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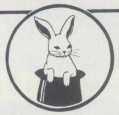
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How to submit articles
Articles which are submitted for publication should not be more than 1000 words long.

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



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Editorial

In a week when they found George Washington's teeth, and a boy who is allergic to Scunthorpe, Commodore announced a £30 cut in the price of its Vic20. From September 28 the Vic20 will cost £169.99 including VAT.

This move, which had been rumoured ever since Sinclair launched the ZX Spectrum in April, is an attempt to undercut some of the other low-cost micros on the market. The Dragon 32, the TI 99/4A, the Atari 400 and now the Lynx, are all priced around the £200 mark.

With more micros likely to appear in the near future — they seem to be averaging almost one a week at the moment — the market is becoming increasingly price sensitive.

Commodore has the advantage of an established user base and a wide range of software. But price is still a crucial factor for prospective buyers.

In the past two months, Sinclair has dropped the price of its ZX81 by £20, to £49.99, and Texas Instruments and Atari have cut more than £100 off the price of their micros. Now Commodore has followed suit.

If this competition among micro manufacturers continues, prices may yet drop further.

Next Week



Life at the top is no joke in Kong's Revenge — a new game for ZX81

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Vic20 price drops by £30

COMMODORE has announced two moves to boost sales of the Vic20 range of products and software.

The price of the Vic20 is to be cut by £30 to £169.99 including VAT, from September 28. This drop takes the machine out of the competitive £200 region and places it between the two versions of the ZX Spectrum.

Over 55,000 Vic20 machines have been sold in the eight months since its launch, compared with over 40,000 Sinclair machines since Spectrum's April launch.

In the second move, Commodore has set up a Vic20 owners club, Vic-Soft, which will send the first issue of its new quarterly magazine to more than 25,000 Vic20 owners who completed and returned their guarantee cards.

A Commodore spokesman explains "Vic-Soft will be a place where owners will be first to find out about new things for their machines."

Further issues and spcial offers will be available to those who join and pay the club's £5 membership fee.

Prestel database for micros

PRESTEL is making a determined effort to capture the home computer market. A 30,000 page database is being set up just for micro users.

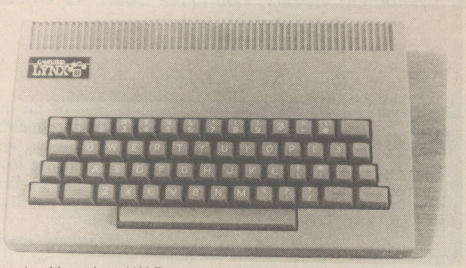
This scheme, known as Micronet, will be launched in January. The database will contain games, programs and information about computers and user groups.

As an added incentive, Prestel plans to reduce its charges for evenings and weekends.

Croydon venue for microfair

CROYDON Home Computer Fair will be held in the Greyhound Halls, Park Lane, Croydon on Saturday, September 25.

Over 40 exhibitors will be there, entry will be £1 and 50p and the show will be open from 10 am to 8 pm. More details from Ron Vogt, Computer Fairs, 359 The Strand, London WC2.



Computers' Lynx has 48K Ram and high resolution colour graphics.

Lynx unsheathes its claws

MORE details have emerged about the Camputers' Lynx (*Popular Computing Weekly*, September 9).

Based around the Z80A microprocessor, the Lynx has 48K Ram, expandable to 192K, and 16K Rom. It has 24 lines × 40 characters display and a colour resolution of 248 × 256.

The 48K Ram leaves 16K available to the user in the high resolution colour mode. With additional memory expansion, the display can be boosted to 24 lines × 80 characters with a colour resolution of 248 × 512.

An enhanced form of Basic, specially developed for the Lynx by Davis Jansons, takes up 10K of Rom. The remaining 6K is used for the keyboard, monitor and screen driver.

Other features of the Lynx include a typewriter keyboard, an internal speaker and an RS232 port. To avoid any possibility of overheating, the power supply will be external.

Though the Lynx is designed primarily for the home user, it has CP/M file management compatibility.

The hardware for the Lynx was designed by John Shirreff of G W Design Services, a Cambridge electronics firm. Finance for the project was provided through the government's small firms loan guarantee scheme.

The 48K Lynx, originally priced at £150 plus VAT, will now be sold for £225 including VAT. It will be launched officially in late October.

Camputers Ltd has moved from its old address in Hills Road, Cambridge. The firm is now based at 33A Bridge Street, Cambridge CA3 4AB.

Programming award competition winners

POPULAR Computing Weekly's Programming Award Scheme Competition winners have been selected.

First prize goes to Phillip Brain of Crookesmoor, Sheffield, for his program *Odyssey*. He wins a Sinclair ZX Spectrum and a ZX printer.

The winners were selected last week by Brendon Gore, Editor of *Popular Computing Weekly*, and Jeremy Ruston, author and programmer.

Jeremy Ruston commented: "The competition received so many entries of a high standard that it was very difficult to decide on the winners."

Odyssey was also the winning program in the Games category.

Malcolm Davison won the Educational/Scientific section with the best presented program, *Spelling* for the 16K Spectrum.

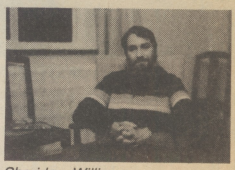
D Swindell won the Utilities section with his impressive *ZX81 Assembler*.

Christopher Copper won the Business/Office section with *Business Accounts* for the 16K ZX81.

BBC users in independence squabble

A ROW has broken out between the two main BBC micro user groups concerning their independence.

In a letter to the magazine *Microcomputer Printout*, Sheridan Williams — co-founder of Beebug — has accused rival group Laserbug of ties with a retail outlet. He alleges "Laserbug are run by a shop called Computers For All and cannot represent their members in a truly independent way. As far as I know, the only truly independent user group is Beebug."



Sheridan Williams.

Paul Barbour, new editor of Laserbug, in a written reply to the letter says "Laserbug is and always has been independent of all outside bodies. While Mr Williams claims he is completely independent, I would like to know how, in the mail-out by Acorn (which supplied the guarantee card to every owner of the BBC micro) he managed to get a sheet publicising his own group."

Beebug currently has a membership of 8,500. Laserbug now has over 2,000 members.

Commodore 64 goes on sale

THE new Commodore 64 microcomputer will go on sale in the UK during the third week of September.

It will cost £299 plus VAT. At over a hundred and fifty pounds more than the Vic20, it nears the price of the 64 selling in the US at $599.

A Commodore spokesman said: "There is an enormous perceived demand for the new machine in the UK. The initial batch will be manufactured in Santa Clara, imported, and sold through selected high street retailers."

Letters

write to Letters, Popular Computing Weekly, Hobhouse Court, 19 Whitcomb Street, London WC2

Is this misplaced enthusiasm?

There were a couple of inaccuracies in my program Screenprint which was published in *Popular Computing Weekly* July 29. The Rem statement in line 10030 should say that TS=4096 on Vics with more than 8K of memory and not 10.24. Also, in the accompanying text the calculation for NL should read:

```
NL=INT((PEEK(36866) AND 127 )/2)
```

I did send in an alternate listing but this was obviously misplaced.

Ken Clark
22 Napier Avenue
Southend-on-Sea
Essex SS1 1LZ

Please help me Mister Postman

I wonder whether any of your readers can help me to obtain a copy of *PCW* April 29 (Planet Ruler issue). This will then enable me to complete my set of issues of your magazine.

Ian Fensome
7 Brussels Way
Luton
Bedfordshire LU3 3TQ

Penitents' stool

I have spent hours trying to make your *Meltdown* program work (*Popular Computing Weekly* July 29). I now realise that at least lines 6500 and 7000 are omitted with possible errors in lines 7 and 70.

Can you please advise of these and any other corrections for this program. I must say the very small print made other sections almost unreadable. A great pity as I believe that, errors excepted, the magazine is very good value for money.

M Farrant
49 Waterer Gardens
Tadworth
Surrey

You are correct, there are a couple of errors in the Meltdown program. The original program worked fine when we played it in our office. Unfortunately, our cassette recorder missed out a couple of lines when we printed out the program.

To correct the program, type in line 6500 RETURN and 7000 REM MELTDOWN.

You pays yer money and . . .

I am writing to reply to Mr S Stratford's letter in Peek & Poke (July 22). It will soon be possible to download telesoftware from teletext on the BBC microcomputer — production of the unit begins in October. If Beebusers can't wait, then programs appear on Ceefax along with a telesoftware newsletter (page 705).

Ian Beardsmore's reply to Mr Stratford said that a ZX Spectrum Prestel adaptor would not be possible ". . . let alone feasible . . .". However, I was delighted to read in the following issue (July 29) that Sinclair are to build such an adaptor likely to cost from £50 — or less. Production starts on a similar adaptor for the BBC micro in early 1983.

Before investing in Prestel it must be remembered that, unlike teletext, it is not free. British Telecom charge on a time-basis for using (a) the telephone line, and (b) the Prestel computer. Some information providers also charge you to look at their pages. Prestel is a brilliant British invention but it is too expensive for the home-user at the moment, just like *Popular Computing Weekly*.

Andrew Wiseman
Hartford Post Office
68 Mayfield Road, Hartford
Huntingdon
Cambridgeshire PE18 7NJ

A partially populated b

I wish to comment on the letter "To b or not to be, that is . . ." in July 29.

The model A can be fully upgraded to model B standard for around £130 if done by an Acorn dealer, and around £75 if you fit them yourself.

The only part of the tube that the model A does not have is the connector which can easily be soldered to the board — the model A board is just a partially populated model B board.

Matthew Newman
3 Harvest Bank
Hyde Heath
Amersham
Buckinghamshire

Cubic rethink . . . WHOOPEE

In your competition page (July 15) you mention errors encountered on comparing cubes, eg: IF 3**3=27 THEN PRINT "WHOOPEE" will fail. However, PRINT 3**3 gives "27" so I thought of using STR$, eg: IF VAL STR$ 3**3=27 THEN PRINT "WHOOPEE" will give a happy response every time.

S Haydock
61 Gordon Street
Wigan
Lancashire

Backslashing answer

Ian Beardsmore's reply to D Whittaker's query about Vic20 inverse graphics (July 22 issue) was somewhat less than helpful.

The character in question was, in fact, an inverse (or reverse) video backslash. This is *not* found in the Vic20 character set but does appear in the character set of the larger CBM machines. When Vic20 programs are listed using a printer on one of the larger CBMs, this character is printed in place of the inverse video £ which denotes *Ctrl red* on the Vic. An example of this appears in Appendix M (page 153) of the booklet *Personal Computing on the Vic20*. Your correspondent should have received a copy of this booklet with his machine.

The reason for this, at first apparently strange effect, is that machines such as the CBM 3000/4000 do not have a £ sign in their character set. There are also slight differences in the versions of the ASCII code employed on the different machines. On the Vic20 the code for the inverse video £ is 220, on the CBM 3000/4000 this code corresponds to the inverse video backslash.

There should be no confusion with the inverse video diagonal given by shifted M, since the backslash has a vertical ascender/descender at each end.

During his discussion of this problem, Ian Beardsmore also reveals an alarming lack of appreciation of the operation of the reverse video controls on the Vic. If you have opened a print statement and then type *Ctrl rvs on*, an inverse video *r* will appear on the display, but all subsequent characters will appear *as normal* until the program is run (or *RETURN* is pressed in the immediate mode). Then, and only then, will the characters appear in reverse video. Deleting the inverse video *r* will cancel the command, but the inverse video *r* will return once you "start again".

On the other hand, in the immediate mode *without* a print statement, typing *Ctrl rvs on* will not cause an inverse video *r* to appear and deleting will not cancel the command — all subsequent characters will appear on the screen in reverse video until *Ctrl rvs off* is entered.

J Meardon
15 Brightwell
Reabrook
Shrewsbury
Salop SY3 7TQ

Manual error in Sinclair

Thank you for such a wonderful magazine.

The reason why I have put pen to paper is to tell readers that I have spotted a mistake in the Sinclair manual. It only becomes dangerous when using machine code. It is the character on page 184, code 135. The character should be "Shift Graphic 3" and not "Shift Graphic E".

