Stories
by J Hughes

Mathematics

on BBC

This program, for any BBC computer, allows the user to obtain mathematical figures for logarithms, anti-logarithms, square-roots, squares, sines, cosines and tangents.

If any incorrect input is made, control is transferred back to the menu. Figures are given to eight decimal places and very small or very large numbers are presented in exponential form.

Extensive use is made of the procedure capability of the Beeb, an excellent feature which allows programs to be structured.

Possible alterations could be made to the functions calculated. For instance, there is no provision at the moment for secants, log-sines, etc.

```
 10REM* MATHEMATICAL TABLES *
 20REM*     FOR THE B.B.C.    *
 30REM*     MICROCOMPUTER.    *
 40REM*       MODEL B.        *
 50REM*          BY           *
 60REM*    STEPHEN LAVERTON   *
 70REM*     APRIL 11 1983     *
 80REM*
 90REM*
100ONERROR GOTO140
110 VDU 23,1,0;0;0;0;
120PROCTITLES
130PROCINSTRUCTIONS
140PROCMENU
150IF N=1THENPROCLOGARITHM ELSEIFN=2THENPROCANTI
     LOGARITHM ELSEIFN=3THENPROCSQUAREROOT ELSEIFN=
     4THENPROCSQUARE ELSEIF N=5THENPROCCOSINE ELSEIFN
     =6THENPROCSINE ELSEIFN=7THENPROCTANGENT ELSEIFN
     =8THENCLS:VDU23,1,1;0;0;0;:END
160GOTO140
170DEFPROCMENU
180CLS
190PROCBIGPRINT(13,2,CHR$141+CHR$136,"MENU")
200PRINTTAB(5,5)CHR$(133)"1. LOGARITHMS";TAB(5,7)
   CHR$(133)"2. ANTI-LOGARITHMS";TAB(5,9)CHR$(133)"
   3. SQUARE ROOTS";TAB(5,11)CHR$(133)"4. SQUARES"
210PRINTTAB(5,13)CHR$(133)"5. COSINES";TAB(5,15)CHR$
   (133)"6. SINES";TAB(5,17)CHR$(133)"7. TANGENTS";
   TAB(5,19)CHR$(133)"8. EXIT FROM PROGRAM";TAB(4,
   21):INPUT"CHOOSE YOUR OPTION";N$=GET$:N=VAL(N$)
220ENDPROC
230DEFPROCBIGPRINT(X,Y,CONTROL$,MESSAGE$)
240PRINTTAB(X,Y);CONTROL$;MESSAGE$'TAB(X);CONTROL$;
   MESSAGE$
250ENDPROC
260DEFPROCLOGARITHM
270CLS
280PROCBIGPRINT(10,4,CHR$141+CHR$133,"LOGARITHMS")
290PRINTTAB(2,11)CHR$134;:INPUT"Enter the number :
   "Y
300PRINTTAB(3,14)"The logarithm is : ";LOGY
310PRINTTAB(4,19);CHR$129;"Another logarithm (Y/N)?
   ";:A$=GET$
320ENDPROC
330DEFPROCANTILOGARITHM
340CLS
350PROCBIGPRINT(7,4,CHR$141+CHR$133,"ANTI-
   LOGARITHMS")
360PRINTTAB(2,11)CHR$134;:INPUT"Enter the log : "Y
370PRINTTAB(3,13)"The Antilogarithm is : ";10^Y
380PRINTTAB(4,19);CHR$129;"Another antilogarithm
   (Y/N)?";:A$=GET$
390IF A$="Y" THEN 360
400ENDPROC
410DEFPROCSQUAREROOT
```

```
420CLS
430PROCBIGPRINT(10,4,CHR$141+CHR$133,"SQUARE ROOTS")
440PRINTTAB(2,11)CHR$134;:INPUT"Enter your number :
   "Y
450PRINTTAB(3,14)"The square root is : ";SQRY
460PRINTTAB(4,19);CHR$129;"Another square root
   (Y/N)?";:A$=GET$
470IF A$="Y" THEN 440
480ENDPROC
490DEFPROCSQUARE
500CLS
510PROCBIGPRINT(12,4,CHR$141+CHR$133,"SQUARES")
520PRINTTAB(2,11)CHR$134;:INPUT"Enter your number :
   "Y
530PRINTTAB(3,14)"The square is : ";Y^2
540PRINTTAB(4,19);CHR$129;"Another Square (Y/N)?";:
   A$=GET$
550IF A$="Y" THEN 520
560ENDPROC
570DEFPROCSINE
580CLS
590PROCBIGPRINT(15,4,CHR$141+CHR$133,"SINES")
600PRINTTAB(2,11)CHR$134;:INPUT"Enter your angle
   (degrees) : "Y
610X=RADY
620IF SINX<5E-5 THEN SINX=0
630PRINTTAB(3,14)"The sine is : ";SINX
640PRINTTAB(4,19);CHR$129;"Another Sine (Y/N)?";:
   A$=GET$
650IF A$="Y" THEN 600
660ENDPROC
670DEFPROCCOSINE
680CLS
690PROCBIGPRINT(13,4,CHR$141+CHR$133,"COSINES")
700PRINTTAB(2,11)CHR$134;:INPUT"Enter your angle
   (degrees) : "Y
710X=RADY
720IF COSX<5E-5 THEN COSX=0
730PRINTTAB(3,14)"The Cosine is : ";COSX
740PRINTTAB(4,19);CHR$129;"Another Cosine (Y/N)?";
   :A$=GET$
750IF A$="Y" THEN700
760ENDPROC
770DEFPROCTANGENT
780CLS
790PROCBIGPRINT(13,4,CHR$141+CHR$133,"TANGENTS")
800PRINTTAB(2,11)CHR$134;:INPUT"Enter the angle
   (degrees) : "Y
810X=RADY
820IF TANX<5E-5 THEN TANX=0
830PRINTTAB(3,14)"The tangent is : ";TANX
840IF Y<5E-5 THEN Y=0
850PRINTTAB(4,19);CHR$129;"Another Tangent (Y/N)?
   ";:A$=GET$
860IF A$="Y" THEN 800
870ENDPROC
880DEFPROCINSTRUCTIONS
890CLS
900PROCBIGPRINT(10,2,CHR$141+CHR$133,"INSTRUCTIONS")
910PRINTTAB(1,7)"This Program allows the user to
   calculate logarithms,lines, square     roots and
   other mathematical functions."
920PRINTTAB(1,12)"The escape key will return you to
   the   main menu at any tim";PROCBIGPRINT(10,21,
   CHR$141+CHR$136,"PRESS ANY KEY"):A$=GET$
930ENDPROC
940 DEFPROCTITLES
950CLS
960PROCBIGPRINT(11,3,CHR$141+CHR$133,"MATHEMATICAL")
970PROCBIGPRINT(14,7,CHR$141+CHR$133,"TABLES")
980PROCBIGPRINT(16,11,CHR$141+CHR$130,"BY")
990PROCBIGPRINT(9,15,CHR$141+CHR$130,"STEPHEN
   LAVERTON")
000PROCBIGPRINT(10,21,CHR$141+CHR$136,"PRESS ANY
   KEY")
010A$=GET$
020ENDPROC
```

Mathematics
by Stephen Laverton

Curve

on Oric

This program written for the Oric is very simple but quite useful for the mathematician. It is designed to draw a curve, either the sine or cosine curve depending on which one you input.

The program is very straight forward, the only confusing lines are lines 80 and 110. These contain the values of X and Y which incidentally are the variables for the cursor position.

When you have finished typing in the listing and have typed Run you are told to enter your required curve. 'S' stands for sine and 'C' stands for cosine. When the plotting has finished it returns to the beginning of the program and so you can try plotting a different curve.

The axis range from 0 degrees to 360 degrees on the X axis and from −90 degrees to +90 degrees on the Y axis.

```
10  PRINT CHR$(17) CHR$(6): PAPER0: INK2: HIRES
20  PRINT "Enter the required wave (S/C)"
30  GETW$
40  CLS
50  IF W$= "S" THEN PLAY1,0,1,500: GOTO 80
60  IF W$= "C" THEN PLAY1,0,1,500: GOTO 110
70  GOTO 20
80  HIRES: GOSUB 140: FOR X=0 TO 239: Y=99*SIN(*PI/120)
    +99: CURSET X,Y,1: NEXT X
90  PRINT: PRINT CHR$(140) CHR$(129)"THE SINE WAVE"
100 PLAY1,1,3,800: GOTO 20
110 HIRES: GOSUB 140: FOR X=0 TO 239: Y=99*COS(*PI/120)
    +99: CURSET X,Y,1: NEXT X
120 PRINT: PRINT CHR$(140) CHR$(129)"THE COSINE WAVE"
130 PLAY1,1,3,800: GOTO 20
140 CURSET 0,0,3: DRAW 0,199,1: CURSET 0,99,3: DRAW
    237,0,1: RETURN
```

Curve
by Stephen Chalmers

Stock Market

on Spectrum

This program tests your skill in making money on the Stock Market. You have three months to make your £800 into £100,000. Easy? It is until you start paying tax on your stocks which can be as much as 50 percent of your shares. To save the program type *GOTO* 9800.

