POPULAR
# Computing WEEKLY

17 June 1982 Vol 1 No 9

30p

## Othello on ZX81



## ZX81, ICL tapes tested

## Spectrum graphics

## BBC sound

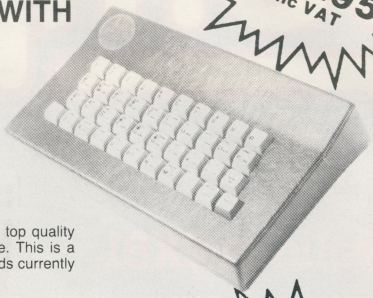
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**How to submit articles**
Articles which are submitted for publication should not be more than 1000 words long.

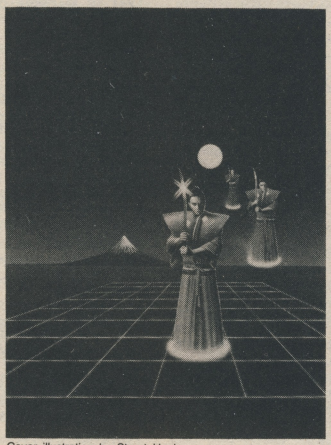
All submissions should be typed and a double space should be left between each line.

Programs should, whenever possible, be computer printed.

At present we cannot guarantee to return every submitted article, so please keep a copy.

**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.

# This Week



Cover illustration by Stuart Hughes

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# Editorial

Since we launched this magazine, only nine weeks ago, we have been surprised by the standard of the programs which you send in.

We have already criticised the number of blood-thirsty programs we receive. But, on reflection, what is surprising is the speed at which newcomers to home computing learn to program at quite an advanced level.

The limitations of Basic as a language for programming must, by now, be clear to most of you.

It is easy to learn and so is a good introduction. But it is very, very slow and it takes up far too much valuable memory space.

The answer is to have the courage to jump in at the deep end and start programming in machine code.

It is not easy — it takes a fair bit of effort and commitment to come to grips with it. But that effort is well rewarded.

To help you along we will be far more willing to accept machine code programs for publication.

# Next Week



**From a missile base on Atlantis you must do battle with an enormous monster of the deeps in a new game called *Shark Attack*.**

# Classified

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**ZX81 Programs.** Games, utilities, machine code editor. Tel: 0234 46248.

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**ZX81 1K SOFTWARE.** 2 packs of 5 listings. £1 each. Send sae to 37 Acacia Drive, Sutton. For listings or more details.

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**ZX81 16K** perfect working order. £70. Richard 01-930 9645 (work) 01-340 9796 (home).

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**ZX81 PLUS 16K** including plenty of software and books. £100. Worthing 46723 evenings.

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**ZX81 16K RAM GAME CASSETTES:** Get Them Before your Bosses get You! Nasty Invaders £4.95; Solve the Clues if you want to Escape! Very Nasty Mountain £6.95. Giltrole Ltd., Dept CW, PO Box 50, Rugby, Warks CV21 4DH.

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**ATOM 12K** plus 12K, 3 books, new, offers around £190. Also ZX81 16K, £60. Phone Terry, 01-669 0457 evenings (Wallington, Surrey).

**ZX81** under guarantee, 16K, six program cassettes (Invaders, Mazogs), £90. Totton 861181.

**ZX81** "Invaders". 16K machine code game. Full screen graphics with scoring. Cassette and instructions only £3. Richard Bond, Sands Farm, Old Warwick Road, Lapworth, West Midlands.

**VIC 20,** 4 months old, plus 8K RAM data cassette unit. Vic revealed manual and 10 programs. Telephone Clevedon (Avon) 87 6322. £210 ono.

**FOR SALE:** Superboard Mk II computer, cased, 8K ram. £160 ono. Tel: Rob 01-267 6447 evenings.

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**ZX USERS,** for neat, accurate programming, "Computer Program Sheets", 32 columns wide, £3.25 per packet, 75 loose leaf A4 size sheets. K. W. Griffiths, 29 Priors Walk, Belmont Road, Hereford. Tel: Hereford 0432-266605.

**ZX81** plus 16K RAM. £70. Swanley (Kent) 64173 after 4 pm.

**ZX81 COMPLETE,** as new: £65. 16K RAM: £25. Both: £85 ono. Tel: 01-794 2078.

**ANGLO AMERICAN SOFTWARE CO** wish to apologise to all their customers for any delay or inconvenience caused on orders received by this company before May 10. This was due to a staff problem and orders placed before this date have been mislaid. Would anybody who has sent an order please contact them as soon as possible so that the orders can be fulfilled. Mike Davis, Anglo American Software Co, 138A Stratford Road, Sparkhill, Birmingham B11 1AG. (Tel: 021 771 2996/2736).

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# News




*The Micro-Ed . . . from Lucas.*

## New Nascom goes for class

Lucas Logic has announced a new version of the Nascom 2 microcomputer, the Micro-Ed.

There are already several thousand Nascom 2s in use in secondary education and it is for such applications that the Micro-Ed is designed.

With this use in mind, the re-packaged and improved Nascom 2 is housed in a sturdy black structural foam plastic case. It is completely self-contained with the power supply within the casing.

The Micro-Ed has 8K of user RAM and can be used either as a cassette-based system or as part of a more advanced installation, using the newly developed Lucas networking system.

This NAS NET networking system allows the use of up to 32 Micro-Ed machines with a control Nascom 3 — perhaps with disk storage and printer output.

The range of software and hardware currently available for the Nascom 2 will be compatible with the new Micro.

The basic Micro-Ed costs £399 plus VAT and orders will be fulfilled within 28 days. The networking system should be available by the end of July.

More information from Lucas Logic Ltd, Welton Road, Wedgnock Industrial Estate, Warwick.

## Phoenix rises for the ZX81

Winged Avenger, a version of the arcade game, *Phoenix* written for the ZX81, with seven levels of play from reasonable to sadistic, has now been produced for £5.95 by Work Force, 140 Wilsden Avenue, Luton.

# Design flaw halts Spectrum delivery

**By David Kelly**

Production of the new Sinclair Spectrum has been halted and dispatch of the micro to the 17,000 initial purchasers has been postponed.

This follows the discovery of a fault in the first production models.

A further four-week delay is now expected. This is in addition to the two-week set-back to orders placed within the first week of the launch.

The delay follows Sinclair's strenuous assertion that it would keep to the promised 28-day delivery schedule.

At the time of the launch, Clive Sinclair claimed the first orders would be fulfilled within two weeks.

Sinclair's Bill Nicholls had already acknowledged problems in meeting orders so far placed. However, he emphasised that the "teething troubles" reported in *Popular Computing Weekly* (Vol 1 No 6) arose only in the pre-production models released for review. He said that none of these micros were being sold and that in the production models the problems had been overcome.

Now, would-be purchasers of the Spectrum have been told by Sinclair Research that they will have to wait up to eight weeks from order to delivery.

Confirming this delay, Bill Nicholls said that the entire first production run, which was to have been dispatched on June 2, had been returned to the Timex factory for further work.

A "circuit design problem" caused by a clash between the Z80A and the ULA on the data bus is to blame. Apparently, both components were trying to use the data bus at the same time. Sinclair has now cured the problem by inserting a buffer between the Z80A and the ULA.

Bill Nicholls said Sinclair very much regretted the difficulties and claimed that Sinclair Research "had the scale of production to cope and the problem should be rolled-over pretty soon."

Meanwhile, no shipments of the Spectrum are being made.

# FIASCO completes the transformation

FIASCO (fully interactive algebraic symbolic computing) is a new software package capable of evaluating polynomials, differentials, integrals, trigonometry and even Legendre mulitpliers. It does so using the normal algebraic notation.

The package, for use with a Pet, is written for 32K of disc store by James Gawlik. It is a version of his program for the ICL 1900 series main-frames. The program uses standard mathematical notation and rational arithmetic, with properly displayed exponents and subscripts, and with correct symbols for summation, integration and factorials.

FIASCO also contains the necessary software to perform all the basic algebraic functions. It costs £80 plus VAT and is available from MacMicro Ltd, Beaufort House, Shore Street, Beauly, Inverness.

# Bigger and better port from Thurnall

A 16-line input/output port forms the basis of the new Thurnall range of add-ons for use with ZX81 and Spectrum.

The programmable port, manufactured by Thurnall Engineering, is based on the Z80A PI/O chip. It allows bi-directional data transport in a variety of configurations and includes full handshaking.

Neil McArthur, of Thurnall Engineering, explained that the operation of the port is programmable from the ZX81/80 or Spectrum keyboard. The 16 lines are dedicated, for example, in one arrangement as 8-bit input plus 8-bit output.

The unit has been designed for use with the ZX81, but Thurnall is producing an adaptor to enable its use with the Spectrum.

The port plugs into the memory expansion socket on the micro and has two sockets itself. One of these allows connection of a suitable RAM pack and the other is to connect the range of new add-ons designed by Thurnall.

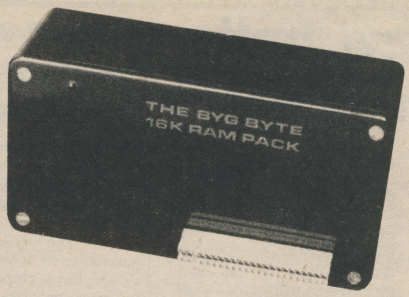
These include a four-output motherboard, a four-channel relay box capable of switching mains voltages (for controlling lighting, heating, etc.), joystick, an 8-bit switch unit (to set up individual binary codes), an 8 LED monitor and a driver box (similar to the relay box but not capable of switching mains voltages).

The input/output port is available either in kit-form or fully assembled, at £14.95 and £17.95 including VAT.

*Thurnall's new range of add-ons for the firm's 16-line port*



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# Club Reports

## Thousands bitten by Beeb user-group bug

***David Kelly** talks to the Co-founders of Beebug – the club for BBC owners.*

Beebug placed their first advertisement asking for members three months ago. Now they have more than 4000 and new members are joining at the rate of 300 per week!

This dramatic growth has left Beebug's two co-founders, Sheridan Williams and David Graham, elated and somewhat in awe of what they have started.

Both Sheridan and David have been involved with micros since they first appeared in this country.

Sheridan has been working with computers for 15 years and is a lecturer in Computer Science. He is a contributor to the micro computer press, well-known for his help and advice column. David too has been fascinated by micros from the start, and is also a college lecturer and writer.

So, with their large number of contacts and experience of every conceivable micro around, why have the two of them co-founded a user group devoted not to the whole gamut of machines, but restricted to only one micro? And why choose the BBC machine?

Sheridan was quick to explain that he didn't see things like that: "Beebug isn't restrictive at all — but it has to concentrate on one machine in order to fulfil its function. It wouldn't be able to be as active and supportive of its members if it didn't adopt that kind of approach." David explained that it wasn't a question of choosing a machine — it was more that the machine chose them!

Sheridan leaned forward and described his initial impression of the machine: "When I first saw it I realised that this was a great machine — at the price and with its features there was nothing comparable.

"When you get a new micro you can tell — you can feel — if it's going to be good or not. With the BBC I immediately felt at home."

At the time both he and David were writing for the same magazine. They met, and discovered that they lived more or less next door to each other. So, in December, 1981, they formed a users group for the then very new BBC micro. After much deliberation the name Beebug was chosen for the group.



*Sheridan Williams and David Graham*

Beebug was always conceived as an international independent user group, dedicated exclusively to the BBC machines.

It would not hold meetings, but would publish a newsletter giving as much information as possible on all aspects of the machine, providing the much needed back-up which had, hitherto, been missing.

The two co-founders placed the first Beebug membership advertisement in March this year and the first issue of the newsletter was sent out at the beginning of May.

David says the response was unbelievable: "In the middle of April we were getting over 200 letters each day. It was just piling up faster than we could cope."

Sheridan gestured the size of the mound of mail and grinned: "There was no way we could cope with reader queries with that many membership applications — that's when we said 'Subscription Agency here we come!' We would have been buried otherwise!"

They now have a membership which represents over one-third of the total number of BBC machines sold by Acorn. The newsletter goes to owners all over the country and there are about 150 overseas members.

"There was a great need for a group such as ours," says Sheridan. "The BBC didn't really know what it was getting into — so where could people turn? They couldn't turn to Acorn either so they turned to us."

With the second issue of Beebug about to appear the two co-founders tried to assess what they had achieved and how they would proceed.

Beebug comes out 10 times per year and the 28 pages of each issue are packed with information of interest to BBC owners — programming hints, reviews, games and longer articles on specific features of the micro.

They are in close and friendly contact with Acorn. As the only major national independent group, devoted exclusively to the BBC micro, representing at least one-third of that micro's owners, they have been in a good position to discuss the developments and future of the machine with Acorn, and to raise with them some of the minor faults which have been discovered, such as the packaging which Acorn have now changed, and the problems with the early machines with EPROMS and 0.1 operating systems rather than the current 1.0 ROMs.

Beebug have also been able to arrange discount for their members at various shops, and, as an independent group, they are able to look objectively at the products available for the BBC micro and to suggest those which are worthwhile.

David is very pleased with the way things have gone, but grins: "If I didn't think it was good then I wouldn't want to be involved in it.

What we are trying to do is to make the technicalities accessible to the beginner and at the same time to make Beebug as packed with programming hints and articles as we possibly can." Sheridan continued: "It's exactly the opposite of that Groucho Marx quote — if I hadn't co-founded Beebug then I would want to join!"

So, what of the future? There will be a cassette-based software library soon, but, of their other plans they won't say: "There are only 10 issues of the newsletter each year so in August we shall take a month to just sit and think — we want to keep the level and quality of information as high as possible."

---

For contributions and editorial enquiries contact: Beebug, PO Box 50, St Albans, Herts.

Membership is £4.90 or £8.90 for five or 10 issues. Applications should be sent to: Beebug, Dept 1, 374 Wandsworth Road, London SW8.

### We want to hear from you!

**Whether you are starting a new club, holding a special meeting, or just changing the venue, we want to hear from you.**

**Write to David Kelly, Club News, *Popular Computing Weekly*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF or call him on 01-930 3271.**

COVER STORY

# Othello

**Can you outwit your computer in this devilish cunning board game?**

The game Othello is played on a draughts board, using 64 pieces which are white on one side, and black on the other. The position of the first four pieces on the board is fixed.

From then on, the players can choose where to put their pieces, although they must place their latest piece touching other pieces on the board. Any 'enemy' pieces which lie between the new piece, and another of the player's pieces, are flipped over to show the player's colour.

The game continues until all the squares on the board are covered, or neither player can move. The winner is the player with most pieces of his colour showing.

In the sample printout, which shows our Othello program at the start of the game, the computer is the graphic character from the letter H, while the human is the graphic character from the letter T. You can see that the computer is on two squares, diagonal to each other, and the human is on the other.