Keith Driscoll
53 Melville Road
Bootle
Merseyside

Jupiter Ace — the making of a micro

***David Kelly** returns to Foxhollow in pursuit of the Jupiter Ace.*



Steve Vickers (left) and Richard Altwasser, co-designers of the Jupiter Ace.

Now the Jupiter Ace has arrived (*Popular Computing Weekly*, September 9) the tongues of Altwasser and Vickers have been untied and they can talk about their new micro, the machine that is not afraid to speak Forth.

The two co-designers of the Spectrum left Sinclair five months ago to develop the machine.

"I first thought in November last year that it would be a good idea to build a microcomputer," says Richard.

"I knew that I couldn't do the whole thing on my own. I can't write machine code — at least, I can't write it like Steve can.

"I turned the idea over for some time but it wasn't until January that I mentioned anything to Steve.

"I didn't know how Steve would feel about setting up on his own. I had always thought Steve was a fairly cautious sort of chap and I wasn't sure if he would be interested."

"As we talked it became clear that Steve was prepared to be adventurous — and it became clear to him that I was prepared to be adventurous — and there you are."

Both Richard and Steve wanted to do something different, so they decided that their micro should run Forth rather than Basic.

"We'd been talking before Christmas about Forth," explained Richard. "We had both independently read an article that was printed in the magazine *Byte* — and we both got quite excited about it".

Having decided to build a new micro that would run Forth, the two designers began to sort out the details of the new machine.

"We spent the last weekend in January sitting down trying to work out the basics of the Ace. We both know the Z80 processor inside out so we really had to use it, and at that stage I already had an architecture in mind.

"The Ace had to be fairly inexpensive for two reasons. You can always make a small computer bigger by hanging a selection of peripherals on it — which makes the small micro a better commercial proposition. And we obviously know so much more about making small computers.

"We agreed to spend a month evaluating the project. We both joined FIG, the Forth Interest Group. Steve went off and bought lots of books and I started making enquiries of component manufacturers."

By mid-March they were still not making much progress and they realised that, if they were going to see the venture through, they would have to leave Sinclair. There was only one time to do that — immediately after the Spectrum launch.

"We couldn't possibly leave before, and, if we waited long after we would more than likely be headlong into another of Clive's projects," says Richard. "So we left and went headlong into one of our projects instead."

By this time the first draft of the hardware was already working.

"If you look at all the new computers coming out they all have new hardware — ours was to have entirely new software as well. Writing the Forth was a huge task for Steve.

"While he was doing that I redrafted the hardware and designed the printed-circuit board. Mixed in with this I was sorting all the components — looking around the factories for someone to build it. We also approached the bank to try to get a three-month loan.

"Forth is a very well documented language. We decided on Forth 79 Standard, with some modification, and Steve built it all up from scratch.

"To say Basic is becoming the standard language for micros is very misleading — you show me two machines that run the same version of Basic. Forth is a better language. It is about ten times faster than Basic. It is more compact — we could easily do a 1K *Space Invaders* in Forth on the Ace.

"Forth is easier to learn, as the first language. Changing from Basic to Forth is a bit like going on the continent and driving on the right: You quickly get into the way of it, but in the first 20 minutes you risk your life so many times."

The Jupiter Ace will get its full launch at the *Personal Computer World* Show when the first production run machines will be on display.

"We will build and ship 500 computers in September which will get us off the ground — production will ramp up from there according to demand.

"In addition we are going to provide a memory expansion, although with a little adaptation any Z80 peripheral can be connected because all the Z80 busses appear at the back of the Ace.

"We will be writing our own software for the machine and we are working closely with several companies who have written good things for the ZX81 and have expressed a wish to write for us.

"Most people buy a micro to learn about computers. They spend a week getting into Basic and discover they cannot produce the kind of games they are used to without learning to program in machine-code. That isn't easy so they resort to buying ready-made machine-code games. The manufacturer is selling a Basic machine to run machine-code. What the Ace does is to provide machine-code speed in an easily understood language.

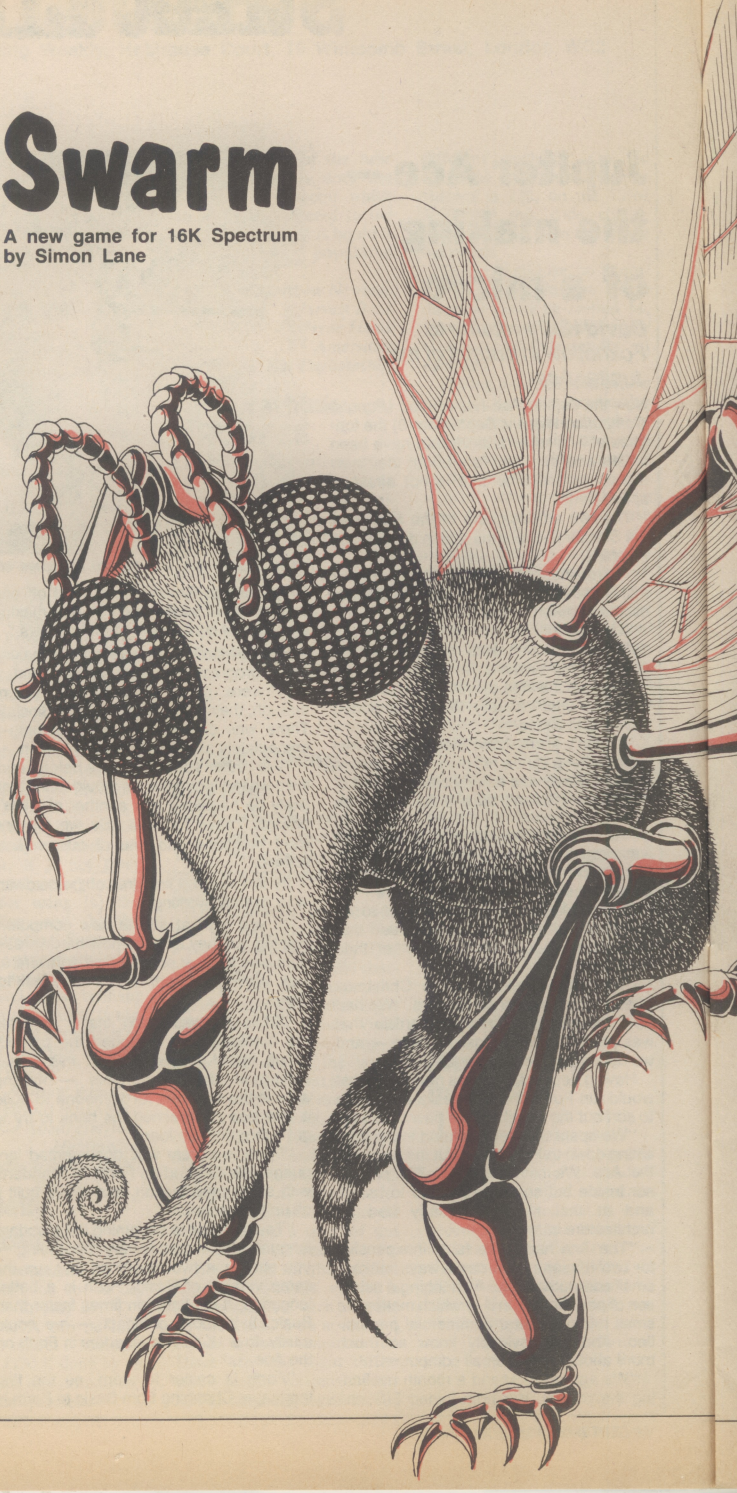
"Learning to program should be easy. If you buy a car it should be as easy to drive as possible. Why should a computer be different? It is the job of designers to produce machines that my grandmother would find easy to use.

"I think," says Richard, "that the introduction of Forth is a major step in that direction. We know we are right to produce the Ace — all we have to do is convince everyone else of that."

COVER STORY

Swarm

A new game for 16K Spectrum
by Simon Lane



An experimental research station at Porton Down is working on a hush-hush project. In a quest to invent a new weapon, to match the Super Powers' terrifying nuclear arsenals, the research team is altering the genetic DNA patterns of various insects.

Black widow spiders, their poisonous bite enhanced a thousand fold, are kept under close observation. Killer ants, bred for size and ferocity, are encased in specially constructed titanium alloy cases. Even beetles, their skins toughened to withstand almost any shock, are being used as instruments of destruction.

The research team's most successful experiment has resulted in a species of hybrid bee. These bees have wingspans of 12 ft, with bodies to match. They are carnivorous and need to feed almost constantly.

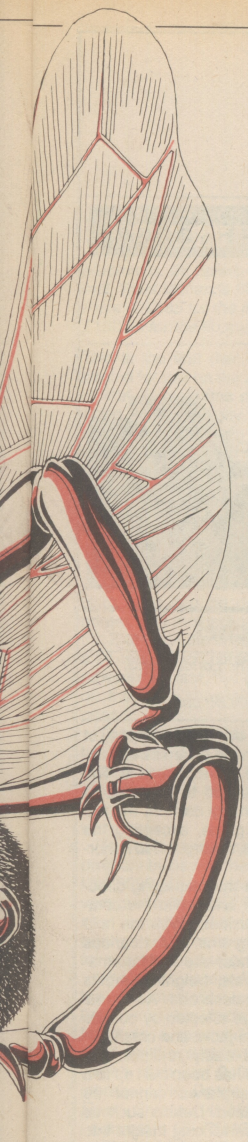
Unfortunately, a swarm of the bees escaped from one of the hives. The bees are approaching a nearby city, looking for food.

You are part of an artillery unit called up to deal with the menace. Your rocket launcher is one kilometre away from the swarm, but you only have enough ammunition for one shot at each bee.

When run, the program displays rows of the giant bees on the screen. Using the keys 5, 6, 7 and 8 you must position your sights directly over each bee. Enter 0 to fire.

Full instructions are contained in the program.