If you need to know how much memory you have left type *Print fn* a$(). If, however, you have a 48K model then change the 9216 in line 9999 to 41984.

```
  10 REM ++++++++++++++++++++++
  20 REM +    STOCKMARKET     +
  30 REM +  © Guy Fullstove   +
  40 REM ++++++++++++++++++++++
  50 LET G=0: LET S=0: LET NI=0:
 LET L=0
  60 POKE 23658,8: GO SUB 8000:
GO SUB 5000
  70 LET MONEY=800: CLS
  80 REM ++++++++++++++++++++++
  90 REM +    MAIN PROGRAM    +
 100 REM ++++++++++++++++++++++
 110 FOR A=1 TO 12
 120 FOR M=1 TO 5: IF MONEY>=1E5
 THEN GO TO 6000
 130 LET D$=("Monday" AND M=1)+(
"Tuesday" AND M=2)+("Wednesday"
AND M=3)+("Thursday" AND M=4)+("
Friday" AND M=5)
 140 POKE 23692,255: IF RND>.61
THEN GO SUB 6500
 150 GO SUB 1000
 160 PRINT '''TAB 10;D$;" Week ";
A
 170 PRINT '''TAB 12;"Prices:";TA
B 11;"Gold....£";P(1);TAB 11;"Si
lver..£";P(2);TAB 11;"Nickel..£"
;P(3);TAB 11;"Lead....£";P(4)
 180 PRINT 'TAB 10;"You have £";
MONEY
 190 PRINT #0;"Option ?(A/B/C/D/
E/F)"
 200 LET A$=INKEY$: IF A$<"A" OR
 A$>"F" THEN GO TO 200
 205 INPUT ""
 210 IF A$="A" THEN GO SUB 1500
 220 IF A$="B" THEN GO TO 170
 230 IF A$="C" THEN GO SUB 5000
 240 IF A$="D" THEN GO SUB 3000
 250 IF A$="E" THEN GO SUB 4000
 260 IF A$="F" THEN NEXT M: NEXT
 A: GO TO 9500
 270 IF MONEY>=1E5 THEN GO TO 6E
3
 280 GO TO 190
1000 REM ++++++++++++++++++++++
1010 REM +      PRICES        +
1020 REM ++++++++++++++++++++++
1030 DIM P(4)
1040 LET P(1)=(INT (RND*801))+20
0
1050 LET P(2)=(INT (RND*501))+15
0
1060 LET P(3)=(INT (RND*401))+10
0
1070 LET P(4)=(INT (RND*251))+50
1080 RETURN
1500 REM ++++++++++++++++++++++
1510 REM +   POSSESSIONS       +
1520 REM ++++++++++++++++++++++
1530 POKE 23692,255: PRINT '''TAB
 10;"Possessions";TAB 11;"Gold..
..";G;TAB 11;"Silver..";S;TAB 11
;"Nickel..";NI;TAB 11;"Lead...."
;L'TAB 10;"Money..£";MONEY
1540 RETURN
3000 REM ++++++++++++++++++++++
3010 REM +        BUY         +
3020 REM ++++++++++++++++++++++
3030 PRINT : PRINT #0;AT 0,4;"Wh
at do you wish to buy ?";AT 1,13
;"(G/S/N/L)"
3040 LET B$=INKEY$
3050 IF B$="G" OR B$="S" OR B$="
N" OR B$="L" THEN GO TO 3060
3055 GO TO 3040
3060 IF B$="G" THEN LET AM=INT (
MONEY/P(1))
3070 IF B$="S" THEN LET AM=INT (
MONEY/P(2))
3080 IF B$="N" THEN LET AM=INT (
MONEY/P(3))
3090 IF B$="L" THEN LET AM=INT (
MONEY/P(4))
3095 POKE 23692,255
3100 INPUT ("You can afford ";AM
;"How many do you want ?")' LINE
 Z$
3105 IF Z$="" THEN GO TO 3100
3110 IF Z$(1)<"0" OR Z$(1)>"9" T
HEN GO TO 3100
3120 IF VAL Z$>AM THEN GO TO 310
0
3130 IF B$="G" THEN LET MONEY=MO
NEY-(P(1)*VAL Z$): LET G=G+VAL Z
$
3140 IF B$="S" THEN LET MONEY=MO
NEY-(P(2)*VAL Z$): LET S=S+VAL Z
$
3150 IF B$="N" THEN LET MONEY=MO
NEY-(P(3)*VAL Z$): LET NI=NI+VAL
 Z$
3160 IF B$="L" THEN LET MONEY=MO
NEY-(P(4)*VAL Z$): LET L=L+VAL Z
$
3170 INPUT "": RETURN
4000 REM ++++++++++++++++++++++
4010 REM +        SELL        +
4020 REM ++++++++++++++++++++++
4040 PRINT : PRINT #0;AT 0,3;"Wh
at do you want to sell?";AT 1,10
;"(G/S/N/L)"
4050 LET B$=INKEY$
4060 IF B$="G" OR B$="S" OR B$="
N" OR B$="L" THEN INPUT "": GO T
O 4070
4065 GO TO 4050
4070 PRINT : PRINT AT 21,0;"You
have ";
4080 PRINT (G AND B$="G")+(S AND
 B$="S")+(NI AND B$="N")+(L AND
B$="L")
4090 INPUT "How many do you wish
 to sell ?"; LINE Z$
4095 IF Z$="" THEN GO TO 4090
4100 IF Z$(1)<"0" OR Z$(1)>"9" T
HEN GO TO 4090
4110 IF B$="G" AND VAL Z$>G THEN
 GO TO 4090
4120 IF B$="S" AND VAL Z$>S THEN
 GO TO 4090
4130 IF B$="N" AND VAL Z$>NI THE
N GO TO 4090
4140 IF B$="L" AND VAL Z$>L THEN
 GO TO 4090
4150 IF B$="G" THEN LET MONEY=MO
NEY+(P(1)*VAL Z$): LET G=G-VAL Z
$
4160 IF B$="S" THEN LET MONEY=MO
NEY+(P(2)*VAL Z$): LET S=S-VAL Z
$
4170 IF B$="N" THEN LET MONEY=MO
NEY+(P(3)*VAL Z$): LET NI=NI-VAL
 Z$
4180 IF B$="L" THEN LET MONEY=MO
NEY+(P(4)*VAL Z$): LET L=L-VAL Z
$
4190 PRINT AT 20,0;"
                    "
4200 RETURN
5000 REM ++++++++++++++++++++++
5010 REM +     INSTRUCTIOS    +
5020 REM ++++++++++++++++++++++
5030 CLS : LET M$="INSTUCTIONS**
**********************"
5040 FOR N=1 TO 11
5050 PRINT AT 0,0;M$
5060 LET M$=M$(32)+M$
5070 LET M$=M$( TO 32)
5080 PAUSE 5
5090 NEXT N
5100 PRINT AT 3,1;"The idea of t
his program is to accumalate £10
0,000 during threemonths on the
Stock Exchange."
5110 PRINT AT 7,1;"You achieve t
his by dealing in Gold,Silver,Ni
ckel and Lead. Theprice of these
 comodities variesas shown below
."
5120 PRINT AT 12,3;"Commodity
   £      -£"
5130 PRINT AT 14,4;"Gold
  200     1000";TAB 4;"Silver
    150      750";TAB 4;"Nickel
      100      500";TAB 4;"Lead
        50      300"
5140 GO SUB 9000
5150 PRINT AT 1,1;"At the start
you are given £800and a display
of the market      prices is show
n. Also there are six options wh
ich mean:"
5160 PRINT AT 7,2;"(A)..Print up
 your possessions";TAB 2;"(B)..P
rint the market prices";TAB 2;"(
C)..Print these instructions";TA
B 2;"(D)..Buy comodities";TAB 2;
"(E)..Sell comodities";TAB 2;"(F
)..Quit"
5170 PRINT AT 19,11;"Good Luck"
5180 GO SUB 9000
```

```
5190 RETURN
6000 REM ************************
6010 REM * YOU HAVE SUCCEEDED   *
6020 REM ************************
6030 CLS : PRINT AT 8,10;"WELL D
ONE"
6040 PRINT AT 10,4;"YOU HAVE MAN
AGED TO MAKE"
6050 PRINT AT 12,4;"THE REQUIRED
 £100,000"
6060 PRINT AT 14,0;"YOU FINISHED
 ON ";D$;" WEEK ";A
6070 PRINT AT 16,2;"YOUR AVERAGE
 EARNINGS WERE:";AT 17,9;"£";INT
 (MONEY/((A*5)+M));" A DAY"
6080 GO TO 9560
6500 REM ************************
6510 REM *     TAX DEMANDS      *
6520 REM ************************
6530 POKE 23692,255: PRINT '''TAB
 1;"You have to pay some tax"
6540 IF RND>.5 THEN GO TO 6700
6550 PRINT '''"The rate is 1/4 of
 your shares"
6560 LET G=G-(INT (G/4)): LET S=
S-(INT (S/4)): LET NI=NI-(INT (N
I/4)): LET L=L-(INT (L/4))
6570 RETURN
6700 PRINT '''"The rate is 1/2 yo
ur shares"
6710 LET G=G-(INT (G/2)): LET S=
S-(INT (S/2)): LET NI=NI-(INT (N
I/2)): LET L=L-(INT (L/2))
6720 RETURN
8000 REM ************************
8010 REM *      FRONT PAGE      *
8020 REM ************************
8030 BORDER 1: INK 7: PAPER 1: C
LS
8040 DIM N$(2,32)
8050 LET N$(1)=" SPEC **********
**************"
8060 LET N$(2)=" SOFT **********
**************"
8070 FOR N=0 TO 4 STEP 2
8080 PRINT AT N,0;"**************
**************"
8090 NEXT N
8100 FOR N=1 TO 14
8110 PRINT AT 1,0;N$(1);AT 3,0;N
$(2)
8120 LET N$(1)=N$(1,32)+N$(1)
8130 LET N$(2)=N$(2,32)+N$(2)
8140 LET N$(1)=N$(1, TO 32)
8150 LET N$(2)=N$(2, TO 32)
8160 NEXT N
8170 PRINT AT 6,12;"PRESENTS
                   ==========="
8180 PRINT AT 10,8;"* STOCK MARK
ET *"
8190 PRINT AT 15,6;"© GUY FULLAL
OVE 1983"
8200 PLOT 0,0: FOR N=1 TO 3
8210 DRAW 32,32: DRAW 32,-32
8220 NEXT N: DRAW 32,32: DRAW 30
,-32
8230 PLOT 0,32: FOR N=1 TO 3
8240 DRAW 32,-32: DRAW 32,32
8250 NEXT N: DRAW 32,-32: DRAW 3
0,32
9000 REM ************************
9010 REM *   "PRESS ANY KEY"    *
9020 REM ************************
9030 PRINT #0;TAB 4; FLASH 1;"Pr
ess any key to continue"
9040 PAUSE 0
9050 INPUT ""
9060 CLS : RETURN
9500 REM ************************
9510 REM *      YOU LOST        *
9520 REM ************************
9530 CLS : PRINT AT 5,7;"YOU HAV
E FAILED TO "
9540 PRINT AT 9,8;"REACH YOUR TA
RGET"
9550 PRINT AT 12,0;"KEEP AWAY FR
OM THE STOCK MARKET";AT 14,9;"IN
 THE FUTURE"
9560 PRINT AT 19,7;"ANOTHER GO (
Y/N) ?"
9570 FOR N=-10 TO 20
9580 LET B$=INKEY$
9590 IF B$="Y" THEN RUN
9600 IF B$="N" THEN STOP
9610 BEEP .01,N
9620 NEXT N
9630 GO TO 9570
9800 REM ************************
9810 REM *    AUTO RUN SAVE     *
9820 REM ************************
9830 SAVE "Stock Mar" LINE 50
9840 VERIFY "Stock Mar"
9850 STOP
9995 REM ************************
9996 REM *HOW MUCH MEMORY LEFT *
9997 REM *    PRINT FN A$()    *
9998 REM ************************
9999 DEF FN A$()=STR$ (9216-((PE
EK 23641+256*PEEK 23642)-(PEEK 2
3635+256*PEEK 23636))+" Bytes"
```

Stockmarket
by Guy Fullalove

Weird Waves

on BBC

This program is designed to demonstrate the colour capabilities of the BBC Model B computer. The program operates in mode 1 and produces four waves in a random colour using the first digit in the *Gcol* command.