### First move

In this version of the game, the computer always goes first. The legal moves open to the computer for its first move are 43 — counting down the left-hand side, then across the top — 46, 53, 56, 35 or 64. If the computer moved to 64, then the human's piece at 54 would be changed to a computer piece.

As the game becomes more complex, a number of pieces may change at a single move, as pieces diagonally and orthogonally are changed after each move.

Many people, when writing Othello programs for the computer, get the computer to find all its possible moves, then count up how many pieces are converted for each move, and select the move which converts the most pieces.

Position, however, is more important in the early stages of the game than numbers. Any piece which can be placed at the edge of the board is very strong, because — if it is not in a corner — it can only be converted by a move on either side of it — if it is on the top or the bottom — or above or below it — if it is on one of the sides.

Pieces away from the edge of the board can be converted from any square surrounding the piece. Pieces in the corner are the strongest of all, as a player with a corner piece controls not only his piece — which cannot be converted — but also the rank and file ending on his piece and the diagonal going out from it.

This ZX81 version of the game uses the routine from lines 1220 to 1270 to find the strongest positions. If you want to add an element of randomness to the game, to get it to choose from equally strong positions, add, to line 1280, before the THEN GOTO OR(RND(1) greater than 0.3).

You will find this version of the game plays slowly, but fairly well. It certainly puts up a sufficiently good defence to get you thinking, and to help you become a better player.

The computer always goes first in this version of the game. You can add a routine between lines 170 and 190 to give the player the option of moving first. If the answer to the question "DO YOU WANT FIRST MOVE?" is yes, then the computer should print out the board — from line 160 — then at line 162 send action to 1390 for the human's move.

The computer goes into fast mode to decide on its move, then back into slow to print the new board. If you want to see the board all the time, then simply delete lines 207 and 1365. Note how the names CHANGE, BOARD and END are assigned to variables — in lines 120 to 140 — to make it clearer when these are used — as in GOSUB BOARD — what they are doing.

The CHANGE routine — from line 4000 — is the routine which actually 'flips' the pieces.

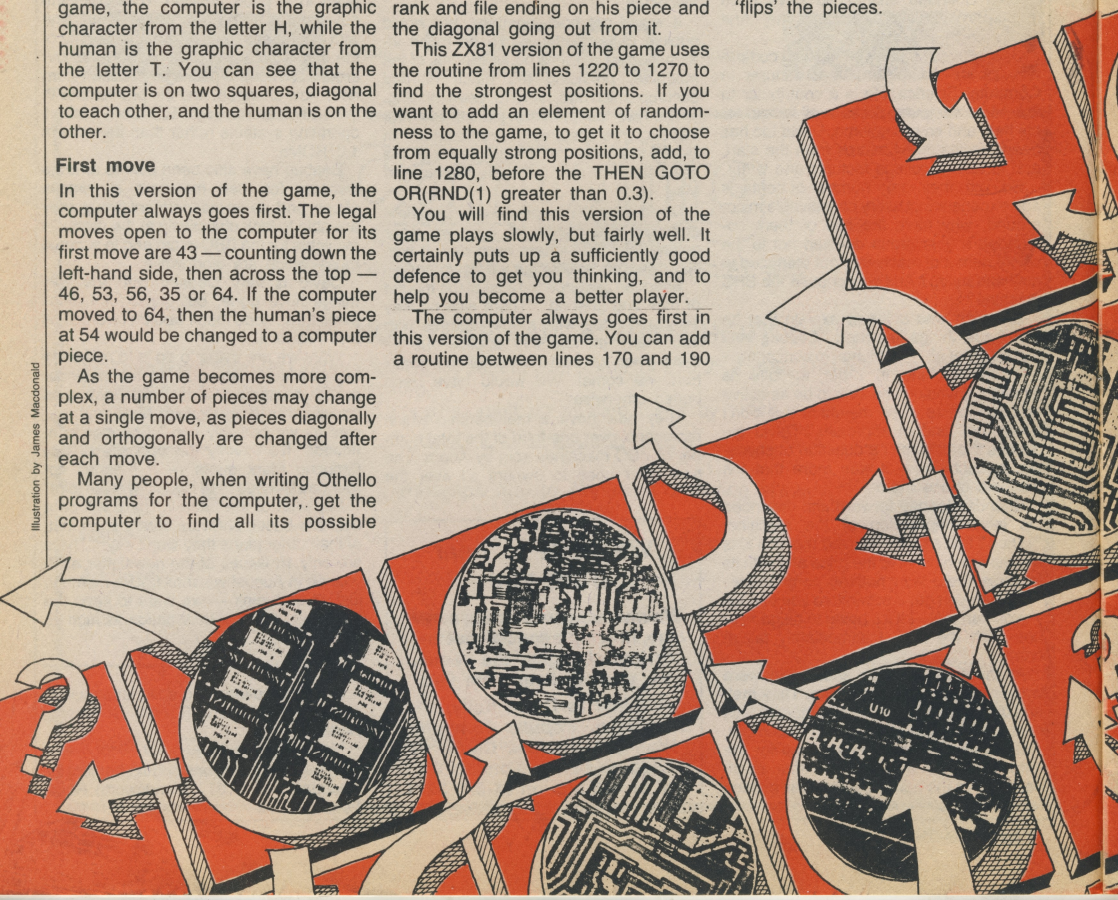
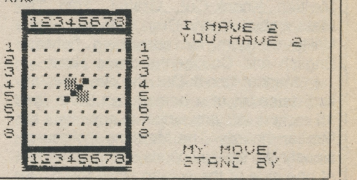


Illustration by James Macdonald

*The software-house Mine of Information owns the trademark to the name Othello when it is used in printed matter relating to computer programs. This version of the game was written in Microsoft by Graham Charlton and modified for the ZX81 by* ***Tim Hartnell.***

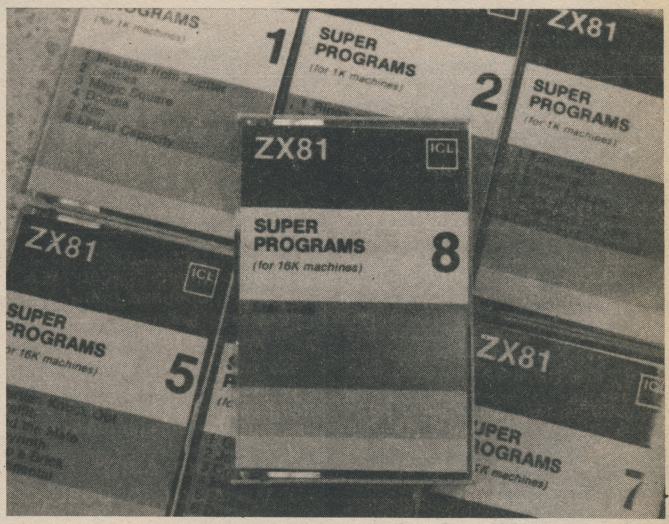
```
  1 REM OTHELLO
  2 REM (C) CHARLTON/HARTNELL
1981
  3 REM NOTE NAME "OTHELLO" IS
  4 REM COPYRIGHT MINE OF INFO
RMATION
  6 LET X=CODE "▓"
  7 REM LETTER O IN 9
  9 LET O=CODE "▚"
 10 DIM A(10,10)
 20 FOR B=2 TO 9
 30 FOR C=2 TO 9
 40 LET A(B,C)=CODE "."
 50 NEXT C
 60 NEXT B
 70 LET A(5,5)=X
 80 LET A(6,6)=X
 90 LET A(6,5)=O
100 LET A(5,6)=O
110 LET P=0
120 LET CHANGE=4000
130 LET BOARD=3000
140 LET END=5000
150 REM **PRINT OUT BOARD**
160 GOSUB BOARD
165 LET R=PI/PI
170 LET GO=0
180 REM **COMPUTER MOVES**
200 PRINT AT 16,22;"MY MOVE.
";AT 17,22;"STAND BY"
205 FOR Z=1 TO 50
206 NEXT Z
207 FAST
210 LET S=0
220 LET T=X
230 LET H=0
240 FOR A=2 TO 9
250 FOR B=2 TO 9
260 IF A(A,B)<>CODE "." THEN GO
TO 1320
270 LET QS=0
280 FOR C=-R TO R
290 FOR D=-R TO R
300 LET K=R-R
1110 LET F=W
1120 LET G=B
1130 IF A(F+C,G+D)<>S THEN GOTO
1180
1140 LET K=K+R
1150 LET F=F+C
1160 LET G=G+D
1170 GOTO 1130
1180 IF A(F+C,G+D)<>T THEN GOTO
1200
1190 LET QS=QS+K
1210 NEXT D
1220 IF A=2 OR A=9 THEN LET QS=Q
S+QS
1230 IF B=2 OR B=9 THEN LET QS=Q
S+QS
1240 IF A=3 OR A=8 THEN LET QS=Q
S/2
1250 IF B=3 OR A=8 THEN LET QS=Q
S/2
1280 IF QS<H OR QS=QS-QS THEN GO
TO 1320
1290 LET H=QS
1300 LET M=A
1310 LET N=B
1320 NEXT B
1330 NEXT A
1340 IF H=0 AND GO=0 THEN GOTO E
ND
1350 IF H=0 THEN GOTO 1365
1360 GOSUB CHANGE
1365 SLOW
1370 GOSUB BOARD
1380 REM **HUMAN'S MOVE**
1390 PRINT AT 16,22;"YOUR MOVE,"
;AT 17,22;"HUMAN."
1400 REM ENTER 0 TO PASS
2000 INPUT GO
2010 LET S=X
2015 REM LETTER O IN 2020
2020 LET T=O
2040 IF GO=0 THEN GOTO 2090
2050 IF GO<11 OR GO>88 THEN GOTO
 2000
2060 LET M=INT (GO/10)+R
2070 LET N=GO-10*INT (GO/10)+R
2080 GOSUB CHANGE
2090 GOSUB BOARD
2100 GOTO 200
2110 REM PRINT BOARD
3000 PRINT AT 4,7;"▔▔▔▔▔▔▔▔▔"
3010 LET C=0
3020 LET H=0
3030 PRINT TAB 7;"▕12345678▏"
3035 PRINT TAB 7;"▕▔▔▔▔▔▔▔▏"
3040 FOR B=2 TO 9
3050 PRINT TAB 6;B-1;"▕";
3060 FOR D=2 TO 9
3070 PRINT CHR$ (A(B,D));
3080 IF A(B,D)=X THEN LET C=C+1
3090 IF A(B,D)=O THEN LET H=H+1
3100 NEXT D
3110 PRINT ;"▏";B-1
3120 NEXT B
3130 PRINT TAB 7;"▕▁▁▁▁▁▁▁▏"
3140 PRINT TAB 7;"▕12345678▏"
3150 PRINT TAB 7;"▕▔▔▔▔▔▔▔▏"
3160 PRINT
3170 PRINT TAB 4;"I HAVE ";C
3180 PRINT TAB 4;"YOU HAVE ";H
3190 RETURN
4000 FOR C=-R TO R
4010 FOR D=-R TO R
4020 LET F=M
4030 LET G=N
4040 IF A(F+C,G+D)<>S THEN GOTO
4060
4050 LET F=F+C
4060 LET G=G+D
4070 GOTO 4040
4080 IF A(F+C,G+D)<>T THEN GOTO
4140
4090 LET A(F,G)=T
4100 IF M=F AND N=G THEN GOTO 41
40
4110 LET F=F-C
4120 LET G=G-D
4130 GOTO 4090
4140 NEXT D
4150 NEXT C
4160 RETURN
5000 IF C>H THEN PRINT "I WON, "
;C;" TO ";H
5010 IF C<H THEN PRINT "YOU WON,
";H;" TO ";C
5020 IF C=H THEN PRINT "IT'S A D
RAW"
```



# Reviews
## software

### ICL/ZX81 tapes

*Super Programs 5, 6 and 8. Available from some W. H. Smith branches, or direct from Sinclair Research, Freepost, Camberley, Surrey GU15 3BR. Price £4.95 each.*




If your local W. H. Smith has a ZX81 counter, you will have noticed the rows of brightly-coloured software tapes somewhere nearby. The range is being extended all the time, but the original ICL tapes can be recognised by their bright orange and red cases, together with the rather more sombre brown and white-striped cases of the Educational Software.

There are five tapes of programs for the unexpanded, 1K machine and some 14 tapes of 16K programs, including three games tapes and 11 educational/domestic tapes.

Tape number 5 contains five games — Martian Knock-Out, Graffiti, Find The Mate, Labyrinth and Drop A Brick — and a Utility program for converting between English and Continental dress sizes.

In Martian Knock-Out, the player, as the last defender of a beleagured Earth, has 15 rockets left with which to annihilate the Martian hoards. The Martians look suspiciously like several pixels sitting stationary at one side of the screen while the player lobs deadly inverse characters at them.

This program takes up almost two of the available 16K of RAM, and is quite typical of the poor graphics and lack of imagination of — almost all — the rest of the games on offer. Poor graphics might be acceptable, if some of the residue memory had been used for clever response, but unfortunately these are also missing, with the end of the game being signalled by a 9-600ish report.

Graffiti is a drawing program, again using only 2K. Using the cursor keys, characters can be drawn across the screen, making some kind of picture. There is no SAVE routine — why not, there is lots of memory left? So the program cannot be of any practical use. This is a pity as there is also a great routine for printing ultra-large letters.

Find the Mate is a pretty standard, and boring, pairs program. Labyrinth shows a plan view of a classical maze. There is treasure at the centre which the player has to obtain whilst avoiding the guards who move about the Maze as the player moves. If you meet one of these guards, the statement "captured and killed . . ." is displayed and the program stops. Subtle, hey?

Drop a Brick is about the poorest *Breakout* I have even seen. It is extremely slow, being written in Basic only, and the ball wanders about in a very drunken state.

Continental is a utility program to convert from English to continental dress sizes and vice-versa. This is fairly useful, and, along the way, quite informative. For instance, did you know that continentals measure their bras *under* the bust, while we English measure *across* the bust?

Tape number 6 contains six games of which five are of even greater mediocrity than tape number 5. Galactic Invasion is exactly like Martian Knock-out, but reverses left to right. Create is Graffiti in inverse. Daylight Robbery is very similar to Labyrinth, while Golf consists of moving an "O" on to an "H". Solitaire is a very pedestrian 3K version of the ancient game.

Only Journey into Danger creates a glimmer of interest. This is a 6K game, and creates a maze through which the player has to move, from entrance to exit, picking up treasure and meeting monsters on the way.

Upon meeting a monster, the player is give the odds for a win and then asked to choose between fighting and running. Points are scored for killing monsters and finding treasure. The current score is continuously displayed, along with several mildly amusing comments such as: "Tea break — time penalty 45." This is probably the best game so far on either tape.

Tape number 8 contains just one game program, Star Trail, a 14K version of the old mainframe Startrek. At last the author — who, incidentally, is not identified on any of these ICL tapes — has stretched his imagination to give some value for money. The mechanics of the game are fairly standard. If you like playing this old favourite, as I do, you will not be surprised to start with. However, there are some unique details. The photon torpedoes, for instance, track a nice graphic trail across the sector, and there is a very satisfying galaxy-shaking explosion, when a Klingon is destroyed.