User defined graphics are present in lines 80-240, 310, 320, 1087 and 1260.



```
 1 REM Swarm
 2 REM © Simon Lane, 1982
 3 REM ----------
 5 LET h=0
 10 RESTORE
 15 FLASH 0: BRIGHT 0: OVER 0
 20 INVERSE 0: BORDER 0
 30 PAPER 0: INK 6: CLS
 40 LET a$="#kblcidje9fhmonp"
 50 FOR i=1 TO 15 STEP 2
 60 FOR j=0 TO 7: READ n: POKE
USR a$(i+1)+7-j,n: NEXT j: NEXT i
 70 POKE 23692,255: PRINT AT 21
,0;
 80 PRINT "          IJABIJ AB  AB
MNEFEF"
 90 PRINT "          KLCDKL CD  CD
OPGHGH"
 100 PRINT "          AB  AB  AB
AB"
 110 PRINT "          CD  CDIJCD
CDEFEF"
 120 PRINT "          AB  ABKLAB
IJGHGH"
 130 PRINT "          CD  CD  CD
KL"
 140 PRINT "          AB  AB  AB
IJEFEF"
 150 PRINT "          CD  CD  CD
KLGHGH"
 160 PRINT
 170 PRINT "  MN IJ   IJ  MNEF  M
NEF  AB  AB"
 180 PRINT "MNOP KL   KL  OPGH  G
PGH  CDIJCD"
 190 PRINT "OP   IJ   IJ  IJ  IJ E
F EF ABKLAB"
 200 PRINT "MNEF KL   KL  KL  KL G
H GH CD  CD"
 210 PRINT "OPGH IJ   IJ IJABIJ M
NEF  AB  AB"
 220 PRINT "  EF KLABKL KLCDKL O
PGH  CD  CD"
 230 PRINT "EFGH IJCDIJ IJ  IJ E
F IJ  AB  AB"
 240 PRINT "GH   KL  KL  KL  KL G
H KL  CD  CD"
 250 PRINT "TAB 9;""BY SIMON LANE
""
 260 FOR i=1 TO 7: INK i
 270 BEEP .1,RND*24: FOR j=0 TO
19: PRINT AT j,0; OVER 1;TAB 31:
NEXT j: NEXT i
 280 FOR a=USR "A" TO USR "U"+7:
READ n: POKE a,n: NEXT a
 290 DIM b$(6,21): FOR i=1 TO 4
 300 LET x$=CHR$ 16+CHR$ (3+(2 A
ND i>2))+CHR$ (i AND i<3)
 310 LET b$(i*2-1)=x$+" AB AB AB
 AB AB AB "
 320 LET b$(i*2)=x$+" CD CD CD C
D CD CD "
 330 NEXT i
 340 LET f=24: LET s=0: LET m=12
 350 LET b=24: LET l=0: LET p=30
 360 LET d=20: LET a=0: LET z=1
 370 LET t=0: LET x=1
 1000 BRIGHT 0: PRINT AT 21,0;
 1010 PRINT '" A swarm of giant
 mutant bees""'"is attacking a c
ity by night.""'"You have a rock
et launcher"
 1020 PRINT '"positioned one kilo
meter away,""but only enough a
munition to""allow you one sho
t at each ""bee."
 1030 PRINT '"Use the keys ""5"
","6","7" and ","8" to mo
ve your sights, and""","0" to
fire."
 1040 PRINT '" Type ""Enter"" to
 start."
 1050 IF INKEY$<>CHR$ 13 THEN BEE
P .05,RND*48-24: GO TO 1050
 1060 CLS
 1070 PRINT "Score:0000 High:";"0
00"( TO 4-LEN STR$ h);h;" Rocke
ts:24"
 1075 LET p$=" UUUUUUUUUUUUUUUUUU
UUUUUUUUUU"
 1076 PRINT AT 21,1;p$
 1080 IF m=0 THEN GO TO 1100+c*10
0
 1090 IF z=0 THEN BEEP .12,-35: G
O TO 2000
 1100 LET t=t+x
 1110 IF t=0 OR t=13 THEN LET x=-
x
 1120 PRINT AT 1,t;b$(1);AT 2,t;b
$(2);AT 4,t;b$(3);AT 5,t;b$(4);A
T 7,t;b$(5);AT 8,t;b$(6);AT 10,t
;b$(7);AT 11,t;b$(8)
 1130 GO TO 2000
 1200 LET d1=4: LET a1=1
 1210 IF b$(d1*2,a1*3+1)="C" THEN
 GO TO 1240
 1220 LET a1=a1+1: IF a1=7 THEN L
ET a1=1: LET d1=d1-1
 1230 GO TO 1210
 1240 LET d2=d1*3-2
 1250 LET a2=a1*3-2+t
 1260 PRINT AT d2,a2; BRIGHT 1;b$
(d1*2-1,1 TO 2);"AB";AT d2+1,a2;
"CD"
 1265 BEEP .01,22-d2
 1270 GO TO 1900
 1300 PRINT AT d2,a2; BRIGHT 1;b$
(d1*2-1,1 TO 2);"EF";AT d2+1,a2;
"GH"
 1305 BEEP .07,21-d2
 1310 GO TO 1900
 1400 PRINT AT d2,a2; BRIGHT 1;b$
(d1*2-1,1 TO 2);"IJ";AT d2+1,a2;
"KL"
 1405 BEEP .07,20-d2
 1410 GO TO 1900
 1500 PRINT AT d2,a2;"  "
 1510 LET d2=d2+1
 1520 PRINT AT d2,a2; BRIGHT 1;b$
(d1*2-1,1 TO 2);"IJ";AT d2+1,a2;
"KL"
 1530 IF d2=19 THEN LET c=c+1
 1535 BEEP .07,20-d2
 1540 GO TO 2000
 1600 PRINT AT d2,a2; BRIGHT 1;b$
(d1*2-1,1 TO 2);"MN";AT d2+1,a2;
"OP"
 1605 BEEP .07,-1
 1610 GO TO 1900
 1700 PRINT AT d2,a2; BRIGHT 1;b$
(d1*2-1,1 TO 2);"AB";AT d2+1,a2;
"CD"
 1710 LET p=p-(p$(a2)="U")-(p$(a2
+1)="U")
 1712 IF p$(a2)="U" OR p$(a2+1)="
U" THEN BEEP .01,20: BEEP .01,24
: BEEP .01,27
 1715 IF NOT p THEN GO TO 3000
 1720 LET p$(a2 TO a2+1)=" ": PR
INT AT 21,a2;" "
 1730 GO TO 3900
 1800 PRINT AT d2+1,a2;"  "
 1810 LET d2=d2-1
 1820 PRINT AT d2,a2; BRIGHT 1;b$
(d1*2-1,1 TO 2);"AB";AT d2+1,a2;
"CD"
 1830 IF d2=d1*3-2 THEN LET m=INT
 (b/2+.5): LET z=1
 1835 BEEP .05,20-d2
 1840 GO TO 2000
 1900 LET c=c+1
 2000 IF m THEN LET m=m-1: LET z=
1-z: IF NOT m THEN LET z=0: LET
c=1
 2010 LET d=d+(INKEY$="6")-(INKEY
$="7")
 2020 LET a=a+(INKEY$="8")-(INKEY
$="5")
 2030 LET d=d+(d=0)-(d=21)
 2040 LET a=a+(a=-1)-(a=32)
 2050 PRINT AT d,a; OVER 1; INK 8
; PAPER 8; BRIGHT 8;"+"
 2060 BEEP .0.001,50
 2070 PRINT AT d,a; OVER 1; INK 8
; PAPER 8; BRIGHT 8;"+"
 2080 IF f THEN GO
TO 3000
 2090 IF INKEY$<>"0" THEN GO TO 1
680
 2100 LET dd=d: LET aa=a
 3000 LET f=f+1
 3010 IF f>6 THEN GO TO 3500
 3020 PRINT AT dd,aa;"@@RASSTT"(f
)
 3030 GO TO 1080
 3500 IF f=10 THEN GO TO 3800
 3510 PRINT AT dd,aa;"+"
 3520 IF m=0 THEN IF (dd=d2 OR dd
=d2+1) AND (aa=a2 OR aa=a2+1) TH
EN GO TO 3550
 3530 IF dd>11 OR dd/3=INT (dd/3)
 THEN GO TO 1080
 3540 IF aa<-1 OR aa>(t+17 OR (a-t
)/3=INT ((a-t)/3) THEN GO TO 108
0
 3550 LET d3=INT (dd/3)*2+1
 3560 LET a3=INT ((aa-t)/3)*3+4
 3565 IF (d3-1)/2+1=d1 AND (a3-4)
/3+1=a1 THEN GO TO 1080
 3570 IF b$(d3,a3)=" " THEN GO TO
 1080
 3580 LET b$(d3,a3 TO a3+1)="  "
 3590 LET b$(d3+1,a3 TO a3+1)="
"
 3600 LET s=s+20+(10 AND d3=2)+(2
0 AND d3=1)
 3610 GO TO 3750
 3650 PRINT AT d2,a2;"  ";AT d2+1
,a2;"  ": LET m=INT (b/2+.5): LE
T f=1
 3660 LET s=s+40+(20 AND d1=2)+(4
0 AND d1=1)
 3670 LET b$(d1*2-1,a1*3+1 TO a1*
3+2)="  "
 3680 LET b$(d1*2,a1*3+1 TO a1*3+
2)="  "
 3750 BEEP .01,40: BEEP .01,44: B
EEP .01,47
 3755 LET b=b-1
 3760 PRINT AT 0,6;"000"( TO 4-LE
N STR$ s);s
 3770 GO TO 1080
 3800 IF SCREEN$ (dd,aa)="+" THEN
 PRINT AT dd,aa;" "
 3810 LET f=0
 3820 PRINT AT 0,30;(10^ AND r<10
);r
 3825 LET f=0
 3830 IF r THEN GO TO 1050
 4000 FOR i=1 TO 100: NEXT i
 4010 CLS
 4015 IF b THEN GO TO 4200
 4020 PRINT "  You have killed al
l the bees.""The bees killed "
;30-p;" people.""  Score:";s''
;(30-p)*2;" (2 per corpse.)"
 4030 GO TO 4220
 4200 PRINT "  You have used up a
ll your""rockets, with ";b;" b
ees left.""The bees killed ";3
0-p;" people.""  Score:";s''
 4210 PRINT "  =";b*5;"(5 pe
r bee)"''
 4220 PRINT "          -";(30-p)*2,"
 (2 per corpse.)"
 4230 LET s=s-b*5-(30-p)*2
 4240 PRINT "          ====
 ";s;"(Final score.)"
 4250 IF s<=h THEN GO TO 4500
 4260 PRINT "  Well done!"''"
 You have the HIGH SCORE!"
 4270 LET h=s
 4500 PRINT "  Type ""Enter"" to
 play again."
 4505 IF INKEY$<>CHR$ 13 THEN GO
TO 4505
 4510 CLS : GO TO 10
 5000 FOR i=1 TO 100: NEXT i
 5010 CLS
 5020 PRINT "  The bees have kill
ed all the""people. You have f
ailed.""  Score:0."
 5030 FOR i=1 TO 500: NEXT i
 5040 CLS : GO TO 10
 9000 DATA 6,1,11,7,3,23,11,17
 9010 DATA 96,128,208,224,192,232
,208,136
 9020 DATA 35,71,135,159,103,11,1
1,9
 9030 DATA 196,226,225,249,230,20
6,206,144
 9040 DATA 12,18,17,8,232,30,127,
255
 9050 DATA 0,0,0,160,68,41,125,25
4
 9060 DATA 0,0,0,5,34,148,190,127
 9070 DATA 48,72,136,16,20,128,25
4,255
 9080 DATA 0,56,84,146,254,146,84
,56
 9090 DATA 0,0,56,84,124,84,56,0
 9100 DATA 0,0,0,16,56,16,0,0
 9110 DATA 0,0,0,0,16,0,0,0
 9120 DATA 16,56,16,254,16,15,40,
68
```

Reviews
software

Winged Avenger

Work Force, 140 Wilsden Avenue, Luton, Bedfordshire.
Spectrum, 16K or 48K.
Price: £6.95 inclusive.

This is one of the first machine code games available for the Spectrum. It is a colour and sound version of a game previously released for the ZX81.

The cassette loaded with no problems from two different machines and is recorded three times on the tape. It consists of a short *Basic* program followed by a large chunk of bytes, so it is important not to switch off the machine the first time the screen no longer shows the loading pattern, as there is no warning on the display. As the auto-load stops, there is a brief description of the control keys and a choice of difficulty levels (0 to 6).

In order to discover how well this program emulates its big brother, I set off one dark night into the nether regions of my local fair, armed only with my courage and a pocket full of 10p pieces. The original game, *Phoenix*, sends squadrons of cosmic eggs at you that later hatch into almost indestructible vultures. The vultures pursue you relentlessly, even when their wings have been blown off by your laser cannons.

Smashing opportunity

After this Hitchcockian nightmare, there is the opportunity to smash the control craft which contains smart weapons that lock onto your base (I confess I could not get past this stage).

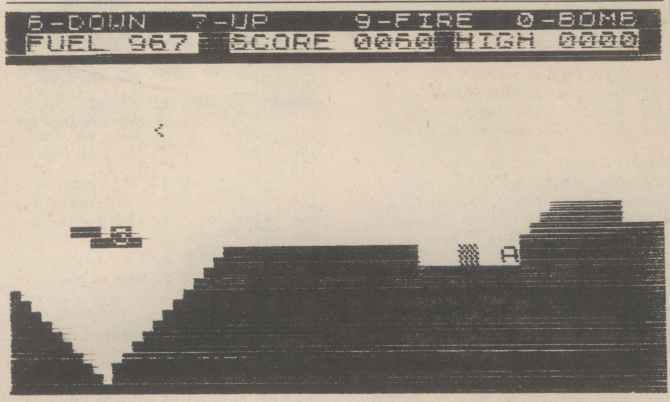
Work Force's version is one of the best Sinclair games so far. It covers all the stages of the arcade original — the arrival of the mother ship is particularly good. It is certainly a game to come back to again and again.

My one criticism would be that the shield control protects you too well. Kami-kazi birds that reach the bottom line hurl themselves to destruction with little damage to the home base.

In all other respects, *Winged Avenger* seems to offer good entertainment, although £6.95 does seem a little high when compared with games like Bug-Byte's *Spectral Invaders* — which is almost £2 cheaper.