The waves are produced using two sine waves, to which the computer moves to the relative point and then draws to the point on the second sine wave producing a solid wave of colour.

Because the colours are random it will use different colours each time it is run, but the waves remain the same because they are stored in a *Data* statement.

The program will run on a Model A in mode 5 by changing the mode statement in at line 50. Z and Z1 are the numbers which the waves are based on.

```
    10 REM WEIRD WAVES
    20 REM By C.Ross  26,4,83
    30 REM (C) copyright
    40 REM This program is designed to de
monstate the GCOL command in an interest
ing way.
    50 MODE 1:REM MODE 5 if using Model
A
    60 FOR N=1 TO 4
    70 CLS
    80 READ Z,Z1
    90 C=RND(1000)
   100 GCOL C,4:PRINT "GCOL ";C;",1",:PRI
NT "Z=";Z;"   Z1=";Z1
   110 FOR X%=1 TO 1280 STEP 5
   120 Y%=500-Z+500-Z*SIN(X%/Z*2)*PI)
   130 MOVE X%,Y%
   140 Y%=500-Z1+500-Z1*SIN(X%/Z1*2)*PI)

   150 DRAW X%,Y%
   160 NEXT X%
   170 NEXT N
   180 END
   190 DATA 200,300,100,300,150,270,
       300,476
```

Weird Waves
by Christopher Ross

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Solids

on ZX81

This program is for any ZX81 either expanded or unexpanded. It will find the volumes of the five main objects one considers for O-level maths; ie, the cube, the cylinder, the cone, the sphere and the square-based pyramid. The program is an example of memory economy using codes of characters and the calling of the same routines by different parts of the program.

The line numbers of these routines are stored as variables at the beginning of the program thus one can save memory by calling the variable; instead of, for example, 26 *Goto Code* "8" we get the line 26 *Goto* E thus saving three bytes.

The graphics characters used in the program are as follows: character 7, *Lines* 8 and 10; character 1 and character 5, *Line 12;* character 3, *Lines* 25 and 35; character 4 and character 3, *Line 29.*

I hope other users, especially maths candidates, find this program useful.

Program notes

1-4 Line numbers of important routines
5-12 Choose which volume you require
13-15 Volume of cube
18-21 Volume of cylinder
23-26 Volume of cone
28-30 Volume of sphere
33-35 Volume of pyramid
36-38 Print volume of object and stop
39-47 Main routines to *Input* certain measurements.

The user should be careful to input all measurements in the same scale; eg, mm, cm, etc, or he/she will get some very funny results.

```
    1 LET E=CODE "8"
    2 LET S=CODE "B"
    3 LET D=CODE "E"
    4 LET I=CODE "H"
    5 PRINT "1..CUBE","2..CYLINDE
R","3..CONE","4..SPHERE","5..PYR
AMID (SQUARE BASE)"
    6 PRINT "PRESS NO."
    7 LET A$=INKEY$
    8 IF A$="" THEN GOTO CODE "F"
    9 IF CODE A$>CODE "0" AND COD
E A$<CODE "6" THEN GOTO VAL "11"
   10 GOTO CODE "F"
   11 CLS
   12 GOTO CODE "$"+(VAL A$-CODE
"■")*CODE "▌"
   13 GOSUB S
   14 LET V=B*B*B
   15 GOTO E
   18 GOSUB D
   19 GOSUB I
   20 LET V=R*R*PI*H
   21 GOTO E
   23 GOSUB D
   24 GOSUB I
   25 LET V=PI*R*R*H/CODE "■"
   26 GOTO E
   28 GOSUB D
   29 LET V=CODE "▗"*R*R*R*PI/COD
E "■"
   30 GOTO E
   33 GOSUB S
   34 GOSUB I
   35 LET V=B*B*H/CODE "■"
   36 CLS
   37 PRINT "VOL OF OBJECT=";V
   38 STOP
   39 PRINT "BASE SIDE?"
   40 INPUT B
   41 RETURN
   42 PRINT "RADIUS?"
   43 INPUT R
   44 RETURN
   45 PRINT "VERTICAL HEIGHT?"
   46 INPUT H
   47 RETURN
```

Solids
by Mike Davies

XXX

on Vic20

This program will run on a basic Vic20 micro computer. The machine code routine locates itself at HEX:1D72 that is 7538:DEC. The program is started by typing SYS(7538). And to break from it press *Run Stop* and *Restore.*

```
1 REM PROGRAM  XXXX
5 REM BY STEVEN JONAS
10 DATA120,169,127,141,20,3,169,
   29,141,21,3,88,96,169,25,141,
   15,144,165,197,201,15
20 DATA208,42,238,1,144,238,1,144,
   238,1,144,169,8,141,15,144,160,
   0,200,192,255
30 DATA208,251,160,0,200,192,255,
   208,251,206,1,144,206,1,144,
   206,1,144,169,25,141,1,15
40 DATA144,76,191,234,234
50 FORI=7538TO7607:READA:POKEI,A
   :NEXT
60 SYS(7538)
B*
   PC  SR AC XR YR SP
.;603E 33 00 63 00 F6
.; 1D72 SEI
.; 1D73 LDA #$7F
.; 1D75 STA $0314
.; 1D78 LDA #$1D
.; 1D7A STA $0315
.; 1D7D CLI
.; 1D7E RTS
.; 1D7F LDA #$19
.; 1D81 STA $900F
.; 1D84 LDA $C5
.; 1D86 CMP #$0F
.; 1D88 BNE $1DB4
.; 1D8A INC $9001
.; 1D8D INC $9001
.; 1D90 INC $9001
.; 1D93 LDA #$08
.; 1D95 STA $900F
.; 1D98 LDY #$00
.; 1D9A INY
.; 1D9B CPY #$FF
.; 1D9D BNE $1D9A
.; 1D9F LDY #$00
.; 1DA1 INY
.; 1DA2 CPY #$FF
.; 1DA4 BNE $1DA1
.; 1DA6 DEC $9001
.; 1DA9 DEC $9001
.; 1DAC DEC $9001
.; 1DAF LDA #$19
.; 1DB1 STA $900F
.; 1DB4 JMP $EABF
.; 1DB7 NOP
```

Cruising & Blind Alley

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Popular Computing Weekly is offering £10 each month to the player with the highest score on *Cruising*. All you have to do to enter this month's competition is send a print-out of your highest score, together with your name and address, to:

Popular Computing Weekly
Cruising
Hobhouse Court
19 Whitcomb Street
London WC2 7HF

Each month we will publish the name of the winner and the new *Cruising* high score. Are you good enough to accept the *Cruising* challenge?

The winner of last month's competition with a score of 22664 was I. C. Willis of Shore Lane, Sheffield, who receives £10. Entries for this month's competition close on June 30.

Notes

1) Each entry must consist of a ZX printout and your name and address.
2) Closing date for this month's *Cruising* challenge entries is June 30.
3) The highest score each month will receive £10.
4) High scores cannot be transferred from one month to another.
5) The judges' decision is final.
6) No employees of Sunshine Publications Ltd, or their families, will be eligible to enter.

Blind Alley

Blind Alley is a game of strategy. In order to win you must outwit the computer, using your craft to fence in and finally destroy the enemy pursuit vehicles. But, watch out for the solid trail left by your opponents — one touch is fatal!

Each month *Popular Computing Weekly* is giving away £10 to the player with the highest score on *Blind Alley*. To enter this month's competition simply send in a copy of your score and the code at the bottom of the score table, together with your name and address to:

Popular Computing Weekly
Blind Alley
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The highest score sent in so far is 70625 from Stuart Williamson of Bradford, West Yorks. Entries for this month's competition close on June 30.

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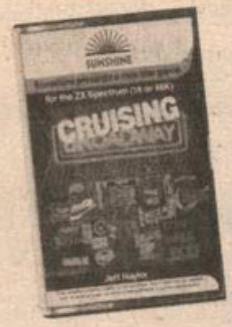

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Volcanic catacombs

Carnel Software of Slough has had considerable and well-earned success with its *Volcanic Dungeon* program for the ZX81. The company has recently released versions for the 48K Spectrum and the Dragon.

For those of you who have not seen *Volcanic Dungeon*, it follows the same company's *Black Crystal* in being very well-packaged in a large box, complete with booklet. The first two pages contain the now obligatory bit of fantastic scene-setting which everyone must now include with their cassettes — a story about Methzar, goddess of evil, who captures the elfin princess Edora, and, with the help of the witch Magra, imprisons her in a crystal coffin somewhere within the catacombs of the *Volcanic Dungeon*.

The Princess knows the secret of the whereabouts of the seeds of life. You are charged by her father, now near to death, with rescuing the princess and thus lifting the blight that has settled on the land.