Another detail which I am sure is unique is this program, and which *almost* makes this tape worth the price of £4.95, is the docking procedure at a Star Base. The player has a lovely little game within a game in order to get the Enterprise docked. When he finally succeeds, and this is extremely hard to do, there is a very imaginative countdown and blastoff.

**Summary**

These tapes are, on the whole, very disappointing. The avilable memory is certainly not used to capaciy, and the lack of imagination in the use of graphics and responses is staggering.

Keeping in mind the other tapes available nowadays at a similar price — and software from independent houses is getting more and more competitive — tapes 5 and 6 cannot really be recommended. Tape 8, containing STAR TRAIL is, however, very interesting. It is probably worth £4.95, when compared with other, similarly-priced programs.

The best thing ICL could do, now the initial flush of ZX-mania is over, would be to combine the best of these programs — Star Trail, Journey into Danger and the conversion program — on to one tape. They might than have a viable product. **TB**

# Reviews
## hardware

### Byg-byte

*Available from CAPS Ltd., 28 The Spain, Petersfield, Hants GU32 3LA. Price £34.95.*

This firm was one of the first contenders in the battle to beat Sinclair at producing a cheaper 16K RAM pack for the ZX80's and ZX81's.

The pack comes in a large black plastic box and a grey edge connector. Once fitted it has the same disadvantage that most 16K RAM Packs have — there is no way of connecting up anything else to the ZX81 as the entire edge connector is covered up. The only solution to this is to go out and buy a motherboard.

This does not however stop the use of Sinclairs Printer as it fits between the RAM Pack and the ZX81.

Inside the box is the usual array of eight 4116 — 16K×1 bit — chips and decoding circuitry. This takes up about a quarter of the box's thickness, the rest being empty. The printed circuit board also provides a power-on indicator in the form of a miniature red LED which glows when power is applied to the RAM Pack.

The case is only held together by four large screws, so it could be used to mount another board inside taking the connections to the ZX81 off the edge connector. The edge connector should be slightly longer as it suffers from the same problem the Sinclair 16K RAM Packs used to have.

It is against the case of the ZX81 and does not allow full contact between the ZX81 and the edge connector. The two inch thick box does stabilise the RAM Pack and stops the infamous Sinclair wobble.

The price of £34.95 was cheap at the time it was introduced, but now that Sinclair has reduced the cost of his own 16K RAM Pack from £49.95 to £29.95 firms like CAPS will either have to reduce their prices even more or go out of business.

The ZX user is famous for his discerning taste in low cost and value for money choice. He/she has proved to other manufacturers that they can no longer get away with huge profits with the excuse that their products cost a great deal to make and maintain.

The ZX manufacturer has shown that he can match Sinclairs computers with other products in the same price range. I hope that CAPand others will now feel encouraged to take up the baton on behalf of users of computers in general and supply other machines with the same quality goods.

**Summary**
An improvement on the original Sinclair RAM Pack at £49.95 with all its problems. It has now been superseded by Sinclair and others dropping their prices to match the falling cost of producing RAM IC's and other components. It will only need to change it's price to stay in the market. **SA**

### Fuller keyboard

*The ZX Computer Centre, Sweeting Street, Liverpool 2, England. Tel: 051-236 6109.*

The cased Fuller system can come with a wide variety of boards to supplement the ZX80 or ZX81 system, the difference being that the whole system can all be packed in the same case.

The Fuller completed system consists of 56K of memory, internal power supply, motherboard consisting of four sockets and a keyboard with two extra shift keys. All of these can be bought individually, as your finances allow.

The most remarkable thing about the system is the 16K RAM board. This uses the industrial standard 4116 RAM chips just like the Sinclair 16K RAM pack and it costs £35.95.

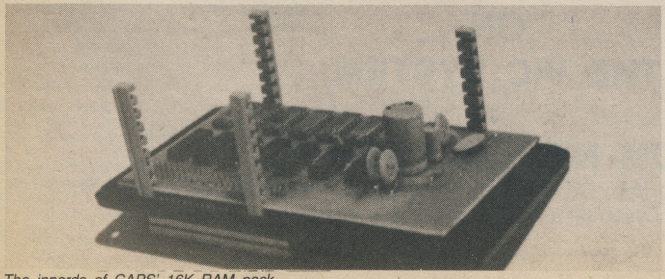
It can also be converted to take the new 64K RAM chips (by the use of a few metal straps) on the same board. This means of course that you do not have to throw away your 16K when you require more memory, just pay £45 for the new chips and the instructions to do the changeover.

The full 42-key keyboard (they also do a plain 40 key version at £19.95 without case and as a kit) is housed in a low black box approximately three inches high. This will house a ZX81 without having to do any soldering (the ZX80 version requires solder connections to the keyboard as there are no sockets).

The rest of the system then just clips together via the edge connectors provided.

There are holes for the edge connector in the case whether you wish to have a motherboard or not, so Sinclair's RAM pack or printer can also be used. If you have a motherboard already this can fit on here.

The whole Fuller system is well designed and robust enough to stand up to most things. **SA**



*The innards of CAPS' 16K RAM pack.*

### Intro. to Basic

*By M. R. Eagles,*
*Bell + Hyman, 147 pages, paperback. Price £3.50*

This, second edition of a book published in 1976, is not quite the first one to attempt to teach the beginner Basic.

Most books perforce are terminal-based. That is, they describe the Basic of the Open University and Southampton — dialects very good for work with mainframes and fairly close to the Dartmouth original.

However, that original dates back millenia, it seems. So it is good that Eagles, unusually, tries a little to recognise the existence of micros and graphics. His concepts are applied to some extent to the Pet as well as to terminal work.

Another unusual aspect of this book is the exercises for the reader. Of course, most beginning Basic books have some such content. In this case, however, many of the tasks are not run-of-the-mill. Almost a third of the book is given over to discussing possible answers and giving further programming ideas.

I hesitate to recommend the book, despite its unusual features, because I suspect that most readers of *Popular Computing Weekly* are users of modern low-cost micros. These come with fairly adequate machine-specific manuals. Perhaps most readers don't even know that this is unusual. Acorn and Sinclair were just about the first to recognise that purchasers may have no knowledge of programming and BASIC.

However, if you are looking for a general account of Basic, whatever the reason, this one is better than most.

**Summary**
The need for such books is rapidly decreasing. This is a fairly good example of the genre.

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# Open Forum

*Open Forum is for you to publish your programs and ideas.*
*It is important that your programs are bug free before you send them in. We cannot test all of them.*
*Contributions should be sent to:* Popular Computing Weekly, *Hobhouse Court, 19 Whitcomb Street, London WC2H 7HF.*

## How to contribute

**Each week the editor goes through all the programs that you send to Open Forum in order to find the Program of the Week.**

**The author of that program will qualify for DOUBLE the usual fee we pay for published programs. (The usual fee is £10.)**

***Presentation hints***

**Programs which are most likely to be considered for the Program of the Week will be computer printed and accompanied by a cassette.**

**The program will be well documented, the documentation being typed with a double spacing between each line.**

**The documentation should start with a general description of the program and then give some detail of how the program has been constructed and of its special features.**

**Listings taken from a ZX Printer should be cut into convenient lengths and carefully stuck down on to white paper, avoiding any creasing.**

**Please enclose a stamped, self-addressed envelope.**

## Rocket blaster

### on Vic-20

The program draws a city on the screen. In the middle are two fuel cells protected by a pyramid. The idea is to place a bomb in front of the incoming enemy missiles to stop them blowing up your fuel cells. Should the fuel cells be hit by a missile then you will lose the game.

Controls are included in the listing of the program.

*Program notes*

Lines 5-9 set up the screen.
Lines 190-199 checks to see if the fuel cells have been hit.
Lines 220-260 are the controls.
Lines 1000-1060 contain the subroutine for blowing up the missiles.
Lines 2500-2570 give the explosion and sound if the fuel cells are hit.
Lines 3000-3110 give the instructions.

To speed up or slow the rate of descent of the missiles alter the first value for TI$ in line 180.

**Rocket blaster**
*by Philip Rollason*

```
5 GOSUB3000:PRINT"♥":POKE650,255:POKE36879,62
10 FORI=38818TO38905:POKEI,2:NEXT:POKE8142,160:POKE8143,160:POKE8144,160:POKE81
20,160
20 POKE8121,160:POKE8099,160:POKE8146,160:POKE8147,160:POKE8124,160:POKE8158,16
0
30 FORI=8164TO8185:POKEI,160:NEXT
40 POKE8159,160:POKE8137,160
50 FORI=8161TO8163:POKEI,160:NEXT:POKE8140,160:POKE8141,160:POKE8118,160
70 POKE8152,160:POKE8153,160:POKE8151,160:POKE8154,160:POKE8130,160:POKE8131,16
0
80 POKE8150,233:POKE8155,223:POKE8150-21,233:POKE8155-23,223:POKE8155-46,223
85 POKE8152,216:POKE38872,2:POKE8153,216:POKE38873,2
90 POKE8150-42,233
94 FORI=38400TO38817:POKEI,0:NEXTI
95 T=INT(RND(1)*22):Y=INT(RND(1)*22):R=INT(RND(1)*22):TI$="000000"
100 P=7976:M=7680:X=M+R:C=M+T:B=M+Y
105 K=7680
107 I=46:O=39:U=58
110 Z=INT(RND(1)*3)+21:POKEP,43
112 PRINT"■■■■■■■"CS
115 IFPEEK(K-22)=58THENB=M+INT(RND(1)*22):CS=CS+10:GOTO1000
120 IFPEEK(K-22)=46THENX=M+INT(RND(1)*22):CS=CS+10:GOTO1000
125 IFPEEK(K-22)=39THENC=M+INT(RND(1)*22):CS=CS+10:GOTO1000
130 POKEX,I:POKEC,O:POKEB,U:POKEX-22,32:POKEC-22,32:POKEX-21,32:POKEB-21,32:POK
EC-21,32
131 POKEB-22,32:POKEX-23,32:POKEB-23,32:POKEC-23,32
132 IFPEEK(X+22)=160THEN2150
135 IFPEEK(C+22)=160THEN2050
137 IFPEEK(B+22)=160THEN2100
140 IFZ=21THENV=23:N=22
150 IFZ=22THENV=21:N=23
160 IFZ=23THENV=22:N=21
180 IFTI$>="000001"THENX=X+Z:C=C+V:B=B+N:TI$="000000"
190 IFPEEK(8152)=58THEN2500
191 IFPEEK(8152)=46THEN2500
193 IFPEEK(8153)=46THEN2500
195 IFPEEK(8153)=58THEN2500
197 IFPEEK(8153)=39THEN2500
199 IFPEEK(8152)=39THEN2500
200 GETA$
220 IFA$="1"THENP=P-22:POKEP+22,32:GOTO110
230 IFA$="Q"THENP=P+22:POKEP-22,32:GOTO110
240 IFA$="-"THENP=P+1:POKEP-1,32:GOTO110
245 POKE36878,10
250 IFA$="←"THENPOKE36877,230:POKE36877,0:POKEP,42:POKEK,32:K=P:P=P+22:GOTO110
260 IFA$="+"THENP=P-1:POKEP+1,32:GOTO110
270 IFPEEK(P+22)=160THENPOKEP,32:P=P-22
280 IFPEEK(P+22)=233THENPOKEP,32:P=P-22
290 IFPEEK(P+22)=223THENPOKEP,32:P=P-22
500 GOTO110
1000 POKEK,42:POKEK+1,64:POKEK-1,64:POKEK+22,66:POKEK+23,77:POKEK-23,77:POKEK-2
1,79
1005 POKEK+46,46:POKEK-46,46:POKEK-2,46:POKEK+2,46
1010 POKEK+21,78
1020 POKE36878,10:FORPO=230TO180STEP-1:POKE36877,PO:FORKL=1TO5:NEXTKL:NEXT:POKE
36878,0
1030 POKE36877,0
1040 POKEK,32:POKEK+1,32:POKEK-1,32:POKEK-2,32:POKEK+2,32:POKEK-21,32:POKEK+21,
32
1050 POKEK-22,32:POKEK+22,32:POKEK-23,32:POKEK+23,32:POKEK+46,32:POKEK-46,32:PO
KEK+44,32
1060 GOTO110
2050 POKEC+22,32:POKEC+21,32:POKEC+23,32:POKEC,32
2055 C=M+INT(RND(1)*22)
2060 GOTO110
2100 POKEB+21,32:POKEB+22,32:POKEB+23,32:POKEB,32
2110 B=M+INT(RND(1)*22)
2115 GOTO110
2150 POKEX+22,32:POKEX+21,32:POKEX+23,32:POKEX,32
2155 X=M+INT(RND(1)*22):POKEX,32
2160 GOTO110
2500 POKE36878,10:FORL=1TO50:POKE36879,8:FORQ=1TO10:NEXT
2505 POKE36876,INT(RND(1)*128)+128:NEXT:POKE36879,0:POKE36876,0
2510 PRINT"■■■YOU HAVE NOT SUCCEEDED IN YOUR MISSION TO SAVE LONDON FROM DESTR
UCTION"
```

turn to next page

# Open Forum

## Pontoon

on ZX81

The program requires 16K memory. On loading it provides the necessary prompts for input, Stake, Buy, Twist or Stick. The only slow part is the shuffling of the pack which takes about 10 seconds, the remaining pauses are by way of loop and could be adjusted for length.

The player's hand is shown on the lower half of the screen until he/she "sticks" when it is scrolled to the upper part. The dealers hand is then built up on the lower half until the dealer (ZX81) stops. The screen is then cleared for the next hand.

The stake for the current hand is continuously updated as are the remaining funds after each hand.