Summary
A well-written high-speed action game that uses the potential of the Spectrum fairly well. Perhaps a little over-priced, but in the long run cheaper than the arcade version — and you might even win!

JS



QS Scramble

QS Scramble
Quicksilva, 92 Northam Road, Southampton
ZX81, 4K, cassette
Price: £5.50.

At any ZX fair a certain amount of indifference toward humankind is called for when moving from stand to stand.

The Quicksilva stand always attracts impenetrable crowds. Their stand is justly popular — their software and hardware is always first class.

Scramble, their new release, follows the QS tradition of concentrating on the classic arcade games.

The game has the same feel as QS's well-known Defender — your spaceship cruises above a changing mountainous landscape, shooting at aliens swooping down from space, and rockets being fired from the ground. In addition, you may drop bombs on the fuel dumps scattered among the mountains. Points, of course, are scored for all of these operations. With the aid of a little insert card, you may change several of the parameters to give a personalised game. You will want to make the game harder after playing a couple of times, as the basic one soon becomes too easy.

The package displays the usual high-quality artwork and the cassette itself is neatly printed with the title of the program. The tape contains, as is usual QS practice, software for the QS character and sound generators.

Summary
"Amazing", "fantastic", and other original observations from neighbouring arcade game fans were enough to convince me that Quicksilva have another worthy addition to their small but select range. **TB**

Airline/Autochef

CCS, 14 Langton Way, London SE3.
ZX81, 16K cassette.
Price: £4.75 each – £8.00 both.

One of the most successful types of boardgame has been the business simulation, witness *Acquire, Monopoly*, et al. The ZX81 is admirably suited to this type of game — more so, in my opinion, than to the graphic arcade game, excepting the efforts of a very small, distinguished minority.

Airline puts you in the managing director's seat. Your task is to build the company into a viable business, with the help of bar charts, histograms and vicarious news flashes. You must use this information, on crewing levels, freighting profits and so on, to make decisions. As in real life, well laid plans are affected by outside events, in this case hi-jacks and crashes.

The program is broadly realistic. For instance, until capital has been built up to a reasonable level, airplanes cannot be bought, but only leased. Details such as this help to build a convincing insight into the business world.

Autochef is not some new cooking device, but the name of a restaurant chain. Again, you are in charge, and given information relevant to your business. This time you decide what type of establishment to run, what to charge for meals, whether to give your staff pay rises and so on.

Summary
Both programs feature attractive layouts and give the player a good sense of being in control of a big business. Although not detailed enough for the serious student of Business Affairs, the games are an ideal simulation for the interested teenager, and good plain fun for everybody. **TB**

Reviews
hardware

Disc drive for ZX81

Macronics, 26 Spiers Close, Knowle, Solihull, West Midlands B93 9ES.
Price: £90.85 for the interface card.
£182.85 for the floppy disc drive.

This is the first disc drive to be demonstrated for use on the ZX81. It can store up to 48K of programs or data on it's single sided, single density, discs. The loading speed of 24 seconds per 16K program is slow by normal disc standards, but is 21 times faster than the tape speed.

The user can either supply his own standard disc drive or buy a 5¼ inch disc drive from Macronics (mini-discs will be available soon).

The interface card (5 × 5½ inches) plugs into a motherboard, so that a 16K Ram pack can be used as well as the printer. The motherboard simply plugs into the ZX81 and the drive is connected up via a 21-inch ribbon cable. The drive must be powered up first, but there is no indication on the drive supplied that this has happened.

The board contains a 2K Rom (soon to be expanded to 4K to cope with three drives and a *Copy* disc routine) which provides the 11 disc commands. There is also 2K of Ram for use by the system as workspace.

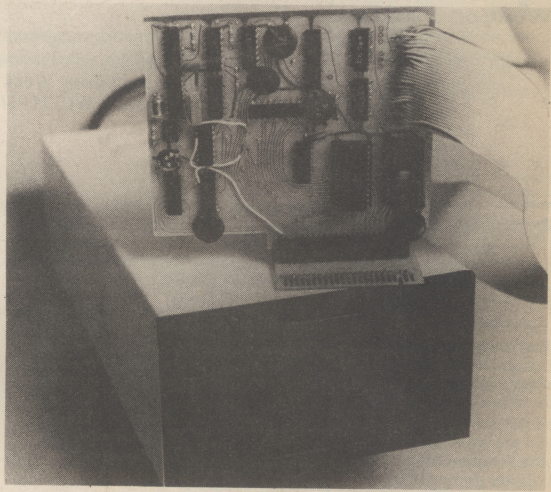
The commands can be written into any program by having the first line as LET E = USR9999. This stores all the numbers as variables so that LET E = USR DSAVE etc can be used. The variable E will then return an error code which can be checked for operator or disc errors.

Although E is used all the way through the documentation as a way of calling these machine code routines, it is not listed as a reserved variable. Variables used by the system are the commands (which take up 240 bytes of variable storage), *Dir*, *Dsave*, *Dload*, *Stat*, *Write*, *Read*, *Create*, *Kill*, *Newd* and the transfer parameters *F$*, *R$(128)* and *R*.

Dir provides a directory (which takes up the whole of the first track of the disc) of programs and data in the form of file names. These file names consist of nine letters — six letters of the name of the file (no spaces) and three letters giving the file type separated by a full stop. The user inputs both when creating the fixed length data array which acts as a file on the disc.

Each file must be in multiples of 1.28K, as it can only be stored in whole tracks. Each track is divided into 10 sectors of 128 bytes which can be *Written* to or *Read* from by using R$ to transfer the data from one sector in or out of memory.

F$ carries the name of the file and R is used to tell the disc operating system which sector to use. There are up to 390 sectors available on a 48K (40 track) disc. All of this is done in *Fast* mode with the screen blank.



Macronics disc drive for the ZX81 can store up to 48K on single sided, single density discs. It has a loading speed of 24 seconds per 16K program.

Files cannot be overwritten and must be *Killed* to get rid of them. Thus copying a file must be done by giving it a new name.

Newd prepares a new disc for use by checking it and installing the directory track. *Stat* will either give the number of free sectors on the disc or the length of the file named in F$. *Dload* and *Dsave* will load or save programs to disc and will allow programs to auto-run as well.

The documentation is good, but I would have liked to see a list of commands on one page as quick reference guide. Also, using a one dimensioned string array ie *Dim*R$(1,128) instead of *Dim*R$(128) would mean that the string could be *Input* and thus save on memory.

It is a pity that larger Ram packs cannot be used as a full 48K of Basic memory would make better use of the disc. At the moment all 48K Ram packs also overlay the 8K—16K space with Ram which stops the operation of the disc's Rom.

Conclusion

This system will only work on the ZX80 and ZX81. It's greatest challenger will be Sinclair's microdrive. When you compare the cost, it is cheaper to buy a 48K Spectrum and a Microdrive. But ZX81 users may not want to rewrite software. **SA**

Thermal printer

Computer Keyboards, Glendale Park, Fernbank Road, Ascot, Berkshire.
Price: £110.97 inc VAT and postage.

This is a thermal printer for the ZX81 and ZX80 with 8K Rom. It provides three commands similar to *Lprint*,*Llist* and *copy* via *Usr* routines located in a 2K Rom contained in the CAI/O black box.

There is a port located in the 14K-16K area of the box's memory map and the three Eprom sockets are mapped into the 8K-14K space. There are also a number of empty sockets on the board, which allow you to upgrade to a RS232 two way modem interface.

The CAI printer is considerably larger than the Sinclair printer (10½ × 7½ × 4 ins) and comes in a white box with three controls, plus a flip up cover for the paper roll. The controls are *Power on*, *Paper advance* and a lever to lift up the printing heads for inserting paper. The paper roll is twice the length of the Sinclair paper and half the price (£1.30 a roll).

All the commands for the printer are in the form of *Let I=Usr(xxx)* and the only variable used in *p$*, which contains the string to be *Lprinted*. The printer will stop with a error code if it is not in *Fast* mode (which has to be set by the user), if p$ has not been set or the printer is faulty.

Conclusion

This alternative to the Sinclair printer is four times cheaper on paper and is cheaper than spending £200-£300 on a paper printer. It is expensive, but don't forget you also get a 16 line port and the option to add an RS232 interface as well. The cost of the extra components I understand will be about £40. The *fast* mode must be specified by the user which is annoying. **SA**

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.

Super Expander

on Vic-20

I am sure there are a large number of Vic20 owners who have the Super Expander cartridge. I have not yet seen your magazine publish any programs which make use of it.

Here are four short programs, each of which should be run with the cartridge plugged in.

String & nails

This program shows how curves can be created by using straight lines. The program repeats in seven different colours, and then restarts. The listing is straightforward.

Line 5 Begins the loop to change the colours, clears the screen (scnclr), and sets the colour.
Lines 10-40 Draw the outer pattern.
Lines 50-80 Draw the inner pattern with a short delay at the end of line 80.

Circle cones

This program draws two cones over each other to show how multiple circles can draw straight lines. The program repeats in seven different colours.

Line 15 Is the loop for the seven colours and sets the colour.
Lines 20-40 Draw the first cone.
Lines 50-70 Draw the second cone.
Line 70 Also clears the screen for the next colour.

Tunnel vision

This program gives the effect of looking down a tunnel with an object coming towards you and then going away. The program repeats in seven different colours.

Line 10 Is the loop for the seven colours and changes graphic modes for effect.
Lines 30-35 Is the object going away from you.
Lines 40-50 Is the object coming towards you.

Wine glass

This program draws a wine glass and then 'paints' the background and fills the glass with colour. Note that graphics mode 1 must be used to use the colours here:

Line10 Sets a white border, white background, blue characters and light yellow for the auxiliary colour.
Lines 20-30 Draw the top of the glass.
Lines 40-50 Draw the stem of the glass.
Lines 60-70 Draw the base of the glass.
Line 80 Fills the glass. Then paints the background in the auxiliary colour. The colour is then changed to yellow border and green characters.
Line 90 There are 20 half density blocks here. The *Char* command is the same as the *Print at* statement as on the ZX81.

```
2 REM STRING AND NAILS USING THE SUPER EXPANDER CARTRIDGE BY A.HORRELL
5 GRAPHIC2:FORA=1TO7:SCNCLR:COLOR0,0,A,0
10 FORY=0TO1023STEP40:DRAW2,0,YTO1023-Y,0:NEXT
20 FORY=0TO1023STEP40:DRAW2,Y,1023TO0,Y:NEXT
30 FORY=0TO1023STEP40:DRAW2,Y,1023TO1023,1023-Y:NEXT
40 FORY=0TO1023STEP40:DRAW2,1023,1023-YTO1023-Y,0:NEXT:FORU=1TO500:NEXT
50 FORY=0TO512STEP40:DRAW2,512,YTO512+Y,512:NEXT
60 FORY=0TO512STEP40:DRAW2,Y,512TO512,512-Y:NEXT
70 FORY=0TO512STEP40:DRAW2,Y,512TO512,Y+512:NEXT
80 FORY=0TO512STEP40:DRAW2,512,1023-YTO512+Y,512:NEXT:FORU=1TO999:NEXT:NEXT:RUN

READY.
```

```
5 REM CIRCLE CONES USING SUPER EXPANDER CARTRIDGE BY A.HORRELL
10 GRAPHIC2
15 FORC=1TO7:COLOR0,0,C,0
20 A=320:FORU=280TO812STEP20
30 CIRCLE2,U,512,A*.7,A
40 A=A-12:NEXT
50 A=320:FORU=280TO812STEP20
60 CIRCLE2,1023-U,512,A*.7,A
70 A=A-12:NEXT:FORP=1TO1000:NEXT:SCNCLR:NEXT

READY.
```

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Open Forum

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```
5 REM TUNEL VISION USING THE SUPER EXPANDER CARTRIDGE BY A.HORRELL
10 FORC=1TO7:COLOR0,0,C,0:GRAPHIC2:GOSUB30:GRAPHIC1:GOSUB30:NEXT:RUN
30 FORX=0TO512STEP15:DRAW2,X,XTO1023-X,XTO1023-X,1023-XTOX,1023-XTOX,X:NEXT
35 FORU=1TO850:NEXT
40 FORX=513TO1023STEP15:DRAW0,X,XTO1023-X,XTO1023-X,1023-XTOX,1023-XTOX,X:NEXT
50 RETURN

READY.