At the start of the game, you are at the entrance to the *Volcanic Dungeon*, excavated by dwarfs — you have with you a sword, and a magic ring which will change shape according to the current strength of the witch Magra. She is loose somewhere within the cave complex, and you will have to do battle with her eventually. As you move through the caves, you have the aid of a map given to you by the dwarfish builders of the dungeon.

This is a text adventure, although unusually, the text is white on black. The display includes the magic ring, at the top of the screen, with its changing shades, and a graphic representation of your current weapons and armour.

You are allowed to carry 10 weapons, including the original sword. These weapons are scattered at random throughout the complex and, assuming that no monster is guarding them, may be picked up or discarded at will.

The game is beautifully balanced. Each weapon has its own attack and defence capabilities — your knowledge of mythology will be put to the test when selecting a weapon for battle with particular monsters. Thus, the stake is obviously a good weapon when fighting the vampire, and the dragon's tear is the defence against a cyclops. How, though, do you kill the dragon to get its tear, and what weapon will you use to fight the witch?

Not only has the weapons system been well thought out, so has the movement system. Each of your moves, or attack/defend commands, uses up one of your strength units and one of your water units, both originally set at 100. Each monster you kill will bump up your strength rating (so you can't keep avoiding battle), but your water can only be replenished by finding one of the four wells.

On rescuing the princess (he says it so glibly!), your strength rating falls dramatically, and you will use up your water at twice the initial rate in getting the princess out — and the monsters are still about!

The whole game mechanism makes for a very addictive program, and one that remains a firm favourite with many adventurers. Apparently there is some competition among many of the fans of *Volcanic Dungeon*, to see who can complete the adventure in the quickest time. Well, now there is an official competition run by Carnel, details of which are printed in the booklet. Two weeks in Florida, including visits to the Epcot Center — how about that for first prize? The final will be held at the Earl's Court Computer Fair in June.

Now, a plea for help! Since I first asked you to send in your requests for tips to get you through sticky situations, I've been inundated with letters. What I need now are more tips and hints from you, the readers. I have a lot of questions about Vic20 adventures, as well as Dragons and Ataris. If you have a few spare minutes between adventures, just jot down a few thoughts you've had whilst playing particular adventures, and the strategy you've used to complete them. I hope then to match these up with the *Help* letters. With advice from the manufacturers, we should be able to build up a good library of tips.

One or two of you have taken me to task for not replying personally to your letters. I apologise, but there are so many letters that I can only reply to them through this column.

Talking of readers' letters, and manufacturers, I'm reminded of a point raised by John Shiali, whose letter I mentioned a couple of weeks ago. He wonders if, with the advent (no pun intended!) of the Timex 2000 (Spectrum to us), we might eventually see some Scott Adams adventures, currently enjoyed by those lucky Vicers. By all accounts they are archetypal difficult games — maybe we should get up a petition to get these adventures converted to other micros.

J Eldridge is stuck at the forcefield on Artic's *Planet of Death*. Run our decoding program, and then type in:

"fearh * ni * s * edcrletnae"
and
"cpeiaehrgoyours * dei * rmt ** r * rnsr"

Mr Eldridge has a tip for anyone just beginning *Planet of Death*, and who might

be having trouble in the laser shed. Make sure you have the board, and then:

"u * a ** e * wdrsbrtbadnoeodorko * o"

John, from Crescent Road in Dagenham is trying to get at the *Inca Treasure* (oh all right, Artic's *Adventure B*) with his Spectrum. You're nearly there, John, but try typing this:

"rvestisheea/ * com * vgskvoleet/t"
then
"b * h * kmesc * uorl/s/bpektgoeautc * s * /hhratsils/rgr * kcecituoood"

That'll get you into the temple, there's still a lot to do — good luck!

Incidentally, some of you have followed my advice and sent Artic your SAE's requesting *Help* sheets. After several weeks — no reply. I agree that this is not good public relations, but let's give them the benefit of the doubt and assume that they're working on *Adventure E* for us even now

In the meantime: *keep your eye on the Cyclops!* ■

● *Inventory:* this is another of those words which are often left undocumented in an adventure program. It's a way to look at what you're carrying — you wouldn't want to attack an Orc when all you're carrying is an empty bottle, would you? (Oh, I don't know, though, it might be made of glass, and that might have some effect, but then bottles in most adventures are, perversly, mostly of leather!). Often abbreviated to *Invent*, though not *In*, you might end up somewhere you don't want to explore just yet! You might also want to try *List*.

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*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

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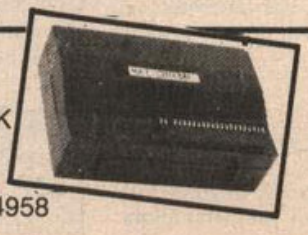

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A CERTAIN TOUCH

F Hill of Horridge Farm, Ashford, near Banstable, Devon, writes:

Q How do you incorporate data statements in a Spectrum? Also, could you please stop putting Spectrum programs under ZX81 programs.

PS. The magazine lost a certain touch when it lost Citizen Pain.

A Data statements must be used along with *Read* commands — one without the other will produce an error code. The other associated command is *Restore*, though this is not always necessary.

Individual pieces of data must be separated by a comma, and *Data* statements used to assign values to a string must always be in inverted commas.

The *Read* statement must be used to read each item of Data from the *Data* statement. That is why the *Data* statement must always be arranged *after* the Read command in the program. Until you get used to using them you might find it best to follow the *Read* statement with its *Data* statement immediately, it certainly makes for easier editing. However, it is generally considered better to keep all the *Data* statements together at the end of a program. *Read/Data* lines can be very fickle. A *Read* statement is always followed by a variable, to which the value of the data will be assigned. If you put the wrong type of variable into the *Data* statement, the computer will not ignore it and carry on until it finds the first appropriate *Data* statement — it will give an error message. Try running this:

```
10 READ A
20 DATA Ian, Is, 300
30 PRINT A
```

Now try changing Line 20 to:

```
20 DATA 100, 200, 300,
```

and add:

```
40 GOTO 10
```

To see how a string works *Enter* the following:

```
20 READ a$
30 DATA "Ian","is","100",
40 PRINT a$
50 GOTO 20
```

You refrain from telling us what sort of 'touch' we lost with the demise of 'Citizen Pain'. Could you mean the touch of gold, the touch of death or what . . . ?

HOW MANY BYTES . . .

John Baseford of Compass Crescent, Old Whittington, Chesterfield, writes:

Q If the Vic20 in its unexpanded form has 5K of memory, how come that when I switch it on it says 3583 bytes free? This to my reckoning is one byte less than 3½K. Is this one byte taken up with the flashing cursor?

A The reason that the Vic only has 3.5K of user available RAM on the unexpanded machine, is because 1K is taken up by the systems variables at the bottom of the memory, and 0.5K is used for the screen. All computers need to have some space in the RAM reserved for use by the ROM.

As for the odd 1 byte missing; in fact this is the same situation that I have explained before, namely the first address used by a computer is 0 which makes the second address 1, and so on.

ATARI MAGAZINES

Julian Bently of The Lea, Trentham, Stoke-on-Trent, writes:

Q I am 12 years old, and am thinking of buying an Atari 400. I would like to know if an Atari 400 (16K) is expandable to 32K. If there is an expansion available I would like to know how much it costs, and who I can get it from. I would also like to know if there is a magazine for the Atari, and if a cassette is necessary for most programs on the Atari.

A A 32K RAM board for the Atari 400/800 is available from the Spectrum group of shops for £75. Your nearest Spectrum shop is probably Computerama, 11 Market Square, Stoke-on-Trent.

At least two shops run clubs for Atari owners; one is run from the Sillica shop at 1-4 The Mews, Hatherley Road, Sidcup, Kent. Another can be contacted through Maplin at PO Box 3, Rayleigh, Essex.

The cassette player is not absolutely necessary for the Atari, because of the number of modules that are available. However, if you have no way of storing your own programs, you are likely to find it difficult to develop your own programming skills. You will also find that you will be cut off from a great many other programs that are available on cassette.

DELAYED COUPLER

N G Macmillian of Lochgreen Avenue, Brassie, Troon, Ayrshire, writes:

Q Could you please tell me which of the two micros, the BBC B and the Spectrum, would download programs from the Micronet database (via a telephone) faster? Would the data or programs be fed into the RS432 socket, or the tape socket on the BBC machine?

A At the moment the Spectrum is still not on line with the Micronet 800 network, though this should change quite soon. The transmission rate from the database to you is governed by British Telecom and is at a standard 1200 Baud. The transmission from you to the database is at 75 Baud. I presume that the delay with the Spectrum coupler is because of the necessary software that will enable the Spectrum to interpret 1200 Baud, instead of its normal 1500 Baud.

The Acoustic coupler is a separate unit, that uses an RS232 interface, so at the moment it is only available on the BBC B.

AT THE RACES!

Mr P B Pardon of Bristol Road, Birmingham, writes:

Q I wish to place details from various race meetings into a computer in such a way that I can juggle any part that is necessary. I also want to be able to extract performance details for types of race, distance, and numbers of runners. Would this be possible on a ZX81 with the proposed new microdrive? If not, have you any ideas which home micro would be useful for handling this type of material. As I do not know anything about computers I would be grateful if you could give me some advice.

A What you are after is a 'calc' program, some were reviewed by Tony Bridge in *Popular Computing Weekly*, Issue 15, including *Vu-Calc, Matacalc, Omnicalc*, and *Flexicalc*. All these are aimed at the Spectrum, but there are several 'calc' type programs available for the ZX81 as well.

A lot will depend on what else you want to do with your computer. If you don't want to spend a lot of money, and want to use it for games as well, then a 48K Spectrum would be as good a buy as any, and probably better if you are already used to Sinclair BASIC.

As for the Microdrives, I do not expect them to be available for some months yet, though they should be useable on a ZX81 soon after being released. The problem with a ZX81, and the amount of information that you want to use, is the *Loading* time of any program or data stored on cassette tape.