## Rocket Blaster

*continued*

```
2620 PRINT"LONDON IS NOW A PILE OF RUBBLE AND IT'S ALL YOUR FAULT."
2630 PRINT"YOU INCOMPETENT FOOL,YOU CAN'T EVEN STOP A TRIDENT MISSILE"
2640 PRINT"AND TO TRY AND RESURRECT THE CITY FROM IT'S MISERY PRESS Y"
2650 INPUT I$
2660 IF I$="Y"THEN5
2670 IF I$<>"Y"THENPRINT"[GRAPHICS]TOWARD";END
3000 POKE36879,27
3005 PRINT"[GRAPHICS]ROCKET BLASTER"
3010 PRINTTAB(5)"[GRAPHICS]FOR THE VIC-20"
3020 PRINTTAB(13)"BY"
3030 PRINTTAB(6)"P.SOLLASCH"
3040 PRINT"[GRAPHICS]THE IDEA OF THE GAME  IS TO DEFEND THE  CITIES AGAINST [GRAPHICS]OMBER
OM  THE"
3050 PRINT"MISSILES.TO DO THIS  YOU MUST MOVE THE  RIGHTS;<>TO A POINT  "
AT IN "
3060 PRINT"FRONT OF THE MISILES  OR  OF  ."
3070 PRINT"TO MOVE, USE 1-UP 0-DOWN --RIGHT +-LEFT & *TO FIRE."
3080 PRINT"[GRAPHICS]HIT SPACE BAR TO START"
3090 GET A$
3100 IFA$=""THEN3090
3110 IFA$=" "THENRETURN
```

## Pontoon

*by D K Allen*

```
  1 GOTO 2000
  2 DIM B$(5)
  3 LET MM=0
  4 LET DD=0
  5 LET Q=0
  6 LET F=2
  7 LET V=0
 10 LET P=0
 11 LET M=0
 12 LET MM=0
 13 LET AA=0
 14 RETURN
 16 GOSUB 3
 17 LET TT=0
 18 LET T=0
 19 DIM A(53)
 20 FOR B=1 TO 52
 30 LET A(B)=B
 40 NEXT B
 41 REM [GRAPHICS]SHUFFLING
 44 PRINT
 45 PRINT "HANG ON I AM SHUFFLI
NG..."
 50 FOR B=1 TO 52
 60 LET C=INT (RND*52)+1
 70 LET A(53)=A(B)
 80 LET A(B)=A(C)
 90 LET A(C)=A(53)
100 NEXT B
105 CLS
134 LET B=1
135 PRINT AT 21,1;"
"
136 IF B=53 THEN LET B=1
140 IF A(B)<14 THEN GOTO 200
150 IF A(B)>13 AND A(B)<27 THEN
GOTO 300
160 IF A(B)>26 AND A(B)<40 THEN
GOTO 400
170 IF A(B)>39 THEN GOTO 500
200 LET A$="D"
205 LET D=A(B)
210 GOTO 550
300 LET A$="C"
310 LET D=A(B)-13
320 GOTO 550
400 LET A$="H"
410 LET D=A(B)-26
420 GOTO 550
500 LET A$="S"
510 LET D=A(B)-39
597 REM [GRAPHICS]DISPLAY
599 LET E=13
600 PRINT AT E,F-1;"[GRAPHICS]"
601 FOR G=1 TO 5
602 PRINT AT E+G,F-1;"[GRAPHICS]"
603 NEXT G
604 PRINT AT E+6,F-1;"[GRAPHICS]"
605 FOR R=1 TO 25
606 NEXT R
610 IF D=1 THEN PRINT AT E+1,F;
"  ";AT E+2,F;"  ";AT E+3,F;"
*  ";AT E+4,F;"  ";AT E+5,F;"
"
615 IF D=2 THEN PRINT AT E+1,F;
"  ";AT E+2,F;"  *  ";AT E+3,F;"
  ";AT E+4,F;"  *  ";AT E+5,F;"
"
620 IF D=3 THEN PRINT AT E+1,F;
"  ";AT E+2,F;"  *  ";AT E+3,F;"
*  ";AT E+4,F;"  *  ";AT E+5,F;"
"
625 IF D=4 THEN PRINT AT E+1,F;
"  ";AT E+2,F;"*  *";AT E+3,F;"
  ";AT E+4,F;"*  *";AT E+5,F;"
"
630 IF D=5 THEN PRINT AT E+1,F;
"  ";AT E+2,F;"*  *";AT E+3,F;"
*  ";AT E+4,F;"*  *";AT E+5,F;"
"
635 IF D=6 THEN PRINT AT E+1,F;
"  ";AT E+2,F;"*  *";AT E+3,F;"*
*";AT E+4,F;"*  *";AT E+5,F;"
"
640 IF D=7 THEN PRINT AT E+1,F;
"  ";AT E+2,F;"*  *";AT E+3,F;"*
**";AT E+4,F;"*  *";AT E+5,F;"
"
645 IF D=8 THEN PRINT AT E+1,F;
"  ";AT E+2,F;"*  *";AT E+3,F;"*
*";AT E+4,F;"*  *";AT E+5,F;"*  *
"
650 IF D=9 THEN PRINT AT E+1,F;
"  ";AT E+2,F;"***";AT E+3,F;"*
**";AT E+4,F;"***";AT E+5,F;"
"
655 IF D=10 THEN PRINT AT E+1,F
;"*  *";AT E+2,F;"*  *";AT E+3,F;"
*  *";AT E+4,F;"*  *";AT E+5,F;"*
*"
660 IF D=11 THEN PRINT AT E+1,F
;"  ";AT E+2,F;"  ";AT E+3,F;"
[GRAPHICS] ";AT E+4,F;"  ";AT E+5,F;"
"
665 IF D=12 THEN PRINT AT E+1,F
;"  ";AT E+2,F;"  ";AT E+3,F;"
[GRAPHICS] ";AT E+4,F;"  ";AT E+5,F;"
"
670 IF D=13 THEN PRINT AT E+1,F
;"  ";AT E+2,F;"  ";AT E+3,F;"
[GRAPHICS] ";AT E+4,F;"  ";AT E+5,F;"
"
675 IF A$(1)="C" THEN PRINT AT
E,F-1;"[GRAPHICS]";AT E+6,F-1;"[GRAPHICS]"
680 IF A$(1)="D" THEN PRINT AT
E,F-1;"[GRAPHICS]";AT E+6,F-1;"[GRAPHICS]"
685 IF A$(1)="S" THEN PRINT AT
E,F-1;"[GRAPHICS]";AT E+6,F-1;"[GRAPHICS]"
690 IF A$(1)="H" THEN PRINT AT
E,F-1;"[GRAPHICS]";AT E+6,F-1;"[GRAPHICS]"
691 IF D>10 THEN LET D=10
693 IF D=1 THEN LET DD=10
694 LET F=F+6
700 PRINT AT 11,1;"
"
710 LET M=M+D
715 IF DD=10 THEN LET MM=M+DD
740 PRINT AT 11,1;"SCORE-";M;"
"
745 IF MM<>0 THEN PRINT AT 11,1
;"SCORE-";M;" OR ";MM
750 IF V=0 AND Q=0 THEN PRINT A
```

```
T 21,1;"STAKE?
                "
 751 IF V=0 AND Q=0 THEN INPUT Z
 755 IF Z>Y THEN PRINT AT 21,1;"
YOU ONLY HAVE £";Y
 756 IF NOT Z>Y THEN GOTO 772
 760 FOR R=1 TO 75
 765 NEXT R
 770 IF Z>Y THEN GOTO 750
 772 LET B=B+1
 773 LET V=V+1
 774 IF V=1 AND Q=0 THEN PRINT A
T 11,22;"STAKE £";Z
 775 IF V=1 AND Q=0 THEN LET ZZ=
Z
 777 LET VV=Z
 779 IF V=1 THEN GOTO 135
 780 GOTO 900
 790 PRINT AT 11,1;"
                "
 800 GOTO 135
 900 REM INSTRUCTIONS
 901 IF Q THEN GOTO 1100
 902 IF MM=21 AND V=2 THEN PRINT
 AT 11,13;"PONTOON"
 904 IF MM=21 AND V=2 THEN GOTO
1000
 905 IF M<12 AND V<>4 THEN PRINT
 AT 21,1;"BUY ANOTHER?-INPUT ""B
""
 906 IF M<12 AND V=4 THEN PRINT
AT 21,1;"TWIST?
                "
 910 IF M>=12 AND M<17 THEN PRIN
T AT 21,1;"BUY,TWIST OR STICK?
                "
 913 IF M<=21 AND V=5 THEN LET A
A=1
 914 IF MM=21 AND V=3 THEN LET P
=1
 915 IF M>=17 AND M<=21 THEN PRI
NT AT 21,1;"TWIST OR STICK?
                "
 916 IF M<=21 AND V=5 THEN GOTO
1000
 917 IF M>21 THEN PRINT AT 11,16
;"BUST"
 918 IF M>21 THEN LET Y=Y-ZZ
 919 IF M>21 THEN GOTO 1200
 920 INPUT B$
 921 IF B$(1)="S" THEN GOTO 1000
 922 IF B$(1)="T" THEN GOTO 950
 923 IF B$(1)="B" THEN GOTO 925
 924 GOTO 900
 925 PRINT AT 21,1;"INPUT STAKE
                "
 926 INPUT Z
 927 IF Z+ZZ<=Y THEN GOTO 935
 928 PRINT AT 21,1;"YOU ONLY HAV
E £";Y-ZZ;"  LEFT"
 929 IF Z>VV THEN PRINT AT 21,1;
"MAXIMUM STAKE £";VV;"
"
 930 FOR R=1 TO 30
 931 NEXT R
 932 IF Z>VV THEN GOTO 926
 933 LET Z=0
 934 GOTO 900
 935 IF Z>VV THEN PRINT AT 21,1;
"MAX STAKE £";VV;"
                "
 936 FOR R=1 TO 30
 937 NEXT R
 938 IF Z>VV THEN GOTO 926
 939 LET ZZ=ZZ+Z
 940 PRINT AT 11,22;"STAKE £";ZZ
 955 GOTO 135
 990 FOR R=1 TO 50
 995 NEXT R
1000 LET T=M
1001 IF MM>M AND MM<=21 THEN LET
 T=MM
1008 REM BANKER
1009 FOR U=1 TO 10
1010 SCROLL
1020 NEXT U
1030 PRINT AT 11,1;"BANKERS TURN
                "
1031 LET V=0
1032 LET D=0
1034 LET DD=0
1035 LET F=2
1036 LET M=0
1037 LET MM=0
1040 LET Q=1
1060 GOTO 135
1100 REM SCORE
1101 IF MM=21 AND V=2 THEN GOTO
1140
1103 IF V=1 THEN GOTO 135
1104 IF M<=16 AND MM<>19 AND MM<
>20 AND MM<>21 THEN GOTO 135
1109 IF V=5 THEN GOTO 1140
1110 LET U=INT (RND*4)
1120 IF U=1 AND M>16 AND M<19 TH
EN GOTO 135
1130 IF M>=17 OR M<=20 THEN GOTO
 1140
1132 IF M>21 THEN PRINT AT 11,16
;"YOU WIN"
1140 LET TT=M
1145 IF MM>M AND MM<=21 THEN LET
 TT=MM
1146 IF P=1 THEN LET TT=TT-10
1147 IF AA=1 AND V>2 THEN LET T=
TT+10
1148 IF V=5 AND TT<T THEN LET T=
TT-10
1150 IF T>TT OR TT>21 THEN PRINT
 AT 11,16;"YOU WIN"
1151 IF T>TT OR TT>21 THEN LET Y
=Y+ZZ
1160 IF TT>=T AND TT<=21 THEN PR
INT AT 11,16;"I WIN"
1161 IF TT>=T AND TT<=21 THEN LE
T Y=Y-ZZ
1170 LET T=0
1180 LET TT=0
1200 FOR R=1 TO 75
1201 NEXT R
1205 CLS
1210 IF Y<=0 THEN PRINT AT 10,0;
"YOU HAVE NO STAKE LEFT AND I DO
 NOT ACCEPT CREDIT CARDS"
1211 IF Y<=0 THEN STOP
1212 PRINT "NEXT HAND COMING UP"
1213 PRINT
1214 PRINT "YOU NOW HAVE £";Y
1215 FOR R=1 TO 100
1216 NEXT R
1220 GOSUB 3
1299 CLS
1300 GOTO 135
1998 STOP
1999 SAVE "21"
2000 PRINT AT 7,11;"PONTOON"
2015 FOR R=1 TO 100
2020 NEXT R
2030 CLS
2040 PRINT "HOW MUCH MONEY HAVE
YOU BROUGHT?(MAXIMUM £100)"
2050 PRINT
2060 INPUT Y
2061 IF Y>100 THEN GOTO 2060
2070 PRINT "YOUR STAKE IS £";Y
2090 GOTO 16
```

## Mock monitor

### on Genie

It is often quite useful to be able to speed up a Basic program by incorporating a machine language routine, but published assembled programs usually expect the source code to be fed into a monitor or assembler to produce a tape of the object code, which is always a series of hexadecimal numbers made up of data and instructions and found on the extreme left of the listing.

Unfortunately, hexadecimal code cannot be fed directly into Basic programs but must be poked into RAM in decimal form. The following Mock Monitor program will produce demical equivalents of the object code which can be poked into RAM and called from the Basic program by the USR function.

The Videogenie memory prompt (READY?) should be set to 32510 on initialisation and the decimal code will be poked into RAM from 7F00H (32512). It will also be printed out both on the VDU and by the lineprinter if available (see line 448).

A display of addresses and hexcodes is printed out on the VDU as it is being read into memory from the hexdata statements in line 500. The code listed here merely demonstrates that you can have a screenful of dollars without getting any richer, but

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your own object code from the program you wish to use will of course be typed in at line 500.

The OD error message generated by the jump out of the loop at line 330 should be answered with "RUN 380" to complete the program. Typing "NEW" will clear out the Mock Monitor ready for your Basic.

## REMloader

### on ZX81

Machine code runs easily on the ZX81 and more and more programs are making use of its extra speed and compactness. The best place to put it is usually in a REM statement at the beginning of Basic, where it is safe from being over-written and can easily be saved and loaded. But typing all those long REMs and trying not to lose count is very hard on the fingers and on the eyes.

Now you need do it only once more, and then never again. The following routine, which occupies only 96 bytes, will give you in a flash a REM of any length you wish. There is no upper limit, so long as you have enough RAM.

First type in at line 1 a REM consisting of 96 full stops (or whatever character you fancy). Then enter the Basic part of the program exactly as given. Be sure to leave line 2 free — that is where your REM will appear. The solitary REM at line 3 is a safety device and should *never* be deleted, even after the whole program is finished and running. Its purpose is to prevent the display from going into an endless loop if the REM at line 2 is longer than the screen can hold.