5 REM WINE GLASS USING THE SUPER EXPANDER CARTRIDGE BY A.HORRELL
10 GRAPHIC1:COLOR1,1,6,15
20 CIRCLE2,512,184,210,64
30 CIRCLE2,512,184,210,292,0,50
40 DRAW2,472,460TO472,768
50 DRAW2,552,460TO552,768
60 CIRCLE2,512,768,175,55,80,71
70 CIRCLE2,512,325,210,50,5,40
80 PAINT1,512,385:PAINT3,0,0:COLOR1,7,5,15
90 FORT=16TO19:CHART,0,"▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒":NEXT
100 END

READY.
```

Super Expander
by Andy Horrell

Meteor run

on Unexpanded Vic-20

The idea of the game is to steer your spaceship through an on-coming meteor storm. You have the option of moving left and right to avoid the meteors, but even so, you have to be very quick to remain alive for any considerable length of time.

With play, the game becomes addictive, as you are always trying to better your previous score.

Program notes:

Lines
- 10-70 Check to see if user requires instructions
- 80-130 Set up special character generator
- 140-180 Activate new character set and commence game
- 190-210 Plot position of spaceship and stars
- 220-240 Check for movement and crash
- 250-260 Increase score
- 270-310 Perform left and right movement
- 320-410 High score and end of program routine
- 420-520 Sound and colour for crash
- 530-610 Instructions

```
10 PRINT"□■  *** METEOR RUN ***"
20 PRINT"■   BY NIGEL AYLING"
30 PRINT"■■  INSTRUCTIONS (Y/N)?"
40 GET X$:IF X$<>"Y" AND X$<>"N" THEN 40
50 IF X$="N" THEN 80
60 GOSUB 530
70 GOTO 90
80 PRINT"■■     PLEASE WAIT"
90 POKE 52,28:POKE 56,28:CLR
100 FOR I=7168 TO 7679:POKE I,PEEK(I+25600):NEXT
110 FOR I=7168 TO 7175:READ Z:POKE I,Z:NEXT
120 FOR I=7432 TO 7439:READ Z:POKE I,Z:NEXT
130 DATA 102,60,126,255,126,60,24,24,24,60,254,254,255,255,119,102
140 POKE 650,128
150 PRINT"■ PRESS A KEY TO START"
160 GET X$:IF X$="" THEN 160
170 PO=7691:S=1:PRINT"■■■■■■■■■■■■":POKE 36879,8
180 POKE 36869,255
190 POKE PO,0
200 R=INT(RND(1)*22)
210 PRINT TAB(R)"!"
220 IF PEEK(PO)=33 THEN GOSUB 420:GOTO 320
230 GET A$:IF A$="" THEN 250
240 GOSUB 270
250 S=S+1
260 GOTO 180
270 IF A$="A" AND PO=7680 THEN 180
280 IF A$="A" THEN POKE PO,32:PO=PO-1:POKE PO,0
290 IF A$="L" AND PO=7701 THEN 180
300 IF A$="L" THEN POKE PO,32:PO=PO+1:POKE PO,0
310 RETURN
320 FOR X=1 TO 1000:NEXT:POKE 36869,240:POKE 36879,27:PRINT"□"
330 PRINT"■   YOU CRASHED!■"
340 IF S>H THEN H=S:GOTO 360
350 PRINT"YOU SCORED";S:PRINT:GOTO 370
360 INPUT"YOUR NAME PLEASE ";N$
370 PRINT"■HIGH SCORE IS HELD BY ■ ■";N$;"■ AT";H
380 PRINT"■■■  ■WANT ANOTHER GO ?■"
390 GET X$:IF X$<>"Y" AND X$<>"N" THEN 390
400 IF X$<>"Y" THEN 620
410 GOTO 150
420 POKE 36878,15
430 FOR I=15 TO 0 STEP-1
440 J=J+1:IF INT(J/2)=(J/2) THEN T=41:GOTO 460
450 T=26
460 POKE 36877,200
470 POKE 36879,T
480 FOR X=1 TO 100:NEXT X
490 POKE 36878,I
500 NEXT I
510 POKE 36877,0:POKE 36878,0
520 RETURN
530 PRINT"□■    INSTRUCTIONS ■"
540 PRINT"■THE OBJECT OF THE GAME"
550 PRINT"IS TO GUIDE YOUR WAY■"
560 PRINT"THROUGH A METEOR STORM"
570 PRINT".SCORE IS GIVEN DEPEND"
580 PRINT"-ING ON HOW LONG YOU  ■LAST."
590 PRINT"■■      ■■CONTROLS■"
600 PRINT"   ■A-LEFT : L-RIGHT"
610 RETURN
620 PRINT"□":END
```

Meteor Run
by Nigel Ayling

Tennis

on ZX81

There is a distinct lack of two player games for the ZX81 and even less that have moving graphics involved. This is probably due to the relative slowness of the ZX81.

This 4K program is written almost entirely in MACHINE CODE and is for one or two players. The game is almost identical to the tennis games found on many video games. The screen shows the two bats, the tennis court and, of course, the ball. The one-player version of the game is squash practice.

To play the game is very simple. Any key from 1 to 5 will move the left bat up, and any from z to v will move it down. Any key from 6 to 0 will move the right bat up and any from b to . will move it down.

The ball will bounce off the top and bottom walls as well as the bats. A point is scored when the ball goes out as in tennis. The winner is the first to get to 15 points.

As the program is nearly all in machine code I will not attempt to explain the workings of it. The small basic section of the program handles the scoring and *Pokes* the random height from which the ball will appear. When the game is finished the computer will print 'GAME OVER' and stop.

There will be no report code as this would obscure the scores which are shown on line 24. Pressing a key will give the normal response. The *Break* key only operates when the ball is off the screen.

The two tables below show how to vary the game as you like. To load the program, type in a line 1 REM of 336 x's and the machine code loading program given and enter the code. Then edit out lines 200 onwards and add the small section of the Basic program. Type *Run* to start it.

Changes that can be made:
POKE:
16839 , (1-100) for overall speed — initially 10
16740 , (2-15) for left bat position — initially 7
16791 , (17-31) for right bat position — initially 26
16764 , (1-5) for left bat size — initially 3
16815 , (1-5) for right bat size — initially 3

turn to page 16



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Open Forum

from page 13

For Squash practice game
16771 , 0 normally 133
16529 , 133 normally 14
16537 , 0 normally 24

```
16514  2A  0C  40  23  05
16519  41  00  00  23  10
16524  FB  23  0E  14  35
16529  0E  23  05  0E  25
16534  10  FD  36  15  05
16539  10  23  10  FD  35
16544  0E  23  20  0D  20
16549  EA  06  20  35  05
16554  23  10  FB  2A  0C
16559  40  06  E9  23  10
16564  FD  E5  E1  54  5D
16569  3A  3C  40  FE  01
16574  28  07  05  21  13
16579  10  FD  16  05  05
16584  21  1B  10  FD  3A
16589  3D  40  FE  01  28
16594  02  13  1B  1A  1A
16599  FE  0E  20  05  3A
16604  40  40  77  C9  FE
16609  83  20  07  3E  00
16614  32  3C  40  18  CC
16619  FE  05  20  07  3E
16624  01  32  3D  40  18
16629  C1  FE  03  20  07
16634  3E  01  32  3C  40
16639  18  B6  FE  85  20
16644  07  3E  00  32  3D
16649  40  18  AD  3A  40
16654  40  77  1A  32  40
16659  40  3E  50  12  52
16664  69  E5  3A  25  40
16669  CB  5F  20  0D  3A
16674  3E  40  FE  01  28
16679  04  3D  32  3E  40
16684  18  0F  CB  47  20
16689  0B  3A  3E  40  FE
16694  12  28  04  3C  32
16699  3E  40  3A  25  40
16704  CB  57  20  0D  3A
```

```
16709  3F  40  FE  01  28
16714  04  3D  32  3F  40
16719  18  0F  CB  7F  20
16724  0B  3A  3F  40  FE
16729  13  28  04  3C  32
16734  3F  40  2A  0C  40
16739  06  07  23  10  FD
16744  3A  3E  40  4F  05
16749  21  23  10  FD  0D
16754  20  F8  7E  FE  83
16759  28  02  36  00  0E
16764  03  06  21  23  10
16769  FD  36  85  0D  20
16774  F6  06  21  23  10
16779  7E  FE  03  28  02
16784  02  36  00  2A  0C
16789  40  06  1A  23  10
16794  FD  36  3F  40  4F
16799  05  21  23  10  FD
16804  0D  20  F6  7E  FE
16809  83  28  02  36  00
16814  0E  05  06  21  23
16819  10  FD  36  05  0D
16824  20  F6  06  21  23
16829  10  FD  7E  FE  03
16834  28  02  36  00  0E
16839  0A  06  C6  10  FE
16844  0D  20  F8  C9  B6
16849  40
```

```
  1 REM  ( 336 X"S FOR CODE )
200 LET A$="
210 FOR A=16514 TO 16849
220 IF A$="" THEN INPUT A$
230 POKE A,15*CODE A$+CODE A$(2
) -476
240 SCROLL
250 PRINT A,A$( TO 2)
260 LET A$=A$(3 TO )
270 NEXT A
```

PROGRAM OF THE WEEK

```
  4 RAND
  5 POKE 16445,10
  6 POKE 16447,10
  7 POKE 16448,0
  8 POKE 16418,0
  9 PRINT AT 23,3;"0";TAB 28;"0
"
 10 LET S1=0
 11 POKE 16418,2
 12 POKE 16561,175
 13 POKE 16594,21-PEEK 16764
 14 POKE 16729,21-PEEK 16815
 15 IF PEEK 16529=14 THEN PRINT
 AT 0,4;"PLAYER 1";TAB 20;"PLAYE
R 2"
 16 PRINT AT 1,0;"
                "
 20 LET S2=0
 21 LET A=USR 16514
 22 GOTO 80
 25 POKE 16448,0
 30 POKE 16418,0
 40 PRINT AT 23,3;S1;TAB 28,S2
 50 POKE 16418,1
 60 IF S1>=15 OR S2>=15 THEN PR
INT AT 11,11;"GAME OVER";:HALT
 70 LET A=USR 16557
 80 IF PEEK 16445=1 THEN GOTO 1
40
 90 LET S1=S1+1
 100 POKE 16561,INT (RND*5+2)*33
+INT (RND*6+(PEEK 16791-9))
 110 POKE 16445,1
 120 GOTO 25
 140 LET S2=S2+1
 150 POKE 16561,INT (RND*5+2)*33
+INT (RND*6+PEEK 16740+1)
 160 POKE 16445,0
 170 GOTO 25
```

Tennis
by Brian Cadge

Aeroplane

on Spectrum

An aeroplane from which you drop bombs to destroy an alien city, flies across the screen. If you manage to destroy the city you can go on to the next city and continue to build up your score.

You can run out of fuel (level displayed at the top of the screen), you can run out of bombs or you can crash.

To make the game harder you can reduce the number of bombs (v) in Line 5, or you can make the fuel run out faster in Line 605 (eg Let f=f−0.5). You can only have one bomb dropping at a time. To load the program LOAD "Aeroplane".

The variables of the program are as follows:

s = Score
v = Number of bombs remaining
f = Fuel
a,b = Co-ordinates of buildings
x,y = Co-ordinates of plane
p,q = Co-ordinates of bomb
d = Number of building blocks in the city

Line 10 Asks if you want instructions. Instructions are from Line 8999 to 9160.
Lines 70 to 95 set up user graphics
graphic a — exploding building
q — bomb
p — building
Lines 97 to 130 print a random city — obtained by graphic p
Line 125 counts the number of buildings
Line 140 prints the fuel gauge
Lines 200 to 470 set up user graphics
graphic o — tail of plane
i — body of plane
l — nose of plane
Line 600 prints plane
To do this use "space, graphic o, graphic i, graphic l".
Line 601 finds out if the space in front of the plane is a building (ATTR = 50). If it is then GOTO 710 (plane explodes and program re-starts)
Line 605 reduces the fuel, f if the plane flies across y co-ordinate 5.
Line 606 prints a space on the fuel gauge at f decreases
Line 607 When fuel runs out (f=5) the plane crashes. (Line 8000)
Line 610 moves plane up when Key"7" is pressed
Line 620 moves plane down when Key"6" is pressed
Line 645 prints Score
Line 647 prints Bombs left
Line 648 prints High Score
Line 650 drops a bomb when key"0" is pressed and finds out if no bombs are left (ie GOTO 900)
Line 655 finds if a bomb has been dropped. If it has not (ie p=0 q=0) then it jumps the bomb dropping.
Line 660 drops the bomb
Line 667 finds if bomb has hit building (ATTR=50), prints exploding building, resets p and q to 0 and adds 10 to the score. The explosion is obtained by a graphic a.
Line 670 prints the bomb — obtained by a graphic q
Line 690 finds if the buildings have been destroyed. If they have (ie d=S/10) then GOTO 800
Line 710 prints exploding plane, obtained by "graphic a, graphic a, graphic a, graphic a"
Line 730 Game restarts
Line 800 gives instructions at the end of a city
Line 805 introduces a variable, j for a series of beeps
Line 820 Game restarts
Line 900 gives instructions after running out of bombs
Line 8000 prints plane crashing after running out of fuel. Plane is obtained by "space, graphic o, graphic i, graphic l"
Line 8002 prints plane crashing if it hits the ground. Explosion is obtained by "graphic a, graphic a, graphic a, graphic a"
Line 8030 finds if falling plane crashes into building (ATTR=50)
Lines 8990 to 9160 print instructions.