I do not usually recommend a specific machine, because it depends on how much money you want to spend. However, I would suggest that you look at issue 15 and if this is the sort of program you are after, then a Spectrum would probably be your best choice.

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek* it to Ian Beardsmore and every week he will *Poke* back as many answers as he can. The address is *Peek & Poke, PCW*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

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SERVICES

Printer listing of your Tandy colour computer programs. Send your programs on tape with £1.50 + 50p for each additional program to:
Dept PCWK 1, McCom Software Ltd, Freepost, Liverpool LI9 9AB
(No stamp is required)

ORIC/TANGERINE PRINTOUTS. Send your programs on cassette and I will return a high quality printout for £1.60 by return post. 60p for revised programs previously listed. Paul Weller, Arley House, Hanley Terrace, Malvern WR14 4PF. Confidentiality assured.

ZX SPECTRUM Printout offer. No printer? Need a listing? Send 75p, cassette and explanation to: R. Desforges, 19 Wheatlands Close, Calcot, Reading.

SPECTRUM OWNERS. All PCWK Vol 2 programs entered and debugged for you. Send for prices and details to: S. Winter, 28 Criss Grove, Gerrards Cross, Bucks.

BUSINESS SOFTWARE

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A complete book-keeping system based on best known book-keeping system for small businesses — up to 300 invoices per month.
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NEWBRAIN SOFTWARE. Business and serious application. Fully descriptive price list available on request. Cornix-Micro, 16 Knaresworth Street, Royston, Herts SGA 5AA.

SPECTRUM: Nine unusual programs. Guarantee and money-making opportunity, £4 (instructions only sae). Spectrum/Kempston/Epson interface, £1. RTL, Westowan, Porthtowan, Truro.

WANTED

PRINTER for Vic20 computer. Please state type, age, condition and price asked to: Edgecock, 8 Jarmin Road, Colchester, Essex.

WANTED. Atari VCS cartridges. New owner of system looking for cheap cartridges. Anthony Potts, 118 Newman Road, Exeter.

WE ARE currently looking for original preferably debugged games and utility programs. Anything from ½K to 24K is acceptable. If you have any programs that fit those criteria write to: Bamby Software, Leverburgh, Isle of Harris, PA83 3TX.

WANTED — PROGRAMS
Quality written games and business programs.
We pay up to £500 + royalties for all popular makes of machine.
If you have the ability to write imaginative and entertaining programs, we will offer you a financial package that will be hard to beat.
Write with details and sample if possible to:
COSMIC SOFTWARE
165 St Helen's Road
Hastings, E. Sussex, TN34 2EH.
Tel: Hastings 446199

FOR SALE

SHARP PC1500, 4K Ram expansion, cassette adapter, RS232 interface. Cost over £500, only £250. Write Flat 3, 405 Goldhawk Road, London W6.

32K ATARI 400, recorder and basic £260, software including PacMan, Centipede, Preppie, Airstrike + books, manuals, magazines. Want £270 or BBC. Tel: Reading 581 969.

ZX81, 16K, boxed, as new, over £30 software including Flight Simulation, Vu-File, etc. £55. Tel: Mark, Ashtead 73964.

ATARI VCS plus seven cartridges. Will swap for Spectrum or sell for £120. Tel: 01-949 0206.

VIC20 BASIC Part 1 beginner's package, willing to swap for any Vic20 Scott Adams cartridge (negotiable-. Tel: Havant 486877.

FOR ZX81 or Spectrum. Fuller keyboard, as new, £20. 16K Ram pack for ZX81, £16. Also Flight Simulator + games, £6, or £40 the lot. Tel: Preston (Lancs) 745851.

RD LABORATORIES DIGITAL TRACER, mounted, as new, £40. Huddersfield (0484) 861080.

ATARI 800 16K, recorder, Basic cartridge, £100+ software, £450 ono. Tel: 368 4044.

VIC20 plus Super Expander, Sargon II, Chess, Alien, Gorf cartridges and programmers reference guide plus software, £130 ono. Tel: Southampton (0703) 455381.

ATARI 400 16K, 410 Program Recorder Basic, assembler, joysticks, manuals, books. Perfect condition, £220. Tel: Letchworth 70331.

ATARI 400, 32K, memory, Basic, two manuals, Jumbo Jet Pilot, Centipede, Star Raiders, cartridges, and joystick, £290. Phone Sunderland 211043.

SHARP MZ80K, 48K, with I/O board, Creed printer, Pascal (2), Basic (2), Forth (2), assembler, disassembler, 50 games, dust cover, green screen, £350 ono. Chelmsford 422001.

ATARI JUMBO JET PILOT. Rom by EMI, £17.50. Tel: Broadstone 691306.

ATARI SOFTWARE FOR SALE. Miner 409er, Pacman cartridges, £15. Cassettes include Airstrike, Frogger, £9. Will consider swap. Tel: 0703 848838.

OSBORNE ONE FOR SALE. Beige case. All software, manuals and back-ups, £700. Olympia ESW KRO RS232, £375. Monitor, £75. Tel: Nottingham (0602) 585544.

SURPLUS ZX81 SOFTWARE, all new. Details SAE: Pyatt, 23 Arundel Drive, Orpington, Kent.

ZX SPECTRUM GAMES for sale. All originals, 48K/16K. Tel: Stubbington 661391.

ATARI VCS. Ten cartridges. Star Raiders, Demon Attack, Asteroids, Missile Command, Invaders, £150. Tel: Droitwich 778314.

SPECTRUM 16K still in box. Excellent condition, £80. Tel: 017393547.

BBC B six weeks old. Joysticks, software, about 40 games, with guarantee. Worth about £650. Genuine sale, £450. Tel: 01-866 0438 after 4.30 pm.

INTELLIVISION CARTRIDGES, secondhand, vgc, 50% list price. Tel: 0223 871603.

Computer Swap 01-930 3266

Free readers entries to buy or sell a computer.
Ring 01-930 3266 and give us the details.

Spectrums for sale

16K SPECTRUM with software + magazines + cassette switching £90. Tel: Brackley 703342 after 4 pm.

16K SPECTRUM as new, £20 + books, £85. Tel: Dartford 0322 72957 (evenings).

SPECTRUM 16K, one book, Spectrum tape Hider reader, Arcadia, £20 magazines. Offers. Tel: 01-267 6201.

16K SPECTRUM, issue two with printer, seven rolls of paper, two games and magazines, £110. Tel: Lou, 01-807 6307.

16K SPECTRUM. Good condition, £80. Tel: 794-6556 (Room 9).

ZX81s for sale

SINCLAIR ZX81, + 16K, Ram + typewriter keyboard + lots of software, leads, manual + box inclusive, £70. Tel: Hemel Hempstead 54763.

ZX81, 16K, File 60 keyboard, keyboard bleeper, Q save, loading aid + over £60 software. Ring 01-540 7860 for details (after 6 pm).

ZX81, 16K plus keyboard and manuals, £60 ono. Tel: 01-450 9652 (evenings).

ZX81, 16K, Ram + DK Tronics keyboard + case + Mother board + software includes 3D Defender + Q save Asteriods, £75. Tel: 0291 423048.

Tandys for sale

16K ZX81, with leads, box, manual and tape, including Scramble, Centipede, £50. Tel: Barton (North Yorks) 218.

ZX81, 16K Rom + joysticks, five arcade tapes, £70. Tel: Belfast 57202.

ZX81 with Sinclair, 16K Ram, all manuals and leads + £40 of software, £65. Tel: 0454 612485 after 5 pm.

ZX81, 16K, over 80 games on tape, magazines and books, £75 ono. Tel: 041-774 8640 after 4 pm.

ZX81, + 16K, guarantee, lots of software, Flight Simulation, ZX Chess II, Mazogs, 3D Master Maze, Frogger, etc., £60. Tel: 051-430 6504.

Acorns for sale

BBC JOYSTICKS for sale, £9 on offer and BBC software to sell or swap including Acorn software. Tel: 01-808 8906 after 6 pm.

ACORN ATOM 12K + 12K (4K floating point), via printer-interpace, £60+ worth of software, cassette recorder and leads, PSU, manuals, £155 ono. Tel: Maidstone (0622) 65003.

Dragons for sale

DRAGON, 32K, joysticks, 7 unused cartridges, many tape programs, books, worth £320, sell for £210. Tel: Plumtree (Notts) 4874.

DRAGON 32, brand new, 12 months guarantee, sell or swap for Spectrum. Tel: 021-449 5076.

Ataris for sale

ATARI VCS and Pacman, Missile Command, casing + Combat, £110 or swap for Spectrum. Tel: Windermere 5345, after 4.30 pm.

ATARI VCS, in perfect condition, 7 cartridges, including Space Invaders, Missile Command and Star Raiders, worth £300, will accept £130. Tel: Guildford 38560, evenings or weekends.

ATARI VCS + 5 tapes, Defender, Combat, Outlaw, etc, £125 ono. Tel: 01-361 2415.

ATARI VCS, 5 months old, still under guarantee, 5 tapes, joysticks, mint condition, £90. Tel: 350 0311, after 6 pm.

Commodores for sale

VIC20 + cassette, joystick, many cassettes, magazines, books, dust cover, £160; Vic 1515 printer, lots of paper, £180; machine code monitor, £25; super expander, £25; 2 adventures, £18 each; Rat Race + 2 others, £15 each, offers. Tel 0440 703357 after 7 pm.

8K RAM PACK + Startrek, Alien cartridge, Advenger, £65. Tel: 0783 288620.

VIC20, C2N, Blitz, Frogger, Dominoe, perfect condition, boxed, £140 ono. Tel: 061-941 2553 (6 pm).

VIC20 + C2N cassette + 8K Ram + Omega Race cartridge + joystick + lots of software including Martian Raider + Cosmaids + lots of books, will accept £300 or very nearest offer. Tel: 01-445 9698 after 5 pm.

VIC20 + 3K, cassette unit, joystick, super expander, 4 games cartridges, 16 cassettes including Vicman, Frogger and Myriad, books, magazines, for £200. Call Tatsfield 656.

VIC20, 16K Ram pack, C2N cassette deck, joystick, £140 ono. Call 0734 785130.