At line 15 enter your favourite machine-code loader and at once use it to poke the following codes into the 96 bytes in line 1. Now SAVE the whole lot. You now have a very useful and time-saving routine.

```
5 CLS: REM SET MEMORY = 32510
10 REM MOCK MONITOR - VIDEOGENIE, LV II MICROSOFT BASIC
20 PRINT@0,"HEX M/C TO DEC M/C- HARDCOPY"
30 PRINT@64,"ON OD ERROR MESSAGE 310 TYPE 'RUN 380'"
40 DIM H$(15)
50 DATA "0","1","2","3","4","5","6","7","8","9","A","B","C","D","E","F"
60 FOR I=0 TO 15:READ H$(I):NEXT I
70 PRINT@194,"HEXSTART ADDRESS"
80 GOSUB 310
90 A=X*4096: PRINT@214,A$
100 GOSUB 310
110 A=A+X*256: PRINT@215,A$
120 GOSUB 310
130 A=A+X*16: PRINT@216,A$
140 GOSUB 310
150 A=A+X: PRINT@217,A$
160 REM HEXSTART NOW DECIMAL
170 PRINT@256,"DEC ADDRESS",A;
180 PRINT@290,"DATA"
190 GOSUB 310
200 D=X*16:PRINT@298,A$
210 GOSUB 310
220 D=D+X: PRINT@299,A$
230 FOR K=1 TO 200: NEXT K
240 REM NOW DATA TO RAM
245 REM /32512 SYSTEM CALL MAY CRASH GENIE !
250 POKE A,D
260 PRINT@275,"     "
270 A=A+1
280 GOTO 170
290 REM SUBROUTINE ENDLESS LOOP
300 REM SO IGNORE ERROR MESSAGE
310 READ A$
320 FOR I=0 TO 15
330 IF H$(I)=A$ THEN GOTO 360
340 NEXT I
350 GOTO 310
360 X=I
370 RETURN
380 INPUT"HOW MANY BYTES";N
390 Z=INP(253): IF Z>64 THEN GOTO 460
400 FOR Y=32512 TO 32512+N
410 K=PEEK(Y)
420 PRINT K;
430 LPRINT K;
440 NEXT Y
448 REM DELETE 390 & 430 IF NO PRINTER
460 PRINT"PRINTER OFF LINE - RESET":STOP
470 DATA 7,F,0,0
480 REM INPUT HEXDATA ONE DIGIT
490 REM AT A TIME FROM LINE 500
500 DATA 2,1,0,0,3,C,0,1,0,0,0,4,1,6,2,4,7,2,2,3,0,B,7,8,8,1,C,2,4,0,4,
A,0,1,0,0,0,0,0,3,7,8,B,1,C,2,4,B,4,A
510 REM 25 BYTES FOR LINE 380
```

**REMloader**
*by Dr LFW Rowe*

```
16514   00 00 CD 20 0F 01 05 00
16522   2A 82 40 E5 09 44 4D 2A
16530   29 40 09 22 29 40 21 0C
16538   40 3E 09 5E 23 56 D5 EB
16546   09 EB 72 2B 73 23 23 3D
16554   28 03 D1 18 EE E1 E5 01
16562   E2 40 A7 ED 42 44 4D E1
16570   ED B8 21 E3 40 36 00 23
16578   36 02 23 C1 03 03 71 23
16586   70 23 36 EA 0B 0B 23 11
16594   01 00 EB 19 EB 36 18 E0
16602   B0 36 75 34 CD 28 0F C9
```

```
  1 REM ........................
................................
................................
........
  3 REM
  4 PRINT "LENGTH OF REM ";
  5 INPUT N
  6 PRINT N
  7 POKE 16514,N-256*INT (N/256
)
  8 POKE 16515,INT (N/256)
  9 RAND USR 16516
 10 PRINT "DELETE LINE 1, THEN
GOTO 15"
 12 STOP
```

# Open Forum

## Quote unquote

on ZX81

This is a game for two or more players reminiscent of Hangman.

Player A types in a well-known quote or proverb, and all the letters in it are changed to stars, as well as the quote or proverb being put within quotes. For instance, "VENI, VIDI, VICI" would come out as:

"****, ****, ****"

Player B then types in what he thinks the proverb is, or N/L if he does not know. If the guess is wrong, then a random letter is added. The example might become this:

"***I, *I*I, *I*I"

This carries on until the quote is correctly guessed. The number of tries is then shown. The object is to guess the quote in the least number of guesses. The program will run on a 1K ZX81.

```
 10 INPUT A$
 20 LET A$="""+A$+"""
 30 LET B$=A$
 40 FOR I=1 TO LEN A$
$(CODE A$(I)>37 AND CODE A
 60 NEXT I
 70 LET T=1
 80 PRINT AT 21,2;B$
 90 INPUT C$
100 IF C$=A$(T TO T+LEN A$-1) THE
N GOTO 200
110 LET T=T+1
120 IF B$=A$ THEN GOTO 90
130 LET D$=C$
140 LET L=INT (RND*26+38)
150 FOR I=1 TO LEN A$
160 IF CODE A$(I)=L THEN LET B$
(I)=CHR$ L
170 NEXT I
180 IF C$=B$ THEN GOTO 130
190 GOTO 60
200 CLS
210 PRINT "IT TOOK YOU";T;" TR
IES"
```

**Quote unquote**
*by Mark Allan*

```
SAMPLE RUN

(NOTE ALL OUTPUTS ARE PRINTED
 ON TOP OF EACH OTHER)

THE PROVERB IS "LOOK  BEFORE YO
CLEAR"

RUN STARTS HERE

"****  ******  ***  *****"
"****K *****R  ***  *****"
"****K ****RE  ***  *****"
"****K ****RE  ***  *E****"
"****K *E***RE  ***  *E****"
"****K *E***RE  *YU  *E****"
"L***K *E***RE  *YU  LE****"
"L***K *E***RE  *YU  LE****"
"L***K SE***RE  *YU  LE****"
IT TOOK YOU 5 TRIES
```

## Arabic writing

on ZX81

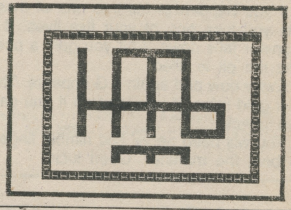
This program allows me to write in Arabic. It is very similar to ones commonly seen in computer journals. They do have a snag in that you cannot save an unfinished picture. I overcame this problem by using the INKEY$ function.

The program does not crash when you hit the edge of the screen.

I have also included a border routine which gives the finished picture a better effect.

```
  1 REM M.M.DHARSI
  2 REM 1982
  10 LET L=11
  20 LET M=14
  30 LET T$=CHR$ (128)
  40 LET L=L-(INKEY$="7")+(INKEY
$="6")
  50 LET M=M-(INKEY$="5")+(INKEY
$="8")
  60 IF INKEY$="C" THEN LET T$=C
HR$ (128)
  70 IF INKEY$="X" THEN LET T$="
 "
  72 IF INKEY$="B" THEN GOSUB 23
0
  80 IF INKEY$="U" THEN CLS
  90 IF INKEY$="Z" THEN GOSUB 19
0
 100 IF INKEY$="S" THEN SAVE "VI
SION"
 110 IF M>31 THEN LET L=L+1
 120 IF M>31 THEN LET M=0
 130 IF M<0 THEN LET M=M+1
 140 IF L<0 THEN LET L=L+1
 150 IF L>20 THEN LET L=0
 160 IF L<0 THEN LET M=M+1
 170 PRINT AT L,M;T$
 180 GOTO 40
 190 PRINT AT 2,2;"CHARACTER REQ
UIRED"
 200 INPUT T$
 210 PRINT AT 2,2;"
                  "
 220 RETURN
 230 FOR A=0 TO 63
 240 PLOT A,43
 250 PLOT A,0
 260 NEXT A
 270 FOR B=0 TO 43
 280 PLOT 0,B
 290 PLOT 63,B
 300 NEXT B
 310 RETURN
```

**Arabic writing**
*by H Dharsi*



## Side Shoot

on Vic-20

The idea is to shoot down enemy space ships before they pass you. You are on the right-hand side of the screen and can move up or down. The aliens start on the left side of the screen and move towards the right.

There are two types of alien craft, both created from user-defined graphics. One is green, the other yellow. The green craft is worth 10 points and the yellow saucer is worth 50 points and moves twice as fast as the first.

When 300 points are reached, both spacecraft move at the same quick speed.

The player's spece-ship is made up of two squares and is again user-defined but is displayed in the multi-colour format.

The game ends when five aliens have managed to pass you.

*Variables used*

A1−: Position of green space craft.

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**PROGRAM OF THE WEEK**

```
10 POKE55,0:POKE56,28:POKE51,0:POKE52,28:CLR
20 PRINT"■■SETTING UP CHARACTERS":POKE36879,105:GOSUB1100:TS=0
30 PRINT"■■DO YOU WANT THE          INSTRUCTIONS ?":POKE198,0
40 GET#:IFA$=""THEN40
50 IFA$="Y"THEN1000
60 IFA$<>"N"THEN40
70 PRINT"■      ■SIDE SHOOT          ■SCORE="SC"LIVES"LI:PRINT"■
"
80 B=7942:C=30720:V=36878:POKEV,207:S1=36876:N=36877:LI=5
90 POKEB,27:POKEB+1,28:POKEB+C,9:POKEB+C+1,9
100 A3=0:A1=INT(RND(1)*19):A2=INT(RND(1)*19)
110 IFA1=A2THEN100
120 A1=7746+22*A1:A2=7746+22*A2:J1=A1:J2=A2
130 POKEA1,30:POKEA2,29
140 P=PEEK(197)
150 IFP=39ANDB>7768THENPOKEB,32:POKEB+1,32:B=B-22:POKEB,27:POKEB+1,28:POKEB+C,9:
POKEB+C+1,9
160 IFP=63ANDB<8142THENPOKEB,32:POKEB+1,32:B=B+22:POKEB,27:POKEB+1,28:POKEB+C,9:
POKEB+C+1,9
170 IFP=32THENGOSUB500
180 POKEB,27:POKEB+1,28:POKEB+C,9:POKEB+C+1,9
190 PRINT"■■SCORE=      ■■■■■";SC;" LIVES "LI
200 IFSC>300THENVU=1
210 IFPEEK(J1)<>32THENPOKEJ1,32
220 IFVU=1THENJ1=J1+1
230 IFJ1>A1+21THENGOSUB590:GOSUB800
240 POKE36875,230
250 A=INT(RND(1)*3):IFA=2THENA=-1
260 IFVU=0ANDRND(1)>.5THENJ1=J1+1
270 J1=J1+A*22:A1=A1+A*22:IFJ1>8185THENGOSUB800
280 IFJ1<7746THENGOSUB800
290 POKEJ1,30:POKEJ1+C,5
300 POKE36875,220
310 IFPEEK(J2)<>32THENPOKEJ2,32:J2=J2+1:IFJ2>A2+21THENGOSUB590:GOSUB900
320 POKE36875,235
330 A=INT(RND(1)*3):IFA=2THENA=-1
340 J2=J2+A*22:A2=A2+A*22:IFJ2>8185THENGOSUB900
350 IFJ2<7746THENGOSUB900
360 POKEJ2,29:POKEJ2+C,7
370 POKE36875,0
380 GOTO140
500 FORX=B-1TOB-20STEP-1:POKEX,32:POKEX+C,1:NEXT:POKEB,32:POKEB+1,32:POKEB+C,9:
POKEB+C+1,9
510 POKEX,31:POKEX+C,3:POKE36876,245:NEXT:POKE36876,0
520 FORX=B-20TOB+1:POKEX,32:POKEX+C,1:NEXT
530 RETURN
540 L=PEEK(X):POKEX,214:POKE36876,0:P=PEEK(197):IFP=32THENFORT=1TO100:NEXT:POKEX,32
```

**Side shoot**
*by Stephen Nelson*

# Open Forum

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A2–: Position of yellow flying saucer.
J1&J2–; Used to determine how far right the two spacecraft are.
B&B+1–: Position of players space-ship.
SC–: Score.
TS–: High score.
LI–: Lives left.

```
550 FORX=XTOB-1:POKEX,32:POKEX+C,1:NEXT
560 IFL=30THENSC=SC+10:GOSUB800
570 IFL=29THENSC=SC+50:GOSUB900
580 POKE36877,0:RETURN
590 POKE36875,0:PRINT"▒▒▒▒▒▒▒▒▒▒▒▒BASE HIT!!!!"
600 FORX=1TO50:POKES1,230:FORY=1TO10:NEXT:POKES1,240:NEXT
610 POKES1,0
620 PRINT"▒▒▒▒▒▒▒▒▒▒▒▒▒                "
630 LI=LI-1:IFLI=0THEN650
640 RETURN
650 PRINT"▒▒YOU HAVE BEEN WIPED    OUT...."
660 PRINT"▒▒▒YOUR SCORE =▒"SC
670 IFSC>TSTHENTS=SC
680 PRINT"▒▒▒TOP SCORE=▒"TS:SC=0:YU=0
690 PRINT"▒▒▒▒ANOTHER GO??":POKE198,0
700 GETA$:IFA$=""THEN700
710 IFA$="Y"THEN30
720 IFA$<>"N"THEN700
730 POKE36879,27:PRINT"▒▒";:POKE36869,240
740 END
800 A1=7746+22*INT(RND(1)*19):J1=A1:RETURN
900 A2=7746+22*INT(RND(1)*19):J2=A2:RETURN
910 END
1000 PRINT"▒▒    INSTRUCTIONS          ▒▒▒────────────────"
1010 PRINT"▒▒UP:     F1":PRINT"          ▒▒":PRINT"          ▒▒":PRINT"          ▒▒":P
RINT"DOWN:   F7"
1020 PRINT"▒(SPACE BAR)-FIRE"
1030 PRINT"▒▒YOU HAVE 5 LIVES AND  LOSE ONE EVERY TIME ANALIEN GETS PAST YOU."
1040 PRINT"▒▒TOP SCORE="TS
1050 PRINT"▒▒▒▒TO START PRESS A KEY":POKE198,0
1060 GETA$:IFA$=""THEN1060
1070 GOTO70
1080 END
1100 FORX=7168TO7679:POKEX,PEEK(X+25600):NEXT
1110 POKE36869,255
1120 FORX=0TO4:FORY=0TO7:READD:POKEX*8+Y+7384,D:NEXTY,X
1130 RETURN
1140 DATA0,0,0,8,63,1,0,0,0,4,26,252,250,84,0,0,0,60,126,219,126,60,0,0
1150 DATA102,255,153,255,255,255,231,129,0,0,0,239,239,0,0,0
1200 PRINTPEEK(197):GOTO1200
```

## Digger

### on ZX81

The screen is drawn with eleven random pits dotted around. Your digger always starts from the centre. Then a monster appears — its position being random.

As soon as it appears it starts chasing after you. You move with the cursor keys and dig with the J key. You always dig a space to your right.

If you happen to fall into one of these pits you lose one of your five lives. If a monster falls down a pit you gain a point and the pit is filled.

Every now and again a G appears. This is a gold mine. If you land on it you gain five points.

You will need nerve and nimble fingers to beat the monster. Good luck.