```
  1 BORDER 1
  2 LET h=0
  3 LET s=0
  4 PAPER 1

  5 LET s=0: LET v=400

  6 INK 6
  7 LET f=31
  8 LET d=S/10
  9 CLS : IF s>0 THEN GO TO 13
 10 PRINT AT 10,1;"Do you want
instructions? (y/n)"
 11 INPUT y$
 12 IF y$="y" THEN GO SUB 8999
 13 CLS
 70 POKE USR "a",BIN 10010001
 71 POKE USR "a"+1,BIN 01001010
 72 POKE USR "a"+2,BIN 00100100
 73 POKE USR "a"+3,BIN 01011001
 74 POKE USR "a"+4,BIN 10011010
 75 POKE USR "a"+5,BIN 00100101
 76 POKE USR "a"+6,BIN 01010010
 77 POKE USR "a"+7,BIN 10001001
 80 POKE USR "q",BIN 0
 81 POKE USR "q"+1,BIN 00000000
 82 POKE USR "q"+2,BIN 10011110
 83 POKE USR "q"+3,BIN 11111111
 84 POKE USR "q"+4,BIN 11111111
 85 POKE USR "q"+5,BIN 10011110
 86 POKE USR "q"+6,BIN 00000000
 87 POKE USR "q"+7,BIN 0
 88 POKE USR "p",BIN 11111111
 89 POKE USR "p"+1,BIN 11111111
 90 POKE USR "p"+2,BIN 11000011
 91 POKE USR "p"+3,BIN 11000011
 92 POKE USR "p"+4,BIN 11000011
 93 POKE USR "p"+5,BIN 11000011
 94 POKE USR "p"+6,BIN 11111111
 95 POKE USR "p"+7,BIN 11111111
```

```
 97 IF a=30 THEN GO TO 135

 98 LET a=a+1

 99 FOR b=21 TO INT (8+RND*11)
STEP -1

100 PRINT ; INK 2; PAPER 6;AT b
,a;"p"
120 NEXT b
125 LET d=d+(21-b)
130 GO TO 97
140 PRINT INK 3;AT 0,0;"FUEL:
200 POKE USR "o",BIN 0
210 POKE USR "o"+1,BIN 00110000
220 POKE USR "o"+2,BIN 01111000
230 POKE USR "o"+3,BIN 01111100
240 POKE USR "o"+4,BIN 01111110
250 POKE USR "o"+5,BIN 01111111
260 POKE USR "o"+6,BIN 01111111
270 POKE USR "o"+7,BIN 0
300 POKE USR "i",BIN 0
310 POKE USR "i"+1,BIN 0
320 POKE USR "i"+2,BIN 0
330 POKE USR "i"+3,BIN 00011111
340 POKE USR "i"+4,BIN 11111111
350 POKE USR "i"+5,BIN 11111111
360 POKE USR "i"+6,BIN 11111111
370 POKE USR "i"+7,BIN 0
400 POKE USR "l",BIN 0
410 POKE USR "l"+1,BIN 0
420 POKE USR "l"+2,BIN 0
430 POKE USR "l"+3,BIN 11111000
440 POKE USR "l"+4,BIN 11000000
450 POKE USR "l"+5,BIN 11111110
460 POKE USR "l"+6,BIN 11111110
470 POKE USR "l"+7,BIN 0
590 LET x=5: LET y=0: LET p=0:
LET q=0
```

to next page

from previous page

```
600 PRINT INK 5;AT x,y;" ▙▄▟ ";
BEEP .009,-10
601 IF ATTR (x,y+4)=50 THEN GO
TO 710
605 IF y=5 THEN LET f=f-.3
606 PRINT AT 0,f;" "
607 IF f<=5 THEN GO TO 8000
610 IF INKEY$="7" THEN PRINT AT
x,y;" "; LET x=x-1: IF x<=1
THEN LET x=1
620 IF INKEY$="6" THEN PRINT AT
x,y;" "; LET x=x+1
621 IF x>=21 THEN LET x=21
630 LET y=y+1
635 PRINT INK 3;AT 0,0;"F"
640 IF y=29 THEN PRINT AT x,y;"
 "; LET y=0
645 PRINT AT 1,20;"Score ";s
646 LET s=s
647 PRINT AT 1,5;"Bombs left
";AT 1,16;v
648 PRINT AT 2,10;"High Score "
;h
650 IF INKEY$="0" THEN LET p=x:
LET q=y: LET v=v-1: IF v=0 THEN
 GO TO 900
655 IF p=0 AND q=0 THEN GO TO 7
00
660 LET p=p+1: LET q=q+1: IF p>
=22 THEN GO TO 700
665 IF q>=32 THEN LET q=0
667 IF ATTR (p,q)=50 THEN PRINT
FLASH 1; INK 6; PAPER 2;AT p,q;
"*": BEEP .009,50: FLASH 0: PRIN
T AT p-1,q-1;" ": LET p=0: LET q
=0: LET s=s+10: IF h<s THEN LET
h=s: GO TO 671
670 PRINT INK 4;AT p,q;"▀";AT p
-1,q-1;" ": BEEP .009,p*2
675 IF q=31 THEN PRINT AT p,q;"
";: GO TO 681
676 IF p=21 THEN PRINT AT p,q;"
": GO TO 681
680 IF d=s/10 THEN GO TO 800
700 GO TO 600
710 PRINT PAPER 5; FLASH 1;AT x
,y;"▚▞▚▞"
720 BEEP 2,-25*RND
725 PAUSE 400
730 GO TO 3
800 PRINT FLASH 1;AT 10,0;"You
have done so well that you ": P
RINT FLASH 1;"can now go on to t
he next city "
805 FOR j=50 TO -50 STEP -1: BE
EP .1,j: NEXT j
810 PAUSE 400
820 GO TO 4
900 PRINT AT 10,0; FLASH 1;"Har
d luck you ran out of bombs ":
PRINT "Do you want another go? (
y/n)"
910 INPUT y$
920 IF y$="y" THEN GO TO 3
8000 PRINT INK 5;AT x,y;"  ";A
T x+1,y;" ▙▄▟ "
8001 IF y+4=30 THEN LET y=0
8002 IF x=20 THEN PRINT PAPER 6;
 INK 5;AT x+1,y+1;"▚▞▚▞": GO TO
710
8003 PRINT FLASH 1;AT 0,0;"
     Out of fuel "
8010 LET x=x+1: LET y=y+1
8020 BEEP .1,3*x: BEEP .1,3*x+1:
 BEEP .1,3*x+2: BEEP .1,3*x+3: B
EEP .1,3*x+4
8030 IF ATTR (x-1,y+4)=50 THEN G
O TO 710
8050 GO TO 8000
8999 CLS
9000 PRINT AT 21,0;"The aim is t
o destroy the alien "
9010 PRINT "city before running
out of fuel "
9015 PRINT "
"
9020 PRINT "To do this drop bomb
s using ""0""
"
9021 BEEP 2,RND*50
9030 PRINT "
"
9040 PRINT "Move the plane up us
ing ""7""
"
9041 BEEP 2,RND*50
9050 PRINT "
"
9060 PRINT "Move the plane down
using ""6""
"
9061 BEEP 2,RND*50
9070 PRINT "
"
9080 PRINT "    If a bomb is dro
pped when
"
9081 BEEP 2,RND*50
9100 PRINT "another is still fal
ling then
"
9101 BEEP 2,RND*50
9120 PRINT "that bomb will stop
"
9121 BEEP 2,RND*50
9130 PRINT "
"
9140 PRINT "      Press any key
for game "
9141 BEEP 2,RND*50
9150 PAUSE 500
9160 RETURN
```

Aeroplane
by Paul Haigh

Bomb Alley

on Spectrum

The objective of the game is to demolish a city of skyscrapers using an aircraft equipped with bombs and short-range missiles.

The aircraft with its 100 bombs and 200 missiles flies from *Print Position* 0,0 to *Print Position* 21,31.

A bomb will demolish the top four storeys of a building directly below, and a missile the top storey of a building at the same height. Flying the aircraft into a building will end the game. The first two skyscrapers must be destroyed by bombs to complete the game. Flying next to them will explode the aircraft.

Points are scored as the plane moves towards 21,31 and for each storey demolished by a bomb. At the end of each game a score is given with the highest score attained so far.

Program notes:

Line 1000 User defined graphics for aircraft.
Line 1500 Instructions.
Line 2000 Flight of aircraft and weapon controls.
Line 3000 Fire missile.
Line 4000 Drop bomb.
Line 8000 End of game and scores.
Line 9000 Draw random city of 32 skyscrapers.

DELETE Lines 2070 and 2090 to increase aircraft speed.
Change LINES 2020 and 8030 to alter scoring method.
INKEY$ '0' to fire missile.
INKEY$'1' to drop bomb.
All Q's are graphic.