VIC20 + 16K + C2N cassette deck, super expander, 6 cartridges, 4 tape games, 1 Maths Revision, joystick + over £30 of books and magazines, £310 ono. Tel: 0935 823537.

VIC20, tape deck, super expander, 8K motherboard, joystick, £50 of books, worth over £375, sell for £199. Tel: 01-905 8145.

For sale

OMEGA RACE for Vic20. Swap for any adventure or sell for £15 ono. Call Staines 53753 between 6 pm and 7 pm weekdays.

FIDELITY mini sensory + mains adaptor, in original box, £35 ono. Tel: Wheathill (096 324) 419.

STACK STORE BOARD + 3K (expandible to 27K) + VicKit II, £50 ono. Tel: Horwich 0204 66094 after 6 pm.

POP COMP Vol 1 No 1 to Vol No 20, offers please. Tel: Porthcawl 065671 4304.

SENSORY 9 CHESS COMPUTER for sale, can solve mate 7, mint condition, cost £170, will sell for £125. Tel: Doncaster 721456 after 6 pm.

SWAP WHITE FLYING V GUITAR + hard case for Atari 400 16K. Tel: Leicester 0533 359488 (after 6 pm).

FOR SALE. Computer books for Dragon, Vic20 Programers Reference + others, Commodore 64, hardly used. Tel: Tonbridge (0732) 361920.

SWAP ELECTRONIC JET FIGHTER for ZX81 16K Ram pack. Tel: 01-857 5850.

VIC20 software half price. Call 01-577 2476 any time.

IF YOU OWN a Tandy colour computer and are interested in swaping software +/or information, tel: Pelsall (0922) 691618.

APS JOYSTICK INTERFACE, with joystick, £15. Tel: 021-360 1421.

UNEXPANDED VIC20 cassettes, Star Wars II, Naval Attack + Space Hopper, swap for anything. Tel: (after 4 pm) Manchester 998 2495 (local callers only please).

TEXAS TI994A, perfect condition, 2 months old, with cassette leads, under guarantee, £110. Tel: Coombe Hill 715 (Gloucester).

FOR SALE. ACORN software for BBC model B, offers. Tel: 01-788 6993 after 5 pm.

LYNX 48K + book + tapes worth £13, mint condition, unwanted gift, will accept £199. Tel: 01-399 4321.

LOTS OF CARTRIDGES for Vic20, mostly from Audiogenie and Commodore, going at very cheap prices, also Rabbit's Anhilator, Quackers, etc, £10 for the six. Tel: 01-387 8751.

VIC20 CARTRIDGES, including Mini from Audiogenie, very cheap prices, also Rabitt's Knell, Quackers, Anhilator, Galactic, Crossfire, Orbis + Alien Soccer for £10 + many others. Tel: 01-387 8751 after 6 pm.

ATARI CASSETTES: Pinball, Pacman, Space Invaders, Missile Command, Adventure, Laser Blast, Kaboom, Combat + two joysticks, £125 or separately. Tel: 01-554 4646.

C2N CASSETTE RECORDER for Vic20, £100; software, only £60; swap Mission Impossible cartridge for Gorf. Tel: 01-455 5780.

ARFON EXTENSION BOARD, 7 slot, 16K memory pack, 8K memory pack + 3K high resolution memory pack, £110 for the lot or £50 for extension board, £60 for memory. Tel: Liverpool 7273317 (Nicholson).

EPSOM MX70 PRINTER, 8 column dot matrix, parallel printer with dot resolution graphic, low useage, £190 ono. Tel: 01-874 6244 (Mike).

TI99/4A thermal printer, £100. Tel: 0438 4758.

IN EXCHANGE 48K Spectrum, £200-worth of Cibie equipment. Tel: Shepton Mallet 0749 3627.

INTELLIVISION VIDEO GAME + Football + Tron cartridges, unwanted gift, £100. Tel: Freeland 882129 (after 5 pm).

FULLER KEYBOARD + case + also approximately ?? of ZX81 software including Flight, Football, Invaders, etc, offers. Tel: 021-328 4474.

GAMES, Spectrum Hobbit, £8; Spectrum Pymania, £6; Atari games, Star Raiders, £15. Tel: 041-427 1460.

THREE ZX BOOKS, Spectrum Pocket Book, Exploring Spectrum Basic, The Explorers Guide to ZX81, cost £21, sell for £10. Tel: Chelmsford 84583.

EG 3303, 16K, sound, Polo printer, Interface, magazines + books, TRS 80 software compatible, all worth over £350, will sell for £160 ono. Tel: 0865 55686.

SWAP, software + own programmes. Tel: 658 1700.

SWAP ATARI VCS, for 48K or 16K isuue 2 Spectrum with Atari, 5 cartridges + joysticks + paddles. Tel: 0422 247082.

FORTH FOR VIC 20, £15 or swap for Vic Revealed, Tank Attack cartridge for 3K or £10. Call 01-579 2129 (after 4.30 pm).

NANA COMP 1 6802, based system, machine code programming, no case, with power supply, £45 ono. Tel: 991-0112, Mr Shalish.

COMMODORE 64 software. Buy, part-exchange of swap your Commodore 64 game. We have a great range of Commodore 64 games, eg, Munchpits, which has been regarded as being better than Pacman 3D, Starship Entry, Robot Craze and many many others. Tel: 01-450 4858. Price range £2.95 to £6.95.

MATELL INTELLIVISION + voice module + 8 cartridges, £250 ono. Tel: 051-933 8387.

MISSION IMPOSSIBLE cartridge. Swap for any other adventure cartridge in the series. Tel: Clevedon 873529.

LYNX 48K, as new, books and tapes, £199. Tel: 01-399 4321.

LYNX 48K, 2 year guarantee, excellent condition, also machine code, book worth £15 + cassette leads, £190. Tel: 044-451173.

ACORN SOFTWARE, Planetoids £7, Rocket Raid £7, Snapper £7, or all for £18. Tel: 061 338 3967 (mornings).

SENSORY 9 CHESS COMPUTER for sale, can solve Mate 7, mint condition. Cost £170 will sell for £125. Tel: Doncaster 721456 after 6 pm.

SWAP ATARI 400 DEFENDER cartridge for Star Raiders cartridge. Tel: 01-200 7028.

SOFTWARE for VIC20, two cartridges £12 apiece. Cassettes, 3.5K cassette and 8K cassette, various prices. Tel: Sheffield 69-2145.

VIC20 CARTRIDGES, Lunar Lander, Ratrace, Jellymonsters, £15; Gorf, Omega Race, £18. Tel: 0442 58200.

A PAIR OF DRAGON 32 joysticks £10; Snake, Moonlander and Invaders, £450; Computer Voice £5. Tel: 021-476 9425.

MEMOTACK 64K MEMORY. Little used, £40. Tel: Andrew, 0955-2286 day time.

COMMODORE 16K RAM PACK for Vic20. Offers please. Tel: 05432-53344.

SWAP 16K MEMORY module Atari 800, Star Raiders, Space Invaders, Centipede Rom cartridges, Atari joysticks. Wanted: Matel cartridges and equipment. Tel: 0726-63501.

ORIC 1 software available. Tel: 01-445 5989 after 6.30.

ACORN BBC software to swap or sell including Acorn software Bugbyte, Programe Power, A + F + Gemini and many, many more. Tel: 01-574 4122.

VIC CARTRIDGES + software for sale. Very reasonable prices. Tel: 01-885 1207, ask for Dave.

INTELLIVISION + six games, cost £160 ono. Tel: 051-933 8387.

BBC BASIC for Atom board + Instruction Book, £35. Tel: 01-363 6075.

MATELL Intellivision cartridge Mazetron, £12; Sea Battle, £12; Boxing, £12. All nearly new. All three for £33, two for £22. Tel: Harpenden 05827-62984 after 5 pm.

STAR BATTLE FOR VIC20, swap for Jellymonster cartridge. Tel: 021-5560775.

Wanted

WANTED, 12 inch Green + Black monitor. Tel: Stadhampton 890 983 (after 7 pm).

WANTED ZX81, fully complete. 061-3708795.

SWAP, Omega Race + 4 ADV + Lazer Zone for CBM m/c cartridge. Cheltenham (0242) 513450 (6 pm).

WANTED, 16K Oric 1. Daren Phillips, Sheerness 663618.

EXCHANGE, Murphy 40 channel home based station, Di/poll aerial + Fidelity 40 channel mobile for any micro, Vic preferred, could travel. Tel: Ashburton 531 83 (Devon).

8K Ram CARTRIDGE FOR VIC 20, (must be Commodore Rampack) around, £21. Phone 542 5567 (after 6 pm).

ZX SPECTRUM, 48K, up to £100. Tel: Heckmondwicke407525.

DRAGON 32s required. £100 + awaits each sound machine, immediate decision. I will arrange collection/dispatch. Details to: A Ellis, 22 Turnarean Road, St Austell, Cornwall PL25 5NX.

NEW RELEASES

DRAGON INDEX

MK1 Software is a new company specialising in titles for the Dragon 32.

Index 200 is its first release. It enables you to create an index of information in the computer which can then be retrieved by either author name or title.

The program is intended for the home user who requires an index for records, books or stamps, etc.

Program *Index 200*
Price *£5.95*
Micro *Dragon 32*
Supplier *MK1 Software*
30 Painswick Road
Birmingham B28 0HF

LIMITED INFO

Wintersoft has issued an adventure game for the Dragon 32.

Called *The Ring of Darkness*, the game consists of several parts which are loaded separately. At the opening of the game you set up your character whose attributes in terms of strength, magical ability, etc, you choose according to what you value most.

The arrow keys are used for movement and other commands are given as two or more letters.

The information given on the cassette inlay is deliberately limited, so that you can experience the pleasure — or irritation — of having to discover everything for yourself.

Program *The Ring of Darkness*
Price *£10.00*
Micro *Dragon 32*
Supplier *Wintersoft*
30 Uplands Park Road
Enfield
Middx EN2 7PT

2 ÷ 4

Numerons is the first release I've seen for the Lynx — for some reason this machine has been largely ignored by the software houses so far.