**Digger**
*by Graham Plowman*

```
   1 CLS
  10 LET L=5
  20 FOR Q=0 TO 21
  30 PRINT "▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒"
  40 NEXT Q
  50 PRINT AT 0,0;"▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒"
  60 PRINT AT 21,0;"▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒"
  70 LET S=0
  80 DIM Q(31,21)
  90 FOR G=0 TO 10
 100 LET AY=INT (RND*30)+1
 110 LET AX=INT (RND*20)+1
 120 PRINT AT AX,AY;" "
 130 LET Q(AY,AX)=1
 140 NEXT G
 160 LET A=10
 161 LET H=INT (RND*20)+1
 162 LET K=INT (RND*30)+1
 170 LET B=15
 171 LET Q(B,A)=0
 175 PRINT AT 0,10;"LIVES=";L
 180 LET X=INT (RND*20)+1
 190 LET Y=INT (RND*30)+1
 200 PRINT AT A,B;"▒"
 201 IF A=H AND B=K THEN GOTO 70
0
 210 LET AO=A
 220 LET BO=B
 230 PRINT AT X,Y;"▒"
 231 PRINT AT 10,15;"▒"
 240 LET XO=X
 250 LET YO=Y
 260 LET A=A+(INKEY$="6")-(INKEY
$="7")
 270 LET B=B+(INKEY$="8")-(INKEY
$="5")
 280 IF X>A THEN LET X=X-1
 290 IF X<A THEN LET X=X+1
 300 IF Y>B THEN LET Y=Y-1
 310 IF Y<B THEN LET Y=Y+1
 315 IF INKEY$="J" THEN GOSUB 50
0
 316 LET E=INT (RND*10)
 317 IF E=5 THEN PRINT AT H,K;"▒
"
 318 IF E=7 THEN PRINT AT H,K;"█
"
 320 PRINT AT AO,BO;"█"
 330 PRINT AT XO,YO;"█"
 340 IF Q(Y,X)=1 THEN GOTO 600
 350 IF Q(B,A)=1 THEN GOTO 400
 380 IF X=A AND B=Y THEN GOTO 40
0
 390 GOTO 200
 400 PRINT AT A,B;"▒"
 401 PRINT AT H,K;"█"
 410 LET L=L-1
 430 FOR D=0 TO 100
 440 NEXT D
 441 PRINT AT A,B;" "
 442 LET Q(B,A)=1
 450 IF L>0 THEN GOTO 160
 455 PRINT AT 0,10;"LIVES=0"
 460 IF INKEY$="R" THEN RUN
 470 GOTO 460
 505 PRINT AT A,B+1;" "
 510 LET Q(B+1,A)=1
 520 RETURN
 600 PRINT AT X,Y;"X"
 610 FOR U=0 TO 20
 620 NEXT U
 629 PRINT AT X,Y;" "
 630 LET Q(Y,X)=0
 631 FOR J=0 TO 10
 632 NEXT J
 633 PRINT AT X,Y;"█"
 640 LET S=S+1
 650 PRINT AT 0,0;"SCORE=";S
 660 FOR U=0 TO 19
 670 NEXT U
 680 GOTO 160
 700 LET S=S+5
 710 PRINT AT 0,20;"GOLD"
 720 FOR T=0 TO 200
 730 NEXT T
 740 PRINT AT H,K;"█"
 750 LET H=INT (RND*20)+1
 760 LET K=INT (RND*30)+1
 770 GOTO 200
```

# Open Forum

## Fruit machine

### on BBC Micro

The data in line 30 contains the Ascii codes of the characters which can be displayed on the machine. In line 50 the VDU23;8202;0;0;0 turns the cursor off.

Line 110 contains the winning combinations and their values.

Every time the symbol ' appears it should be replaced by £.

PROCMD draws the fruit machine.

After displaying the winning combinations at the start and after revealing your fate the computer will wait for you to press a key before continuing.

**Fruit Machine**
*by Alan Wood*

```
10DIMA$(7),P$(8),P%(8),L$(3)
20FORZ=1TO7:READC:A$(Z)=CHR$C:NEXTZ
30DATA94,123,42,35,96,43,88
40MODE5
50VDU19,1,6,0,0,0,19,3,5,0,0,0,23,8202;0;0;0
60CLS:COLOUR2
70PRINT'"FRUIT MACHINE"
80PRINT"----- -------"
90RESTORE110
100FORZ=1TO8:READP$(Z),P%(Z):NEXTZ
110DATA^^^,20,$$$,15,XXX,10,###,10,^^^,10,+^+,8,+++,5,***,5
120PRINT''
130FORZ=1TO8:PRINTP$(Z);" wins ";P%(Z)'NEXTZ
140PRINT"^-- wins 2"'"#-- wins 2"
150K$=GET$
160PROCMD
170PROCCB
180PROCAG
190GOTO170
200DEFPROCMD
210GCOL0,1
220MOVE800,0:MOVE800,600:PLOT85,850,600:MOVE850,0:PLOT85,800,0
230MOVE1200,0:MOVE1200,600:PLOT85,1250,600:MOVE1250,0:PLOT85,1200,0
240MOVE850,0:PLOT85,850,100:MOVE1200,100:PLOT85,1200,0
250MOVE1200,600:MOVE850,600:PLOT85,850,550:MOVE1200,550:PLOT85,1200,600
260MOVE1200,450:MOVE850,450:PLOT85,850,400:MOVE1200,400:PLOT85,1200,450
270VDU5:MOVE870,350:PRINT"MONEY":MOVE870,290:PRINT"MAKER"
280MOVE870,200:PRINT" ^^^ "
290VDU4:ENDPROC
300DEFPROCCB
310PROCRN
320FORZ=1TO3:L$(Z)=A$(RND(7)):NEXTZ
330PRINTTAB(14,16);L$(1);L$(2);L$(3);
340PROCCK
350ENDPROC
360DEFPROCRN
370COLOUR1
380FORX=1TO(10+RND(10)):PRINTTAB(14,16);A$(RND(7));A$(RND(7));A$(RND(7));:SOUN
D1,-15,RND(255),1:FORA=1TO100:NEXTA:SOUND2,-15,RND(255),2:SOUND3,-15,RND(255),2:
NEXTX
390ENDPROC
400DEFPROCCK
410W=0
420W$=L$(1)+L$(2)+L$(3)
430FORX=1TO8:IFW$=P$(X) W=P%(X):NEXTX ELSE NEXTX
440IFW=0ANDL$(1)="^"ORL$(1)="#"W=2
450IFW>0COLOUR3:PRINTTAB(15,5);"You"TAB(15,6);"win";TAB(15,7);W;"p.":ENDPROC
460COLOUR3:PRINTTAB(15,5);"You";TAB(15,6);"lose.":ENDPROC
470DEFPROCAG
480VDU5
490*FX15,0
500K$=GET$
510VDU4
520PRINTTAB(15,5);"   ";TAB(15,6);"     ";TAB(15,7);"   ";
530ENDPROC
```

## Random choice

### on Vic-20

This game of chance takes the form of the old party game, Stone, Scissors, Paper.

In this adaptation, the operator keys in which object he wishes to play with. The computer randomly selects an object (lines 110 to 140), compares it with the operator's (lines 150 to 350) and prints the result.

Lines 360 to 510 are to keep the score which is obtained by typing in 3 (line 80).

Line 6 is to clear the screen.

The game should give even odds for the computer and the operator. Experience shows, however, that the computer seems to have the edge.

**Random choice**
*by Stuart Maclaren*

```
3 REM S.MACLAREN
4 N=0
5 M=0
6 PRINT"{CLR}"
10 PRINT"STONES-SCISSORS-PAPER GAME"
20 PRINT"=========================="
30 PRINT
40 PRINT"0=STONES"
50 PRINT"1=SCISSORS"
60 PRINT"2=PAPER"
65 PRINT
70 PRINT"ENTER 0,1,2 TO PLAY"
80 PRINT"ENTER 3 TO GET THE SCORE"
85 PRINT"ENTER 4 TO STOP THE GAME"
90 INPUT A
100 IF A=3THEN500
105 IF A=4THEN520
110 B=RND(6)
120 C=10*B
130 D=INT(C)
140 IFD>2THEN110
150 IFA<>DTHEN190
160 PRINT"I PICKED ";A$;" AS WELL"
170 PRINT"THATS A DRAW THIS TIME"
180 GOTO90
190 IFA=0ANDD=1THEN250
200 IFA=0ANDD=2THEN270
210 IFA=1ANDD=0THEN290
220 IFA=1ANDD=2THEN310
230 IFA=2ANDD=0THEN330
240 IFA=2ANDD=1THEN350
250 PRINT"YOU PICKED A STONE,ME SCISSORS,SO YOU WIN"
260 GOTO400
270 PRINT"YOU PICKED A STONE,ME PAPER,SO I WIN"
280 GOTO360
290 PRINT"YOU PICKED SCISSORS,ME A STONE,SO I WIN"
300 GOTO360
310 PRINT"YOU PICKED SCISSORS,ME PAPER,SO YOU WIN"
320 GOTO400
330 PRINT"YOU PICKED PAPER,ME A STONE,SO YOU WIN"
340 GOTO400
350 PRINT"YOU PICKED PAPER,ME SCISSORS,SO I WIN"
360 LET M=M+1
370 GOTO90
400 LET N=N+1
410 GOTO90
500 PRINT"SCORE IS:YOU ";N;" ME ";M
510 GOTO90
520 END
```

# Programming

## A cubist plot on ZX81

***Andrew Esmond** describes how to make the most of the plot command.*

The ZX81 has been criticised on its graphics side. The PLOT function, however, makes some very interesting effects possible.

The plottable resolution on the ZX81 is a very low 64 by 44 pixels, ranging from 0 to 63 from left to right and 0 to 43 pixels from bottom to top.

The 2816 pixels can be used very imaginatively. For instance, the following program draws a circle:

```
10 FOR F=0 TO 100
20 PLOT 32+20*SIN(F/32*PI),22+20
   *COS(F/32*PI)
30 NEXT F
```

The program basically works by joining a sine and cosine wave. The 20's in line 20 are used to determine the radius of the circle. Try changing them to produce circles of different sizes.

To produce spirals try setting the radius equal to a variable, say R, and reducing R by .1 each time the FOR-NEXT loop is executed. Why not try altering the value of one of the radii in the PLOT statement to produce oval shapes?

To produce a circle with a thicker outline use PRINT AT. Remember that the co-ordinates start in a different place, the top lefthand corner of the screen, and also there are half as many points to be plotted.

There are also a couple of things to remember when using SIN, COS and TAN for drawing.

1. The computer works in radians instead of degrees, so that for every 360° there are 2*PI radians.
2. Always use something to enlarge the result of a trig — SIN, COS and TAN — operation. The results alone are very small and consequently are not very interesting.
3. If the operand — the thing you perform the function on — is greater than 2*PI the computer will reduce it so that it lies between zero and 2*PI.

The ZX81 does not have an in-built line drawing function. There are, however, many of these about, so I will assume that you have access to one. To draw a square all you need to do is send five sets of co-ordinates to your subroutine — five sets as it must join the fourth corner to the first.

To draw a cube all that is needed is to superimpose two squares upon each other and join up their corners. This will produce a skeleton cube. If you want to conceal hidden faces you must devise a way of stopping your program plotting inside the foreground.

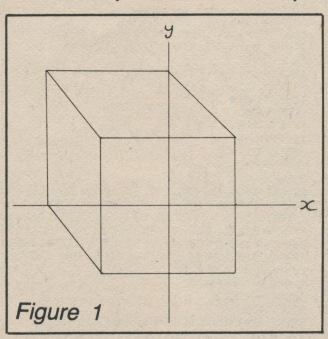


*Figure 1*

This is quite simple, although it is extremely slow on the ZX81, and is ideally done in machine code.

The best cube can be drawn by starting the second cube in the centre of the first. The following program draws a cube on the screen. It is best run in fast mode if you are not interested in seeing the lines drawn.

Lines 100 to 320 set up the arrays which store the cube. 340 to 450 plot the foreground square, 470 to 580 the background square and 590 to 670 join them up.

I have left the line-drawing routine to your choice. This program will run in 16K, although quite a lot can be done in 1K if memory conserving steps are taken. The random blobs which occur on the 1K model do not appear on the 16K.

I think the 1K chip may have something to do with this. If you know the cause, why not write in and let other users know.

Three dimensional graphics can be done by using sines and cosines to modify the points plotted. There are still many graphic things to be done on a ZX81. I hope I have given you some ideas.

```
100 DIM A(4)
110 DIM B(4)
130 DIM C(4)
140 DIM D(4)
150 REM ***LOAD ARRAYS
    WITH COORDINATES
160 REM **A() AND B() ARE
    THE X AND Y COORDS OR THE
    FOREGROUND CUBE, C() AND
    D() ARE THE POINTS.
170 LET A(1)=10
180 LET B(1)=10
190 LET A(2)=30
200 LET B(2)=10
210 LET A(3)=30
220 LET B(3)=30
230 LET A(4)=10
240 LET B(4)=30
250 LET C(1)=0
260 LET D(1)=20
270 LET C(2)=20
280 LET B(2)=20
290 LET C(3)=20
300 LET D(3)=40
310 LET C(4)=0
320 LET D(4)=40
330 REM **DRAW FOREGROUND
    SQUARE
340 FOR F=1 TO 3
350 LET X1=A(F)
360 LET Y1=B(F)
370 LET X2=A(F+1)
380 LET Y2=B(F+1)
390 GOSUB 1000
400 NEXT F
410 LET X1=X2
420 LET X1=Y2
430 LET X2=A(1)
440 LET Y2=B(1)
450 GOSUB 1000
460 REM** DRAW BACKGROUND
    SQUARE
470 FOR F=1 TO 3
480 LET X1=C(F)
490 LET X2=C(F+1)
500 LET Y1=D(F)
510 LET Y2=D(F+1)
520 GOSUB 1000
530 NEXT F
540 LET X1=X2
550 LET Y1=Y2
560 LET X2=C(1)
570 LET Y2=D(1)
580 GOSUB 1000
590 REM**JOIN TWO CUBES
600 FOR F=1 TO 4
610 LET X1=A(F)
620 LET Y1=B(F)
630 LET X2=C(F)
640 LET Y2=D(F)
650 GOSUB 1000
660 NEXT F
670 STOP
```

# Spectrum

**In this new slot various contributors explore different aspects of the ZX Spectrum.**

## A pixel plot to make you fast on the draw...

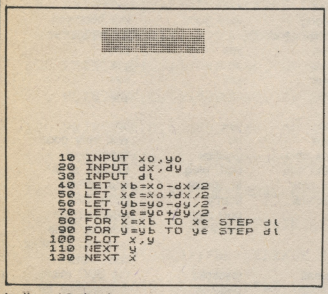
***Nick Hampshire** starts exploring the new computer's graphics*

The Spectrum incorporates some quite sophisticated high resolution graphics capability. The simplest of the high resolution commands is PLOT. This simply plots a point on the screen at the coordinates specified in the parameters following the command.

The plotting resolution is 256 × 192 pixels, a resolution which is quite adequate for most applications. To display a point on the screen at a location 100 pixels in the X direction and 50 pixels in the Y direction the command would be:

```
PLOT 100, 50
```

A single pixel point occupies a space which is 1/64th of a normal character. There are 8 × 8 pixels in a character space. The PLOT command can be used to fill areas of the screen with dots. When used in conjunction with the correct colour commands this can create blocks of colour. This program shows you how this can be done.