```
100 REM @ @ BOMB ALLEY @ @
110 REM
120 REM @ K.C.RYLETT
130 REM Manchester
140 REM 12/8/82
150 REM
1000 REM Plane 2/8/82
1010 POKE USR "0",BIN 11111000
1020 POKE USR "0"+1,BIN 00110000
1030 POKE USR "0"+2,BIN 00011100
1040 POKE USR "0"+3,BIN 01111111
1050 POKE USR "0"+4,BIN 01111111
1060 POKE USR "0"+5,BIN 00011100
1070 POKE USR "0"+6,BIN 00110000
1080 POKE USR "0"+7,BIN 11111000
1090 RANDOMIZE
1100 LET hi$hi$=0
1500 REM Instructions & Setup
1510 DIM H$(32,22): DIM H(32)
1520 BORDER 6: PAPER 6: INK 0: C
LS
1530 PRINT AT 0,10;"BOMB ALLEY"
1540 INPUT FLASH 1;"DO YOU WAN
T INSTRUCTIONS ";B$
1550 IF B$(1)="n" OR B$(1)="N" T
HEN GO TO 1990
1560 CLS
1570 PRINT "Your task is to dest
roy a city and also make a safe
 landing.": PRINT
1580 PRINT "To achieve this you
have"
1590 PRINT "100 bombs & 200 miss
iles."
1600 PRINT "Use '1' to drop a bo
mb"
1610 PRINT "and '0' to fire miss
ile"
1620 PRINT ""; INK 2;"BEWARE !!!
"
1630 PRINT "; INK 2;"BOMBS & MIS
SILES ONLY GO SO WIDE"
1640 PRINT "; INK 2;"WATCH YOUR
 FUEL"
1650 PRINT "; FLASH 1;"GOOD LUC
K": PRINT "Any key to start"
1660 IF INKEY$="" THEN GO TO 166
0
1990 BORDER 1: PAPER 0: INK 7: C
LS
2000 REM FLIGHT
2010 GO SUB 3000
2030 SET r 3000
2030 LET bombs=100: LET missiles
=200
2040 FOR y=0 TO 21
2050 FOR x=0 TO 31
2060 IF ATTR (y,x)=7 THEN GO TO
8000
2070 PAUSE 1
2080 IF ATTR (y,(x OR x-1))=7 TH
EN GO TO 8000
2090 PRINT AT y,x-1; INK 1;"▀"
2100 PAUSE 1
2110 PRINT AT y,x; PAPER 1; INK
7;"▀"
2120 IF INKEY$="0" THEN GO SUB 3
000
2130 IF INKEY$="1" THEN GO SUB 4
000
2140 NEXT x
2150 PRINT AT y,31; INK 1;"▀"
2160 NEXT y
2170 CLS
2180 PRINT AT 10,3;"WELL DONE !
YOU MADE IT"
2190 PRINT AT 21,31; INK 7;"▀"
2200 GO TO 8030
3000 REM Fire missile
3010 IF missiles=0 THEN RETURN
3020 FOR n=x+2 TO x+3
3030 LET missiles=missiles-1
3040 IF n>31 THEN GO TO 3110
3050 PRINT AT y,n; BRIGHT 1; INK
 4; PAPER 1;"▄"
3060 PRINT AT y,n-1; INK 1;"▀"
3070 NEXT n
3080 PRINT AT y,n-1; INK 1;"▀"
3090 RETURN
3110 PRINT AT y,31; INK 1;"▀"
3120 RETURN
4000 REM Drop bomb
4010 IF bombs=0 THEN RETURN
4020 LET bombs=bombs-1
4030 LET z=1
4040 FOR n=y+2 TO 21
4050 IF z=5 THEN GO TO 4110
4060 IF ATTR (n,x)=7 THEN LET z=
z+1
4070 LET r=r+1
4080 PRINT AT n,x; PAPER 1; INK
2;"▄"
4090 PRINT AT n-1,x; PAPER 1;" "
4100 NEXT n
4110 PRINT AT n-1,x; PAPER 1;" "
4120 PRINT AT y,x; INK 1;"▀"
4130 LET x=x+1
4140 RETURN
8000 REM Scores
8010 PRINT AT y,x; INK 6; FLASH
1; PAPER 2;"*"
8020 PRINT AT y,x-1; INK 1;"▀"
8030 LET score=((y-4)*32+x)+r-bo
mbs-missiles
8040 IF score<0 THEN LET score=0
8050 PRINT AT 0,0; INK 6;"YOUR S
CORE ";score
8060 IF score>highest THEN LET h
ighest=score
8070 PRINT AT 0,20; INK 6;"HIGHE
ST ";highest
8080 INPUT ; FLASH 1;"Another tr
y";B$
8090 IF B$(1)="n" OR B$(1)="N" T
HEN STOP
8100 CLS : GO TO 2000
9000 REM Data
9010 LET H(1)=INT (RND*15)+4
9020 FOR n=2 TO 32
9030 LET H(n)=INT (RND*15)+2
9040 IF H(n)>H(n-1) THEN GO TO 9
030
9050 NEXT n
9060 FOR b=0 TO 31
9070 FOR h=H(b+1) TO 0 STEP -1
9080 PRINT AT h,b; INK 1;"▀"
9090 NEXT h: NEXT b
9100 RETURN
```

Bomb Alley
by Ken Rylett

```
1 REM  (C) 1982
2 REM N.ECKERSLEY
3 GOSUB15000
4 PRINT"■":SC=0
5 FU=100
6 POKE36879,39
7 SH=7886:I=7855:J1=7723:J2=8164
10 IFPEEK(4096)=32THENSH=4302:I=4271:J1=4139:J2=4580
1998 PRINT"■SCORE ";SC;" FUEL ■";FU;"■ "
2000 PRINT"■■";
2001 FORJ=0TO20
2002 PRINTTAB(1)CHR$(20)
2003 NEXT
2005 FU=FU-1:DI=DI+1
2006 IFFU<0THENGOTO2101
2007 PRINT"■ OUT OF FUEL":PRINT"■■■BUT YOU MANAGED TO"
2008 PRINT"■DESTROY "SC"POINTS"
2009 PRINT"■WORTH OF THE ENEMY"
2010 PRINT"■AND YOU DELVED "INT(DI/10)
2011 PRINT"■MILES INTO THE PLANET"
2012 PRINT"■■■PRESS 'P'TO PLAY AGAIN"
2013 GETA$:IFA$<>"P"THEN2013
2014 GOTO2
2101 J=INT(RND(1)*4)
2110 Q=INT(RND(1)*4)+4
2111 VB=INT(RND(1)*15)+1
2112 NM=32
2113 IFVBC8THENNM=30
2114 IFVB<4THENNM=65
2115 IFVB<2THENNM=88
3001 FORRT=J1TOI+(J*22)STEP22:POKERT,160:NEXT
3002 FORRT=I+(J*22)TOI+(J*22)+(Q*22)STEP22:POKERT,32:NEXT
3004 FORRT=I+(J*22)+(Q*22)TOJ2STEP22
3008 POKERT,160:NEXT:IFPEEK(SH+2)<>32THEN10000
3140 POKESH,127:POKESH+1,121:POKESH+2,111:POKESH-1,32
3142 POKEI+(J*22)+(Q*22)-22,NM:IFP0=99.99THENRETURN
3143 IFZ=48THENPOKESH+22,32:POKESH+23,32:POKESH+21,32
3144 IFZ=17THENPOKESH-23,32:POKESH-22,32:POKESH-21,32
3146 IFHI=99.99THEN10000
3150 Z=PEEK(203)
3151 IFZ=32THEN5000
3160 IFZ=64THEN1998
3170 IFZ=48THENGOSUB9500:SH=SH-22
3190 IFZ=17THENGOSUB9600:SH=SH+22
3201 IFZ=32THEN5000
3210 GOTO1998
5000 FORSL=SH+3TOSH+13
5001 IFPEEK(SL)=32THEN5003
5002 GOTO8002
5003 POKESL,46:FORIU=1TO20:NEXT
5011 POKESL,32
5012 NEXT:P0=0:GOTO1998
8002 IFPEEK(SL)=30THENSC=SC+10
8003 IFPEEK(SL)=65THENSC=SC+20:FU=FU+30
8004 IFPEEK(SL)=88THENJK=(INT(RND(1)*5)+1)*10:SC=SC+JK
8005 IFPEEK(SL)=160THENDG=1
9001 CM=81:GOSUB9002:CM=87:GOSUB9002:CM=46:GOSUB9002:CM=32:GOSUB9002:DG=0:GOTO1 998
9002 POKESL+DG,CM:POKE36878,15:FORAL=1TO5:POKE36877,250:NEXT:POKE36878,0:RETURN
9500 IFPEEK(SH-22)<>32THENHI=99.99
9501 IFPEEK(SH-20)<>32THENHI=99.99
9502 IFPEEK(SH-21)<>32THENHI=99.99
9504 RETURN
9600 IFPEEK(SH+22)<>32THENHI=99.99
9601 IFPEEK(SH+23)<>32THENHI=99.99
9602 IFPEEK(SH+24)<>32THENHI=99.99
9603 RETURN
9700 IFPEEK(SH+3)<>32THENHI=99.99
9701 RETURN
10000 CB=81:GOSUB11000:CB=87:GOSUB11000:CB=46:GOSUB11000:CB=32:GOSUB11000
10001 PRINT"■■■■■■■■YOU WERE DESTROYED    ■FOR A SCORE OF ■";SC
10002 PRINT"■■■PRESS 'S' FOR ANOTHER    ■GAME"
10003 GETA$:IFA$<>"S"THEN10003
10004 CLR:GOTO3
11000 POKESH,CB:POKESH+1,CB:POKESH-1,CB:POKESH+22,CB:POKESH+22,CB:POKESH-22,CB
11001 POKESH+23,CB:POKESH-23,CB:POKESH-21,CB:POKESH+21,CB
11002 POKE36878,15:FORJ=1TO10:POKE36877,220:NEXT:POKE36878,0:RETURN
12110 FORI=I+DTOB+DSTEP22:POKEI,160:NEXT
15000 PRINT"■YOU ARE THE CAPTAIN OFA SPACE SHIP,WHO HAS  BEEN GIVEN THE TASK"
15002 PRINT"OF DESTROYING A PLANET,BUT FIRST YOU MUST  DELVE DEEP INTO THE"
15003 PRINT"PLANET,BY THE MEANS OFA TUNNEL"
15004 PRINT"■CONTROLS OF THE SHIP":PRINT"■UP    - O"
15005 PRINT"■DOWN - A":PRINT"■FIRE - SPACE BAR"
15010 PRINT"■PRESS SPACE TO CONT."
15011 GETA$:IFA$<>" "THEN15011
15012 PRINT"■    SCORING
15013 PRINT"■■   ↑....10 PTS
15014 PRINT"■■   ♣....MYSTERY
15015 PRINT"■■   ♠....20 PTS
15016 PRINT"■  +30 UNITS OF FUEL
15017 PRINT"■■PRESS SPACE TO START"
15018 GETA$:IFA$<>" "THEN1501C
15019 RETURN
```

Scramble
by Neil Eckersley

Scramble

Vic20

This is a version of the popular arcade game. Your sector has been given the task of destroying the planet Lomillialor. The other ships have been destroyed by surface nuclear missiles. The mission is in your hands.

Your spies have managed to disable the tunnel's defensive system, so all you have to do is destroy as much as possible in the tunnel. The tunnel is made up of cliffs and valleys which makes some things impossible to destroy.

Although there is a safe path through the tunnel you must guide your ship, so that you can destroy the vital fuel dumps and so you can continue on your mission a little while longer.

At the top of the screen the running score and amount of fuel remaining is shown. The best score for the game so far is 820.

All keyboard directions are shown in the instructions. The program runs on the unexpanded Vic, but can be used without any modification with any amount of memory.

Program notes:

Lines

6-10	Set-up of variables according to amount of memory
1998-2006	Move screen by one space to the left
2007-2014	End of program
2101-3146	Create the landscape
3150-3210	Check which key is pressed
8002-9002	Explosion when hit occurs, and adjust score
9500-9701	Check if ship crashes
10001-10004	End of program
11000-12110	Explosion of ship
15000-15019	Instructions

```
10 REM  ************************
        **  Planet  By D.Elliot  **
        ************************
20 MODE 2
30 VDU 23,0,11,0;0;0;0;
40 PRINTTAB(1,2);:PROCstring("
   ****Planet****")
50 REM  Plot stars and redefine
   flashing colours.
60 FOR X%=8 TO 15
70   VDU 19,X%,7;0;
80   GCOL 0,X%
90   FOR Y%=0 TO 10
100    PLOT 69,RND(1279),RND(1023)
110  NEXT
120 NEXT
130 VDU 19,1,2;0;:GCOL 0,1
140 MOVE0,0:DRAW1279,0:DRAW1279,1023:
    DRAW0,1023:DRAW0,0
150 REM  Draw bottom half of planet
160 GCOL 0,1
170 PROCcircle(640,512,-200)
180 REM  Draw rings
190 FOR X%=600 TO 350 STEP -50
200   PROCring(640,512,X%)
210  NEXT
220 REM  Draw top half of planet
230 GCOL 0,1
240 PROCcircle(640,512,200)
250 REM  Animate drawing
260 PROCcycle
270 VDU23,0,11,8;0;0;0;
280 END
290
300   Draw one Half of the planet.
310
320 DEF PROCcircle(X%,Y%,R%)
330 LOCAL A%,B%,C%:C%=R%*R%
340 FOR A%=0 TO R% STEP SGNR%
350   B%=SQR(C%-A%*A%)
360   MOVEX%-B%,Y%+A%
370   DRAWX%+B%,Y%+A%
380   NEXT
390 ENDPROC
400
410   Draw rings.
420
430 DEF PROCring(X%,Y%,R%)
440 LOCAL A,B%,C%,D%
450 D%=8
460 FOR A=0 TO 2*PI STEP PI/24
470   B%=SIN(A)*R%+X%:C%=(B%-X%)
      DIV6+COS(A)*R% DIV3 +Y%
480   GCOL 0,D%:D%=D%+1:
      IFD%>15THEND%=8
490   IF A=0THEN MOVEB%,C%
      ELSE DRAW B%,C%
500   NEXT
510 ENDPROC
520
530   Cycle through colours setting
      one to black each time
540
550 DEF PROCcycle
560 LOCAL A%,B%,C%,T%
570 REPEAT
580   FOR A%=8 TO 15
```

to next page

Planet

on BBC Micro

This program produces an animated picture of Saturn by revolving the rings. The program starts by drawing stars followed by Saturn itself, then after the drawing is finished the program animates the rings.

The program works by redefining the flashing colours in mode 2. The program starts by drawing random stars (Lines 50 to 120) and setting the flashing colours to white.

Then the lower half of Saturn is drawn (Line 170) using *Proc*circle. The rings are then drawn using *Proc*ring, which draws a 48 sided ellipse containing all the flashing colours in sequence.

The top half of Saturn is drawn, which also erases the rings behind Saturn. The animation is then produced by *Proc*cycle which cycles through all the flashing colours setting one to black and the rest to white.

Since the rings are drawn using these colours in sequence, black bands will be seen to circle the planet.

from previous page