Numerons is published by Camsoft, which is part of Camputers, the company behind the hardware.

The game uses a vaguely *Invaders* like scenario to teach multiplication and division. Each invader is a number at which you must fire a number that divides into it.

The other side of the tape contains *Intronum* which explains the scoring system and introduces the game itself.

Program *Numerons*
Price *£9.90*
Micro *Lynx*
Supplier *Camsoft*
33A Bridge Street
Cambridge CB2 1UW

GUIDER!

Panic is a game for the Spectrum from Mikro-Gen. You must guide a little man, who is trapped underground, making sure he is kept away from the lurking aliens.

Not that this is a totally one-sided affair — you can retaliate, and pretty viciously too, by beating the aliens over the head once they fall into a hole which you have dug.

An added feature is that your air is slowly draining away, so you must defeat the monsters quickly.

Program *Panic*
Price *£5.95*
Micro *Spectrum*
Supplier *Mikro-Gen*
Retail Control
Department
6 Royal Buildings
West Glamorgan
SA13 1DN

DOCTOR!

Medidata is a company whose aim is to supply user-friendly software for medical purposes. Its first package is *Cycle Planner/Growth Tracker.*

This program is designed to enable the female user to predict the various stages of her period cycle.

Program *Cycle Planner*
Price *£4.95*
Micro *Spectrum 48K*
Supplier *Medidata*
PO Box 26
London NW9 9BW

DOUBLE BILL

Jupiter Ace owners must have felt that they have been completely forgotten in the software market — so few programs have been issued.

Perhaps the situation is changing however, Jupiter Cantab has just made nine cassettes available.

Greedy Gobbler is a maze game featuring ghosts and power pills — need I say more. Included on the cassette is another game called *Blow Up the World* in which you must blow up all the land on a map of the world which is spinning past you. It must win the title of "most nihilistic game ever".

Program *Greedy Gobbler/Blow Up the World*
Price *£5.95*
Micro *Jupiter Ace (3K)*
Supplier *Jupiter Cantab*
Cheshunt Building
Bateman Street
Cambridge CB2 1LZ

TRAFFIC JAM

The arcade favourite *Frogger* has been adapted for the Vic20 under the title *Froggit.*

This version has 21 levels of play and uses the hi-res graphics and joystick.

For those few people who have never heard of the game, the object is to guide a frog across a road avoiding the traffic which increases as the game progresses.

Program *Froggit*
Price *£5.95*
Micro *Vic20*
Supplier *Unit 3*
Meadow View
Browston Lane
Browston
Great Yarmouth
Norfolk NR31 9DP

ROUTINE

Compusense is a company which has issued a number of programs for the Dragon 32.

Its latest release is a cartridge — the DASM Assembler — which comes in a package including a manual and a quick reference card for the more experienced machine code programmer.

The package is completely compatible with Dragon Basic — enabling you to initialise routines from your own program.

Program *DASM Assembler*
Price *£18.95*
Micro *Dragon 32*
Supplier *Compusense*
PO Box 169
286D Green Lanes
London N13 5TN

MATHS TEST

Geometry is a package designed to test your knowledge of the O-level syllabus.

Six programs take you through Pythagoras, symmetry, properties of circles, etc. The program also gives you the correct answers through a help function, should the answer elude you.

Rose Software, who issues the cassette, also has a number of other educational programs available.

Program *Geometry*
Price *£4.95*
Micro *Spectrum*
Supplier *Rose Software*
148 Widney Lane
Solihull
West Midlands
B91 3LH

BRAIN DRAIN

Brain Strain is a version of the computer game *Mastermind* for the Commodore 64.

The game involves using your powers of reasoning to discover the correct sequence in a series of colours. At each guess the computer will tell you how many of your colours are correct and how many are in the correct place.

There are three levels which give you four, five or six colours to guess.

Program *Brain Strain*
Price *£9.95*
Micro *Commodore 64*
Supplier *ASN Computer Services*
17 Adelphi Crescent
Hayes Park
Hayes
Middlesex UB4 8LY

MADE SIMPLE

There are a vast number of books on the Spectrum particularly on simple programming.

Yet another — *Exploring Spectrum Basic* – uses over 50 programs to illustrate a number of programming techniques. It has some useful tips on places to *Poke*, how to make the Spectrum run faster, and on using other languages.

Book *Exploring Spectrum Basic*
Price *£4.95*
Micro *Spectrum 16/48K*
Supplier *Timedata*
16 Hemmells
High Road
Laindon
Basildon
Essex SS15 6ED

ON SAFARI

Spectrum Safari is a game which is claimed to be a mixture of adventure and arcade techniques.

Your aim is to cross an island and reach a boat to escape. Along the way, you may barter with native traders who will sell you various things including other natives.

The task is complicated by the animals you may meet along the way, all of whom set you some kind of task or puzzle. If you answer wrongly, one of the members of your team gets eaten.

The game features a practise routine and three skill levels.

Program *Spectrum Safari*
Price *£5.95*
Micro *Spectrum 48K*
Supplier *A J Rushton*
194 Shay Lane
Walton
Wakefield
West Yorkshire
WF2 6NW

MONOPOLY!

Automonopoli is a computer version of the famous board game of property buying and selling.

The producer of the game, Automata, is stressing that, unlike some other versions already available, the computer plays as well and doesn't just display the board and do the banking.

Automata is famous for its *Pimania* adventure game and infamous for its "best possible taste" offerings. *Automonopoli* is its first major release in quite a while. I can't help thinking that its timing is somehow connected with the general election — maybe Automata is after the Conservative vote — maybe I'm just suffering from *Pimania* induced paranoia . . .

Program *Automonopoli*
Price *£6.00*
Micro *Spectrum 48K*
Supplier *Automata*
65A Osborne Road
Portsmouth
Hants PO5 3LR

HATCHED!

Vultures is described as a "*Galaxian* type game" for the Dragon 32 with one joystick.

The vultures guard their eggs and swoop towards you, while you must try to kill them off. However, ultimate victory is impossible, since the eggs hatch once one wave has been killed off.

Program *Vultures*
Price *£6.95*
Micro *Dragon 32*
Supplier *J Morrison (Micros)*
2 Glensdale Street
Leeds LS9 9JJ

ARMED COMBAT

A number of companies have been interested in producing a home micro version of the *3D Tank Hunt* game found in the arcades.

The first version I've seen has been issued by Artic and is called *3D Combat Zone*.

The screen displays the view through your tank windows whilst a radar tells you where the enemy is hidden.

High resolution is used to draw the enemy tank in 3D. The object, obviously, is to shoot the enemy, but your missile, which can be seen disappearing into the distance, will be spotted and the enemy tank will try to avoid it.

The same company has issued two other games at the same time, both based on the arcades, one being *Galaxions*, the other *Panic*.

Program *3D Combat Zone*
Price *£5.95*
Micro *Spectrum 48K*
Supplier *Artic Computing*
396 James Reckitt Avenue
Hull
North Humberside

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, 19 Whitcomb Street, London WC2 7HF.

Ziggurat

For whom the poll tolls

The opinion polls clearly show that the trend of opinion is away from the Conservative Party, towards greater uncertainty in the electorate. With the latest poll I have been able to examine, the Conservative possible vote varies from 39½ percent to 56 percent, the Labour vote varies from 28½ percent to 46 percent, and the Alliance vote varies from 15 percent to 32 percent (*Sunday Mirror*, 22 May, poll on Friday, 20 May, by Marplan).

In another poll, the information for which was collected at about the time of the election declaration, the votes were: Conservative 46 percent to 56 percent, Labour 29 percent to 40 percent, and Alliance 16 percent to 26 percent (*Daily Telegraph*, 12 May, poll previous week by Gallup). It can be seen that the Labour and Alliance votes have stood up during the campaign, whereas the possible minimum vote for the Conservatives has declined.

This change in relative status has not been noticed by most commentators because of an unfortunate habit to concentrate on percentages without considering non-response. In the earlier poll, the degree of ambiguity (ie, non-response, don't know, or vote for "others") was 9 percent, whereas in the later poll the degree of ambiguity was 17 percent.

By various simulations on a computer, I have found that for samples of about 1,000 (most polls claim to have samples of around that size) to claim any greater accuracy than 3 percent either way for a figure is not realistic.

So, to all the lower figures we should therefore mentally subtract 3 percent (less for the Alliance as lower percentages are inherently more stable). The closer a percentage approaches 50, the greater the inherent variability in estimating that value.

To try to make sense of all these different figures I have developed a method of displaying poll results for three main parties (see *Popular Computing Weekly*, June 2).

The basic shape is an equilateral triangle, with each party being located at an apex of the triangle. The apex represents 100 percent of the vote for that party, and the point in the middle of the side directly opposite represents 0 percent. The dotted lines joining the midpoints are at 50 percent: and, in a perfectly fair distribution of seats, this would represent an overall majority.

If all the percentages (for the three parties) add to 100 percent then the result can be plotted as a point. Otherwise the result is a triangle — the *triangle of ambiquity*. The larger this triangle the greater the lack of knowledge about voting intentions.

Around the ambiguity triangle is the *triangle of confidence*. This is a tentative measure of the amount of variability in the estimation of the percentages. Maybe 19 times out of 20 the correct result is within those limits, but we cannot be sure. We can be reasonably sure that the true result is somewhere within the confidence trianble but views change with time.

The clearest trend in the polls so far has been the increasing size of the ambiguity triangle, from a small shape in the first poll to a rather large triangle for the last poll (22 May).

Another trend shows the ambiguity triangle moving towards the centre of the major triangle (the triangle of dominance): support for both Alliance and Labour is keeping up, but the support for the Conservatives is less firm. If these trends continue, the possibility of a hung parliament is greater than it would appear.

The accuracy of polls has always been suspect, and perhaps one reason is the lack of attention payed to those who do not know, or who say they may vote for 'other' parties.

Polls in chronological order of sampling

1 *Daily Telegraph*, 12 May (week before), Gallup.
2 *Daily Telegraph*, 19 May (week before), Gallup.
3 *Sunday Times*, 22 May (Tues/Wed), MORI.
4 *Daily Express*, 20 May (Thurs), MORI.
5 *Observer*, 22 May (Thurs/Fri), Harris.
6 *Sunday Mirror*, 22 May (Fri), Marplan.