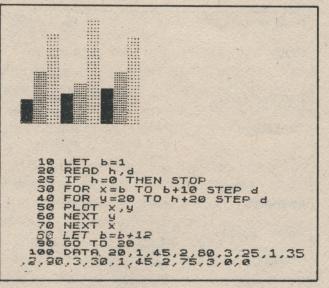


```
10 INPUT xo,yo
20 INPUT dx,dy
30 INPUT dl
40 LET xb=xo-dx/2
50 LET xe=xo+dx/2
60 LET yb=yo-dy/2
70 LET ye=yo+dy/2
80 FOR x=xb TO xe STEP dl
90 FOR y=yb TO ye STEP dl
100 PLOT x,y
110 NEXT y
120 NEXT x
```

In line 10 the input command requests the coordinates of the centre of the block. The height and width of the block are input in line 20. The input command in line 30 requests the spacing between dots in the block. This is very useful since it allows one to create blocks of different density.

By plotting blocks of points of different densities a range of different displays can be created. In the following program a barchart is displayed which shows three goups of bars each representing three figures. Each related bar has the same density of dots displayed.

It should be noted that the algorithm used in this program for plotting a block of dots is much simpler than that used in the previous program since it is the bottom left corner of the block which is specified rather than the centre.



```
10 LET b=1
20 READ h,d
25 IF h=0 THEN STOP
30 FOR x=b TO b+10 STEP d
40 FOR y=20 TO h+20 STEP d
50 PLOT x,y
60 NEXT y
70 NEXT x
80 LET b=b+12
90 GO TO 20
100 DATA 20,1,45,2,80,3,25,1,35
,2,90,3,30,1,45,2,75,3,0,0
```

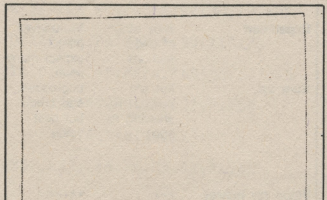
In line 20 the height of the bar and the density of the dots in the bar are obtained from a DATA statement. The data statement is located in line 100. Note that the end of data is signalled by a double 0 data which is detected by line 25.

The other principle Spectrum high resolution command is DRAW. This command draws a straight line from the last plotted point to a point specified in the coordinate parameters following the DRAW command. The problem with the DRAW command is that it is relative to the last plotted point rather than using absolute coordinates.

Thus the DRAW command obtains the absolute end coordinates of the line by using the last plotted point as the beginning coordinates and adding to these the relative offset coordinates following the DRAW command.

A further complication is that in order to determine whether the new end line is closer to the x or y origin than the last plotted point the relative coordinates can be negative.

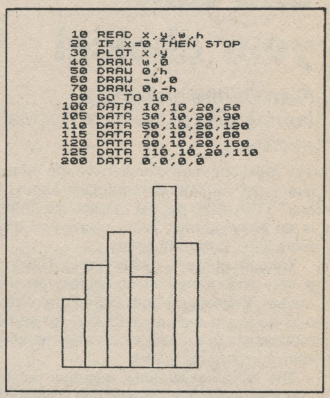
The complexities of the DRAW command are shown in the following example which draws a border around the screen.



```
10 PLOT 1,1
20 DRAW 254,0
30 DRAW 0,174
40 DRAW -254,0
50 DRAW 0,-174
```

Line 10 specifies the start point, x, y origin, which is at the bottom right corner of the screen. Line 20 draws the bottom horizontal line, line 30 the right vertical, line 40 the top horizontal and line 50 the left vertical.

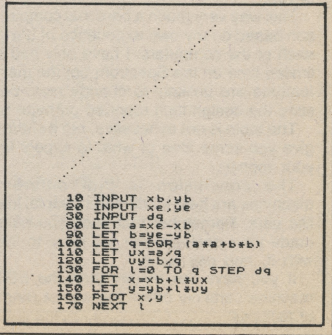
Just as bars of dots could be used to create barcharts so rectangular boxes can be used to display values in a barchart. The next program does just this.



```
10 READ x,y,w,h
20 IF x=0 THEN STOP
30 PLOT x,y
40 DRAW w,0
50 DRAW 0,h
60 DRAW -w,0
70 DRAW 0,-h
80 GO TO 10
100 DATA 10,10,20,60
105 DATA 30,10,20,90
110 DATA 50,10,20,120
115 DATA 70,10,20,80
120 DATA 90,10,20,160
125 DATA 110,10,20,110
200 DATA 0,0,0,0
```

Note that this routine like the previous barchart program used data statements to store the information required to display each bar. This data is read in line 10 where the coordinate of the bottom right corner of the bar is obtained, x and y variables, plus the bar width — w — and height h.

The problems involved in using the DRAW command can, to a degree, be overcome by using a line drawing routine written in Basic. The main problem with this is that it is considerably slower than the machine-code DRAW command. The algorithm is fairly simple and can be speeded up by not printing every dot in the line. The program requires five parameters. These are, start of line x and y coordinates — line 10 — end of line x and y coordinates — line 20 — and the spacing between dots on the line.



```
10 INPUT xb,yb
20 INPUT xe,ye
30 INPUT dq
80 LET a=xe-xb
90 LET b=ye-yb
100 LET q=SQR (a*a+b*b)
110 LET ux=a/q
120 LET uy=b/q
130 FOR l=0 TO q STEP dq
140 LET x=xb+l*ux
150 LET y=yb+l*uy
160 PLOT x,y
170 NEXT l
```

# You pay your money and take your choice!

***Sam Blythe** presents a comparison of the most popular micros.*

The most common question we are asked every day is "Which computer should I buy?" Too many people assume that there is an easy answer, that on any one day there is a best computer.

This, of course, is totally wrong. There is a very wide range of computers on the market. Prices start from £69 for the ZX81 and go up to well over £1,000 for some models which are still moderately popular with some home users.

The most fundamental question before you start looking is "How much money do you have?" For most people the choice is then made.

The next question, once you have decided on your price bracket, is: "What do you actually want to use it for?" Are you mainly interested in playing arcade style games, writing your own programs in Basic, dabbling with machine code or starting your own software business? I would not seriously recommend using a ZX81 for business or office use, for example.

To help you choose I have drawn up this comparison table of some of the most important features of the most popular computers on the market at the moment. Although the top price is £399 for the BBC model B it does not take long to spend considerably more on software and hardware add-ons such as printers and disc drives.

This was very much a personal comparison based on my own experience of using each of the computers. I have only had a limited time on the Spectrum but the main features are unlikely to change now, despite the design fault reported on page 5.

The table is not exhaustive, but it should give you some idea of what to expect for your money.

The conclusion is that different machines are best for different people, just like cars. Remember that once you have made your decision you will have to live with it, and pay for it.

If you have the money then the BBC machine certainly offers the widest range of facilities.

| Make | *Sinclair ZX81* | *Spectrum* | *Acorn Atom* | *Commodore Vic* | *BBC* |
|---|---|---|---|---|---|
| **Price** | £69.95 | 16k £125<br>48k £175 | RRP £174<br>(note 4) | RRP £199 | model A £299<br>model B £399 |
| **Processor** | Z80 | Z80A | 6502 | 6502A | 6502A |
| **RAM (note 1)** | 1k | 16k or 48k | 2k | 3.5k | 16k model A<br>32k model B |
| **ROM** | 8k | 16k | 8k | | 16k Basic+<br>16k operating system. |
| **Relative speed** | very slow | slow in hi-res mode. | fast Basic | 2MHz. (fast) | 2MHz. (very fast) |
| **Cassette** | **<br>300 Baud tacky | doesn't work | ***<br>300 B good once set up. | *****<br>reliable but needs special unit (£45) | *****<br>300 & 1200 Baud cassette motor |
| **Keyboard** | *<br>(poor) | ** | ***<br>Ascii | *****<br>Ascii | *****<br>Ascii |
| **Power Supply** | ***<br>external need bigger pack for printer & Ram pack. | ***<br>external | ***<br>external some problems | ***<br>external some problems | ****<br>internal |
| **Printer** | * | **<br>same as ZX81 but higher Res | **** | ****<br>same as Atom | interfaces to any printer |
| **Sound** | none | **<br>crude | *<br>very crude | ****<br>3 voices +noise | *****<br>3 voices+noise and envelope<br>Speech available |
| **Graphics** | * | **** | *** | **** | ***** |
| rows × columns | 24 × 32 | 24 × 32 | 16 × 32 | 23 × 22 | |
| **Hi-res pixels** | 72 × 64 | 192 × 256 | 192 × 256 (note 2) | 176 × 158 | 320 × 256 model A<br>640 × 256 model B |
| **Character set** | non Ascii | Ascii | 256 chrs Ascii | Pet-type graphics+ alphanumerics | 256 Ascii |
| **Colour** | none | 8<br>only to nearest chr | 4 (note 3) | 16 | 16 |
| **Basic** | **<br>non-standard | ***<br>fairly standard | ***<br>highly non--standard | ****<br>very good | *****<br>like Microsoft but structured |
| **DATA/READ** | no | yes | yes | yes | yes |
| **DO . . . UNTIL** | no | no | yes | no | yes |
| **multiple statements** | no | yes | yes | yes | yes |
| **Auto line numbering** | no | no | no | no | yes |
| **Verify** | no | yes | no | yes | no |
| **Assembler** | no | no | yes | no | yes, very good |
| **Ports** | special port | same but bigger.<br>RS232 soon. | via chip and lots of pins.<br>Econet. | joystick port, plug in socket<br>floppy port and modem | floppy port<br>Econet, serial and parallel ports. Bus extension for teletext. Tube connects to other computers. |
| **Expansion** | wide range of good add-ons | Microdrives printer, expect many more. | small range.<br>but easy to adapt. | joysticks paddles, light-pen<br>more coming. | the BBC micro is designed for expansion. |
| **Sum up** | this old stalwart is showing its age. | bug-ridden and crude but best value. | out-of date, but excellent second-hand value | games machine and fine computer cash. | the Rolls-Royce computer. May be built into a full-blown system. |
| **Value for money** | *** | ***** | ** | * | **** |
| **Educational value** | *** | **** | *** | **** | **** |
| **Games value** | ** | **** | *** | ***** | **** |

Note 1) Ram supplied with Basic machine.
Note 2) needs extra Rom and Ram.
Note 3) needs extra hardware.
Note 4) Atom price is for assembled 2k version. Excellent deals are available on Atoms making them much better value.

# Sound & vision




## Sound out that envelope

Among the many tantalising mysteries hinted at, but not solved by, the provisional BBC Microcomputer User Guide is the ENVELOPE statement. Even when this is explained it can seem a daunting task to experiment with the computer's full sound generating capabilities.

The ENVELOPE statement requires 14 parameters and must be used in conjunction with a complete SOUND statement which itself involves eight parameters! All this for each sound.

The greater the attack rate, the more rapidly the sound reaches full volume. The decay, sustain and release rates define the way in which the note fades. The peak and sustain levels determine the volume of the sound.

The pitch of the note may be varied up or down during the first three phases of the sound (phase 4 is merely the dying away period — corresponding to keeping your finger down on a piano key).

The accompanying program enables the user to change each parameter at will and hear the result whilst displaying the current values on the screen.

Just for starters, once the program is loaded, you might care to try changing the intitial set values as follows:
RR −1, PS1 1, PS2 −1, PS3 25, NS1 50, NS2 50, SL 100

**Kevin Rooke**

```
 10 REM SOUNDTEST BY K.ROOKE
 20 PITCH = 100:L = 50
 30 S = 0:PS1 = 0:PS2 = 0:PS3 = 0:NS1 = 0:NS2 = 0:NS3 = 0:AR = 0:
    DR = -1:SR = 0:RR = 0:PL = 120:SL = 0
 40 CLS
 50 PRINT
 60 PRINTTAB(0,0);"S=DURATION 0/255 =":PRINTTAB(30,0);S
 70 PRINTTAB(0,1);"PS1=PITCH STEP -128/127 =":PRINTTAB(30,1);PS1
 80 PRINTTAB(0,2);"PS2=PITCH STEP -128/127 =":PRINTTAB(30,2);PS2
 90 PRINTTAB(0,3);"PS3=PITCH STEP -128/127 =":PRINTTAB(30,3);PS3
100 PRINTTAB(0,4);"NS1=NO. OF STEPS 0/255 =":PRINTTAB(30,4);NS1
110 PRINTTAB(0,5);"NS2=NO. OF STEPS 0/255 =":PRINTTAB(30,5);NS2
120 PRINTTAB(0,6);"NS3=NO. OF STEPS 0/255 =":PRINTTAB(30,6);NS3
130 PRINTTAB(0,7);"AR=ATTACK RATE 1/127 =":PRINTTAB(30,7);AR
140 PRINTTAB(0,8);"DR=DECAY RATE -127/127 =":PRINTTAB(30,8);DR
150 PRINTTAB(0,9);"SR=SUSTAIN RATE 0/-128 =":PRINTTAB(30,9);SR
160 PRINTTAB(0,10);"RR=RELEASE RATE 0/-128 =":PRINTTAB(30,10);RR
170 PRINTTAB(0,11);"PL=PEAK LEVEL 0/126 =":PRINTTAB(30,11);PL
180 PRINTTAB(0,12);"SL=SUSTAIN LEVEL 0/126 =":PRINTTAB(30,12);SL
190 PRINTTAB(0,13);"PITCH   0/255   =":PRINTTAB(30,13);PITCH
200 PRINTTAB(0,14);"LENGTH  0/ ?    =":PRINTTAB(30,14);L
210 ENVELOPE 1,S, PS1,PS2,PS3,NS1,NS2,NS3, AR,DR,SR,RR,PL,SL
220 SOUND &0001,1,PITCH,L
230 PRINTTAB(0,17);"TYPE R FOR REPEAT NOTE"
240 PRINTTAB(0,18);"OTHERWISE TYPE THE LETTER(S)"
250 PRINTTAB(0,19);"WHICH YOU WANT TO CHANGE"
260 INPUT Q$
270 IF Q$ = "R" THEN 210
280 IF Q$ = "S" THEN 430
290 IF Q$ = "PS1" THEN 450
300 IF Q$ = "PS2" THEN 470
310 IF Q$ = "PS3" THEN 490
320 IF Q$ = "NS1" THEN 510
330 IF Q$ = "NS2" THEN 530
340 IF Q$ = "NS3" THEN 550
350 IF Q$ = "AR" THEN 570
360 IF Q$ = "DR" THEN 590
370 IF Q$ = "SR" THEN 610
380 IF Q$ = "RR" THEN 630
390 IF Q$ = "PL" THEN 650
400 IF Q$ = "SL" THEN 670
410 IF Q$ = "PITCH" THEN 690
420 IF Q$ = " LENGTH" THEN 710
430 INPUT S
440 GOTO 40
450 INPUT PS1
460 GOTO 40
470 INPUT PS2
480 GOTO 40
490 INPUT PS3
500 GOTO 40
510 INPUT NS1
520 GOTO 40
530 INPUT NS2
540 GOTO 40
550 INPUT NS3
560 GOTO 40
570 INPUT AR
580 GOTO 40
590 INPUT DR
600 GOTO 40
610 INPUT SR
620 GOTO 40
630 INPUT RR
640 GOTO 40
650 INPUT PL
660 GOTO 40
670 INPUT SL
680 GOTO 40
690 INPUT PITCH
700 GOTO 40
710 INPUT L
720 GOTO 40
```

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If you have any queries regarding Classified or semi-display advertising please call Alastair Macintosh on 01-930 3840

**Popular Computing Weekly.**

**The fast one.**

# Peek & poke

**Peek your problems to our address. Ian Beardsmore will poke back an answer.**

## THIS IS A REALLY MOVING EXPERIENCE

*David Austin of Parliament Hill, London NW3, writes:*

**Q** I am quite new to computers and have recently purchased a TI99/4a. Now that I am familiar with TI Basic I have endeavoured to program a *Space Invaders* type game. Unfortunately while I was in the process of doing so I came across a problem. I cannot program the computer to accept a statement from the keyboard determining the movement of the man and move the Invader simultaneously. Can you give me any advice?