Boris Allan

Puzzle

Standard or de-luxe?

Puzzle No 59

The Downshire Wotzit Marketing Company is a world leader in its field — Wotzits.

As you will be aware, amongst the many mechanical parts which are to be found in a Wotzit, the nubble grommet screws are most vital if the efficient geometry of the design is not to be endangered.

In fact, in each standard model Wotzit is found a total of one hundred and fifty-seven screws. The de-luxe version, contains no fewer than one hundred and eighty-seven of these screws.

Last week the factory used 50,500 screws. Assuming a 1 percent loss through waste or damage, and that all the remainder were used, how many Wotzits of each type were made.

Solution to Puzzle No 54

The only time that the watch shows the correct time under the given conditions is at 5.48, so that must have been the time that I first met Jamie. A number of entries suggested 4.16 but LN (4 * 16) = 4.158 and the question states that only the first two digits to the right of the decimal point are displayed.

Note in the program how neither the hour nor minutes can equal zero. This is to prevent an error condition — LN (0) gives an invalid argument. Note also Line 70 where additional zeros are added to the string S$ to ensure that it is of sufficient length when it is sliced in Line 80.

```
10 LET H = 1
20 LET M = 1
30 LET H$ = STR$ H
40 LET M$ = STR$ M
50 IF LEN M$ = 1 THEN LET M$ = "0" + m$
60 LET T$ = H$ + "." + M$
70 LET S$ = STR$ LN (H * M) + "0000"
80 IF T$ = S$ (1 TO LEN T$) THEN PRINT T$
90 LET M = M + 1
100 IF M = 60 THEN LET H = H + 1
110 IF M = 60 THEN LET M = 1
120 IF H = 24 THEN STOP
130 GOTO 30
```

Winner of Puzzle No 54

The winner is: Gilbert Rigot, Avenue Demolder, B-1342, Ottignies/LIN, Belgium, who receives £10.

Top 10 Top 10 Top 10 Top 10

Vic20

1	(6)	Introduction to Basic Part 1	(Commodore)
2	(3)	Race	(Commodore)
3	(4)	Blitz	(Commodore)
4	(—)	Strategic Advance	(Commodore)*
5	(1)	Panic	(Bug-Byte)
6	(7)	Asteroids	(Bug-Byte)
7	(2)	Cosmiads	(Bug-Byte)
8	(5)	Wacky Waiters	(Imagine)
9	(8)	Amok	(Audiogenic)
10	(—)	Introduction to Basic Part 2	(Commodore)

*Cartridge (Figures compiled by Boots & Co, London).

Spectrum

1	(1)	Flight Simulation	(Psion)*
2	(2)	The Hobbit	(Melbourne House)*
3	(3)	Penetrator	(Melbourne House)*
4	(5)	Horace Goes Skiing	(Psion/Melbourne House)
5	(4)	Transylvanian Tower	(Richard Shepherd)*
6	(7)	3D Tanx	(DK 'Tronics)
7	(8)	Arcadia	(Imagine)
8	(6)	Football Manager	(Addictive Games)*
9	(10)	Chess	(Psion)*
10	(9)	Planet of Death	(Arcadia)

*Requires 48K.
(Figures compiled by WH Smith and Son Ltd)

Atari

1	(1)	Zaxxon	(Datasoft)
2	(3)	Miner 2049er	(Big Five)*
3	(7)	Preppie II	(Adventure International)
4	(—)	Gorf	(Roklan)*
5	(—)	Shamxus	(Synapse)
6	(10)	Protector 2	(Synapse)†
7	(9)	Pharaoh's Curse	(Synapse)†
8	(—)	Floyd of the Jungle	(Microprose)†‡
9	(—)	AE	(Broderbund)§
10	(—)	Necromancer	(Synapse)†‡

*Cartridge. †32K cassette. ‡32K disc. §48K disc.
(Figures compiled by Calisto Computers, Birmingham 021 632 6458)

Dragon

1	(1)	The King	(Microdeal)
2	(2)	Space War	(Microdeal)
3	(4)	Defence	(Microdeal)
4	(5)	Alcatraz	(Microdeal)
5	(6)	Katerpiller Attack	(Microdeal)
6	(—)	Space Monopoly	(Microdeal)
7	(—)	Mansion Adventure	(Microdeal)
8	(8)	Chess	(Dragon Data)*
9	(—)	Typing Tutor	(Dragon Data)
10	(—)	Dragon Trek	(Salamander)

*Cartridge (Figures compiled by Boots & Co. London)

BBC*

1	(2)	Rocket Raid	(Acornsoft)
2	(4)	Planetoids	(Acornsoft)
2	(7)	Great Britain Ltd	(Simon W Hessel)
4	(—)	Inheritance	(Simon W Hessel)
4	(1)	Snapper	(Acornsoft)
4	(8)	Arcadians	(Acornsoft)
4	(—)	Meteors	(Acornsoft)
8	(—)	World Travel Game	(Simon W Hessel)
8	(10)	Chess	(Computer Concepts)
10	(3)	Chess	(Program Power)

*All Model B.
(Figures compiled by Micro Mangement, Ipswich 0473 59181)

ZX81*

1	(1)	Flight Simulation	(Psion)
2	(3)	QS Scramble	(Quicksilva)
3	(2)	3D Monster Maze	(New Generation)
4	(4)	Chess	(Psion)
5	(6)	Space Raiders	(Psion)
6	(5)	Catacombs	(JK Greye)
7	(7)	Galaxians	(Artic)
8	(8)	10 Games for 1K	(JK Greye)†
9	(9)	Gulp	(Campbell Systems)
10	(10)	Scramble	(Woodside)

*All 16K except where noted. †Runs in 1K.
(Figures compiled by WH Smith and Son Ltd)

Books

1	(1)	Spectrum Rom Disassembly, *Logan*	(Melbourne House)
2	(3)	Vic Programmer's Reference Guide, *Commodore*	(Commodore)
3	(4)	Spectrum Hardware Manual, *Dickens*	(Melbourne House)
4	(7)	Assembly Language Programming for the BBC Micro, *Birnbaum*	(Macmillan)
5	(5)	Commodore 64 Programmer's Reference Guide, *Commodore*	(Commodore)
6	(—)	Mapping the Atari, *Chadwick*	(Compute!)
7	(—)	The Complete Forth, *Winfield*	(Sigma)
8	(9)	6809 Assembly Language Programming, *Leventhal*	(Osbourne)
9	(8)	Enter the Dragon, *Carter*	(Melbourne House)
10	(—)	Compute!'s First Book of Vic, *various authors*	(Compute!)

(Figures compiled by Watford Technical Books, Watford 0923 23324)

everything seemed tediously normal, until....

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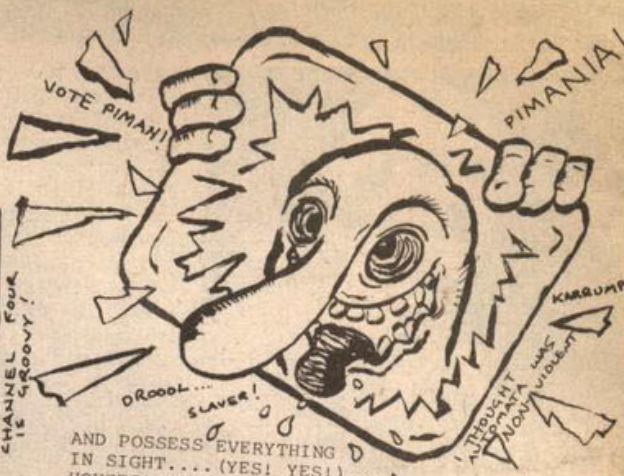

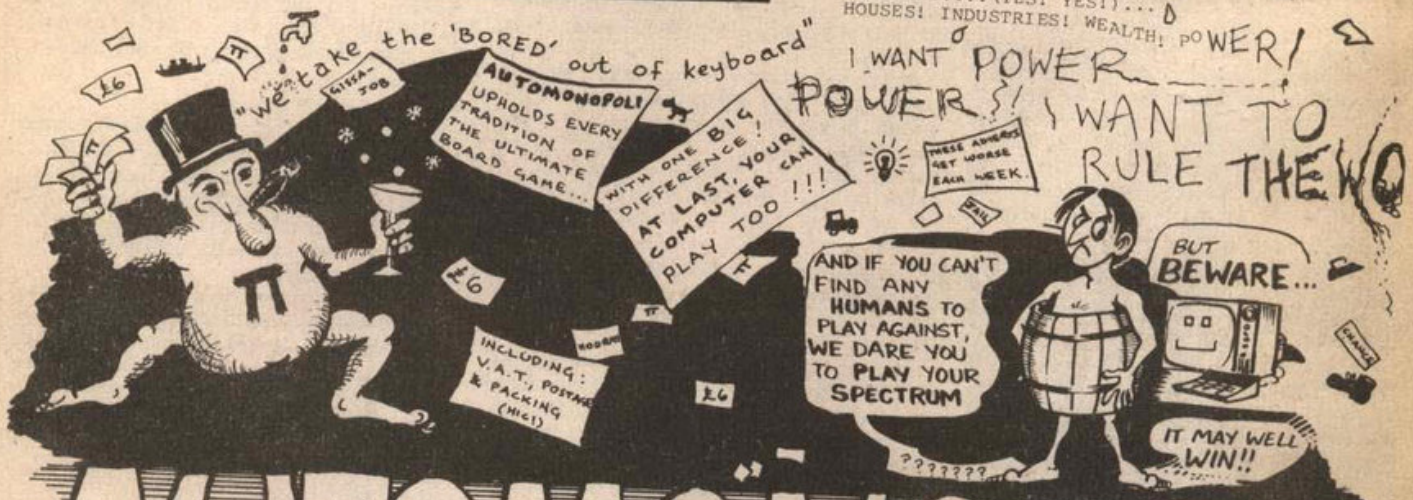

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