**A** In TI Basic you cannot get two objects to move at the same time unless you have the Extended Basic module. I phoned Texas Instruments to see if they had any advice. Unfortunately you do not give enough details of the program. Nor do you say if you have access to the Extended Basic module.

If you have the module then there are the sprite commands that will move one or more objects in the direction you want and at the rate that you want. If you do not have the module then you will have to use nested FOR/NEXT loops. These will give the effect of moving the man and the Invader alternately.

You will have to give an x,y co-ordinate for each, then increment or decrement them. So to move across you would have to add one, or subtract one, from x at each turn. To move up or down you would have to add or subtract one from y.

## AN AMAZING WAY TO BE CAUGHT SHORT

*Shawn Williams of Oakly Lane Chinnor, Oxfordshire, writes:*

**Q** Please could you tell me if you need extra memory to play Space Amaze, *Popular Computing Weekly*, Vol 1 No 1, on the ZX81. If you do could you make a shorter version. Also could you publish some games and educational programs in your next issues.

**A** Unfortunately there are no plans to write or publish a shortened version of Space Amaze at the moment. As you will have seen from later issues of *Popular Computing Weekly*, we aim to publish as wide a variety of programs as possible.

However, we can only publish what is sent to us, and so far we have not been sent enough educational programs. Nevertheless, if you look at some of the very good programs we have published so far you will certainly pick up some useful tips on programing your ZX81.

## JUST PLOT A COURSE TO THE NEAREST BAR

*Darren Fox of Hazelhurst Crescent, Sheffield, writes:*

**Q** I have been writing a bar graph plotter program on my ZX81, so that I can input the amount on the bars and print the bars on the graph. I became stuck when it came to the bit about plotting the bars. Is it possible to do this on a ZX81. If so, can you help me out with a program?

**A** You do not say how much memory you have available, what sort of numbers you are dealing with, or how many inputs you want. So here is a program which you will have to adapt to what you want.

```
 10 REM I BEARDSMORE
 20 REM HISTOGRAM FOR D.FOX.
 30 FAST
 40 FOR A=40 TO 0 STEP -5
 50 LET B=0
 60 PRINT A
 70 PRINT
 80 NEXT A
 90 PRINT AT 19,2; "0-----
    5----10----15----20----25"
100 SLOW
110 PRINT AT 20,6; "NUMBER ?",,,
    " five spaces STOP (S)"
120 INPUT N
130 FOR C=1 TO N
140 LET P$= "inverse space"
150 PRINT AT 0+B, (3+C); P$;
160 NEXT C
170 IF C> N THEN PRINT N
180 LET B=B+1
190 IF B=18 THEN STOP
200 GOTO 110
```

If you only have 1K then line 40 will have to be STEP −10, and 190, IF B=9. After you press RUN the screen will go grey while lines 30 to 90 set up the graph in FAST mode. In line 90 you can use dashes as I have done, or spaces between the numbers. There are five between 0 and 5, and four between the rest.

I find that printing the actual number at the end of each bar a great heap. If you do not want this, leave out the P$ from the end of line 150.

## WHERE A LADY MAY BE WAITING

*Nadeen Mirza of Lagos Close, Moss-Side, Manchester, writes:*

**Q** I am writing about the review of the ZX Spectrum in *Popular Computing Weekly*, Vol 1 No 3. I would like to know whether the ZX Spectrum is available to the public yet. If it is could you please give me details.

**A** Tony Barnett of Central Wall Road, Canvey Island, and T. Webb of Sandbach in Cheshire, are two other people who want more information about the ZX Spectrum.

The ZX Spectrum is available from Sinclair Research, Freepost, Camberley, Surrey GU15 3BR. The 16K RAM version is £125 and the 48K RAM version is £175. In both cases add £4.95 postage and packing. 7K of the on-board RAM is used to maintain the screen, and as such is not available to the user.

The delivery time is quoted at 28 days but this is slipping already. Later on this year it should be available over the counter from W. H. Smith.

The computer includes READ, DATA, RESTORE among its functions, as well as FN and DEF FN. It has a much better cassette interface than the ZX81. It seems as if this part of the machine has been thoroughly overhauled, and includes a schmitt trigger to cut down extraneous noise on playback.

## YES, THE HEAT IS REALLY ON!

*Brett Gamston of Pimlico Court, Dudley, West Midlands, writes:*

**Q** I have recently purchased a ZX81. So far I have been very happy with it, but one thing worries me. When my computer has been on and I have been using it for about ten minutes the top left hand corner starts getting warmer and warmer. I would like to know if it is overheating, and if so what can I do to stop this happening?

**A** Unlike the ZX80, which became known as the breakfast computer because you could fry an egg or boil a kettle on it, the ZX81 is not so prone to overheating problems. Yes, it does get hot, though the heat sink is under the keyboard at the front.

Unless you are very unlucky, I do not think that it will actually cause your screen to crash. As the time your computer is plugged in gets longer then obviously the more danger there is of the heat affecting your RAM and causing decay, or even a total crash.

If you are going to have your ZX81 plugged in for a long time then it might be best if you used one of those small battery fans every so often just to take the worst of the heat off. Other tricks developed for the ZX81 include standing a carton of frozen milk, or ice cubes in a plastic bag on the back of the computer.

However, this is not advised! One drop of water and you no longer have a computer. In all honesty, you are unlikely to need such drastic measures with your ZX81. Just make sure that it is on a hard, flat surface, and that all the feet are properly in place so it has that vital small amount of clearance underneath.

*Send your questions to Peek & poke*, Popular Computing Weekly, *Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.*

# Competitions

## Puzzle No 9

$$X = \sqrt[n]{n}$$

In the formula above, the value of $X$ is equal to the $n$th root of $n$. If we make a few trials using various values for $n$ we can see that the value of $X$ at first increases and then very soon begins to decrease. After this point no matter how large we make $n$ the value of $X$ will get progressively smaller. The following table illustrates this:

| n | X |
|---|---|
| 1 | 1.0000000 |
| 2 | 1.4142136 |
| 3 | 1.4422496 |
| 4 | 1.4142136 |
| 5 | 1.3797297 |

The puzzle this week is: at what value of $n$ is $X$ at its highest?

### Solution to Puzzle No 5

As the amount of money handed out by the cashier was for *more* than the value of the cheque, then the true amount on the cheque must have a higher number of pence than pounds.

So we can write a program:

```
10 FOR L = 0 TO 99
20 FOR P = L TO 99
30 LET CHEQUE = L * 100 + P
40 LET CASH = P * 100 + L
50 IF CASH - 20 = 2* CHEQUE THEN PRINT L, ".";
   P
60 NEXT P
70 NEXT L
```

This gives a solution to the value of the cheque of £26.53.

### Winner of Puzzle No 5

The winner of the £10 prize this week is A. Myers, Reddown Road, Coulsdon, Surrey. He submitted the following neat solution which uses the relationship between pounds (L) and pence (P): L=(98*P−20)/199.

```
10 FOR P= 1 TO 99
20 L=(98*P-20)/199
30 IF L=INT(L) THEN PRINT L,P
40 NEXT
```

### Solution to Crossword No 5

**Across:** 1 Commodore 8 Sort 9 Numbered 10 Penury 11 Orders 13 Eggs on 15 Lowest 16 Reassign 18 Inch 19 First step.

**Down:** 2 Outputs 3 Money 4 Dumbo 5 Roe 6 Foreigner 7 Heartsick 12 Do while 14 Nails 15 Lines 17 Ski.

### Winner of Crossword No 5

The winner is: B. Tunks, Chingford Hatch, London, who gets £10.

### Rules

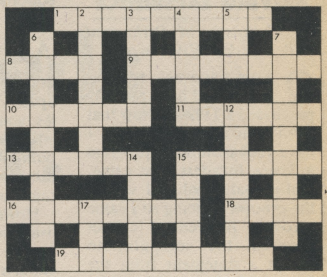
The winner of the puzzle will be the reader who, in the opinion of *Popular Computing Weekly*, has submitted the best solution. Preference will be shown to submissions which show how the entrant arrived at the correct answer, and to entries that indicate, in any way, how a micro might be applied.

The winner of the crossword will simply be the first name out of the hat.

The closing date for both the puzzle and the crossword is Monday, July 5.

Please mark your envelopes clearly with either CROSSWORD or PUZZLE.

## Crossword No 9



**ACROSS**

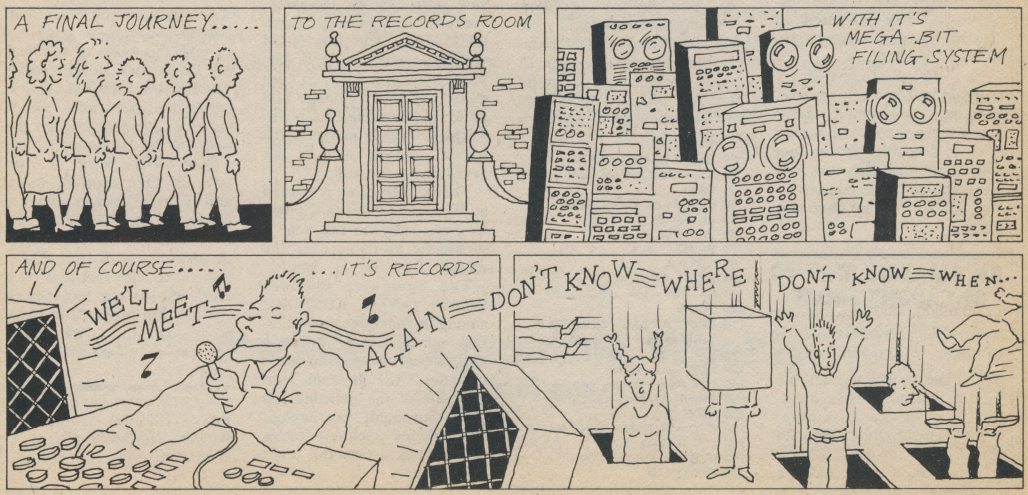
1 Officer making a connection between a Pet and a Vic (9)
8 Kick the micro initiator! (4)
9 Micro pet damaged in a scrum (8)
10 Royal engineer's prompt escape (6)
11 Gain control over a commander (6)
13 Start finally with rolls of goblins (6)
15 Brazen-faced undergarments with system lacking support (6)
16 Uncle Clive gets a point in French light (8)
18 Two parties that are extinct (4)
19 Micro begins with coloured line to circle (9)

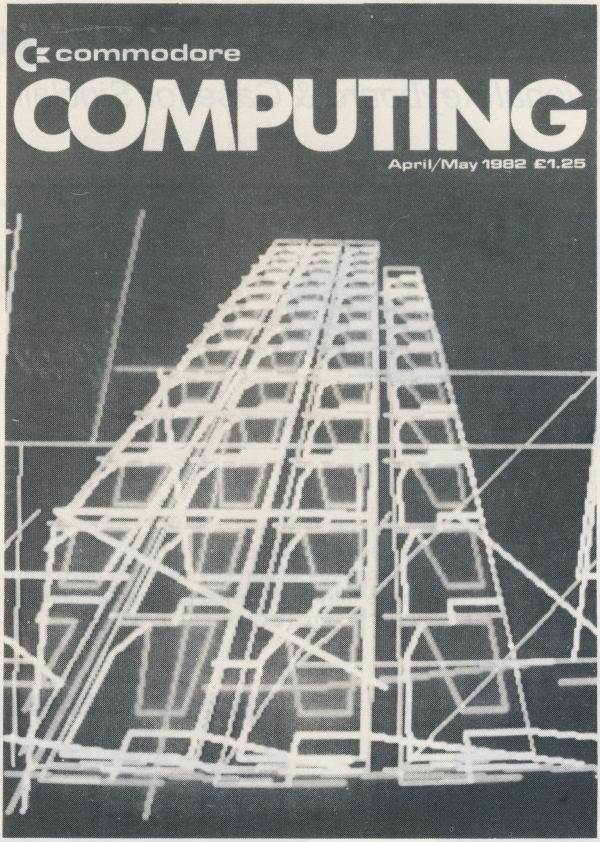
**DOWN**

2 Work a little jerk over — a student finds a visual (7)
3 Girl that is under 11A's (5)
4 Drink containing Eastern ideal (5)
5 Tell tail of an animal (3)
6 Fear Robin in confused frontal lobes (9)
7 Replace bad user with speed (9)
12 Two men that put their feet down (5, 2)
14 Common tongue of Abbots Langley's inhabitants (5)
15 One who loses attention a bit (5)
17 American organisation raising a chip (1,1,1)

## CITIZEN PAIN

BY DAVID IRELAND and JAMES MACDONALD






# An exciting new Commodore peripheral

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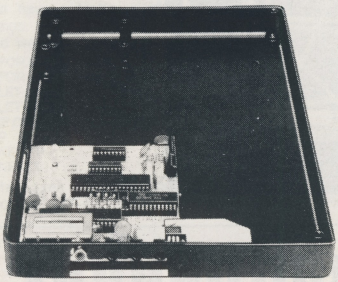
# FULLER FD SYSTEM £39.95

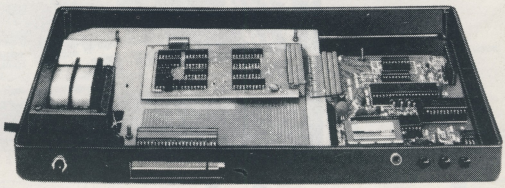
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The tough ABS injection moulded plastic case measures 8" x 14" x 2½" and hooks up to your ZX printed circuit board in minutes. No technical know how or soldering is required.

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| AD Code | | Price | Qty | Amount |
|---|---|---|---|---|
| Fuller | FD System 42 Keyboard & case | 39.95 | | |
| | FD System Motherboard | 15.95 | | |
| | FD 16K. Memory Module | 29.95 | | |
| | FD 64K. Memory Module | 78.95 | | |
| | FD PSU 9 Volts at 2 amp. | 12.95 | | |
| | FD *Shipping and Handling* | 2.50 | | |

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The ZX Centre, Sweeting Street, Liverpool 2. England, U.K.

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