```
590      FOR B%=2 TO 15
600 IF B%=A% THEN VDU19,B%,0;0; ELSE
IF B%>7 THEN VDU 19,B%,7;0; ELSE
VDU 19,B%,(B%+C%)MOD6+2;0;0;
 610      NEXT
 620      T%=TIME:REPEAT UNTIL
    TIME>T%+25
 630      C%=C%+1
 640      NEXT
 650    UNTIL INKEY(0)<>-1
 660 ENDPROC
 670
 680    Print string in set of
    colours
 690
 700 DEF PROCstring(A$)
 710 LOCAL A%
 720 FOR A%=1 TO LEN(A$)
 730    COLOUR A% MOD 6 +2
 740    PRINTMID$(A$,A%,1);
 750    NEXT
 760 ENDPROC
 770
 780    Print Screen onto the printer
 790
 800 DEF PROCscreen
 810 CALL dump
 820 ENDPROC
 830
 840    Assemble routines
```

Planet
by David Elliot

Morse

on Spectrum

"Morse" is intended for practice. Phrases may be continuously repeated, giving the operator a chance to learn combinations of words or characters.

The morse symbols are printed alongside each letter and the whole message is reprinted.

Line 70 can be readily changed to suit the working speed, 0.5 being as slow as a beginner would require.

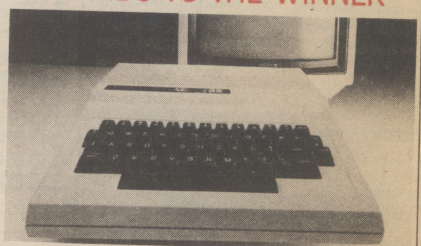
Line 320 ensures no stopping when the screen fills — ie it is an auto-scroll. Line 140 ensures that only capital Ascii codes are used.

```
  10 REM "morse"
  20 REM © RATLAW
  30 REM to change rate adjust v
alue d line 70
  40 LET U$="▬▬▬ ": REM graphic
1+ space
  50 LET D$=" ■ ": REM graphic 3
twice + space
  60 DIM a(43,5)
  70 LET d=0.1: REM Dot Value
  80 LET s=4*d: REM Dash Value
  90 FOR j=1 TO 43
 100 FOR k=1 TO 5
 110 READ a(j,k)
 120 NEXT k
 130 NEXT j
 140 POKE 23658,8
 150 LET f=32: REM Frequency
 160 CLS : PRINT : PRINT "******
******"
 170 PRINT "ONLY CAPITALS & nume
rals": PRINT "******************
******"
 180 INPUT "enter message",a$: C
LS
 190 LET l=LEN a$
 200 FOR j=1 TO l
 210 LET b$=a$(j): LET b=CODE b$
 220 IF b=32 THEN GO TO 410
 230 LET b=b-47
 240 FOR k=1 TO 5
 250 LET c=a(b,k)
 260 IF c=-1 THEN GO TO 310
 270 BEEP c/f
 280 IF c=d THEN PRINT d$;
 290 IF c=s THEN PRINT u$;
 300 NEXT k
 310 PRINT " ";b$
 320 POKE 23692, 255
 330 NEXT J
 340 PRINT A$,,,,,,,,
 350 PRINT
 360 PRINT "Another Message",,"i
ap any key, N to stop",,,"C TO R
EPEAT MESSAGE"
 370 IF INKEY$="" THEN GO TO 370
 380 IF INKEY$="n" OR INKEY$="N"
 THEN CLS : POKE 23658,0: STOP
 390 IF INKEY$="C" THEN CLS : GO
 TO 190
 400 GO TO 150
 410 PAUSE 20: GO TO 330
 420 REM Data section ##must rem
ain in this order##
 430 DATA s,s,s,s,-1,d,s,s,s,s
,-1,d,d,s,s,-1,d,d,s,s,-1,d,
d,d,s,-1: REM 0 to 4
 440 DATA d,d,d,d,d,-1,s,d,d,d,d
,-1,s,s,d,d,d,-1,s,s,s,d,-1: REM 5 to 9
 450 DATA s,0,0,0,0,0,d,0,0,0,0,
0,s,0,0,0,0,0,d,0,0,0,0,0,s,0,0,
0,0,0,d,0,0,0,0,0,s,0,0,0,0,0
 460 DATA d,s,-1,0,0,0,s,d,d,d,-
1,0,s,d,s,d,-1,0,s,d,d,-1,0,0,d,
-1,0,0,0,0: REM A to E
 470 DATA d,d,d,s,d,-1,0,s,s,d,-1,
0,0,d,d,d,d,-1,0,s,-1,0,0,0,0,s,
s,s,-1,0: REM F to J
 480 DATA s,d,s,-1,0,0,d,s,d,d,-
1,0,s,s,-1,0,0,0,s,d,-1,0,0,0,s,
s,s,-1,0,0: REM K to O
 490 DATA d,s,s,-1,0,0,s,s,d,s,-
1,0,d,s,d,-1,0,d,d,-1,0,s,
-1,0,0,0,0: REM P to T
 500 DATA d,d,s,-1,0,0,d,d,d,s,-
1,0,d,s,s,-1,0,s,d,d,s,-1,0,s,
s,s,-1,0,s,s,d,d,-1,0: REM U t
o Z
 510 REM end of data section
```

Morse
by Len Winsor

A GREAT NEW COMPETITION WORTH £THOUSANDS TO THE WINNER

Whizz-Kid '82



Fancy your chances?
We're looking for a bright young thing who can out-shine all the commercial software houses and come up with a sparkling new program that can be marketed commercially.
We want you to prove you can write a selling program and if you win the competition you'll be well on the way to making big money.
The winner will receive:

1. **A Dragon 32 computer.**
2. **Advice from *Popular Computing Weekly* on how to market and sell the winning software and how to form and finance the company to do so.**
3. **£2,000-worth of free advertising in *Popular Computing Weekly*.**

The winner will be the author who submits the most commercially viable program together with a written outline of the author's own proposals on how he would run his software house and why he would like to do it. The judge will be *Popular Computing Weekly* editor, Brendon Gore.

If a number of equally good and commercially viable programs are submitted the decision of the overall winner will be based on the best accompanying written outline of the author's proposals for running a software house.

Entries to the award scheme must be accompanied by at least four out of five of the numbered coupons published in *Popular Computing Weekly* throughout September. The closing date for the competition is October 18. The winning entry will be announced in the issue published on November 18.

Rules

1. *There is no limit on the number of entries you can send in, but each entry must be accompanied by four differently numbered competition coupons.*
2. *Closing date for entries is October 18, 1982.*
3. *The names of the winners will be announced in the November 18 issue of Popular Computing Weekly.*
4. *The Judges' decision is final.*
5. *No employees of Sunshine Publications Ltd, or their families, will be eligible to enter the competition.*

Popular Computing Weekly
Whizz-Kid '82 Scheme

Fill in this coupon. When you have collected four differently numbered coupons, send them with your program to: *Popular Computing Weekly*, Whizz-Kid '82, Hobhouse Court, 19 Whitcomb Street, London WC2.

NAME: .....

ADDRESS: .....

.....

.....

.....

3

Spectrum

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

Function line displayed in 3-D graphics

***Ian Reynolds** gives a three dimensional view of plotting.*

This program runs on a 16K or 48K Spectrum. It produces a three dimensional view of the function held at line 1010. You can input any function at line 1010 to produce stunning effects on the screen.

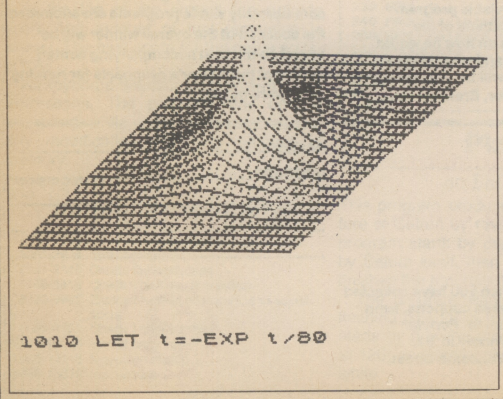
There is a simple, but very effective, "hidden line removal" routine comprised of lines 5, 10, 1022, 1023, 1026, 1050 and 1060.

When run, the program will request "resolution", which determines the spacing between the points plotted. A value of four gives a detailed plot, 10 gives a reasonable plot and 20 produces a fast but crude display. A resolution of four takes between 15 and 25 minutes, depending on the function at line 1010.

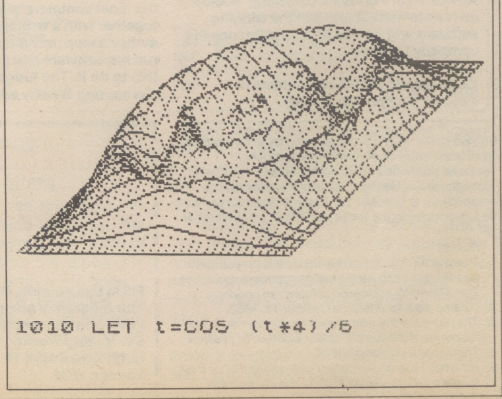
Experimenting with different functions and resolutions will give you some idea of the Spectrum's graphics capabilities. The following examples produce interesting displays:

Resolution	Line 1010
4	LET t = EXP(t/80
10	LET t = (SIN(t*3)+COS(t)/4
5	LET t = LN ABS COS(t/10
10	LET t = SGN COS (4*t)/10
5	LET t = – SIN(t*(1–COS(t)/2

```
    1 BORDER 0: PAPER 0: CLS
    3 INPUT "resolution";s
    5 DIM p(250,2)
   10 FOR f=1 TO 250: LET p(f,2)=
255: IF f>140 THEN LET p(f,2)=f
   12 NEXT f: BEEP .5,30
   15 FOR f=-50 TO 50 STEP s
   20 LET a=f
   25 LET b=50-ABS f
   30 FOR g=-70 TO 70
   35 LET c=70-ABS g
   40 GO SUB 1000
   50 NEXT g
   55 IF f=50 THEN STOP
   60 FOR a=f+1 TO f+s-1
   65 LET b=50-ABS a
   70 FOR g=-70 TO 70 STEP s
   75 LET c=70-ABS g
   80 GO SUB 1000
   90 NEXT g
  100 NEXT a
  110 NEXT f
1000 LET t=b*c/800
1005 LET r=a+g+121
1010 LET t=-EXP t/80
1020 LET t=INT (80+a-t*80)
1022 IF f=-50 THEN LET p(r,2)=t
1023 IF t<=p(r,1) THEN GO TO 105 0
1025 INK 6
1026 LET p(r,1)=t
1027 IF t<0 THEN LET t=0
1028 IF t>175 THEN LET t=175
1035 PLOT r,t
1040 RETURN
1050 IF t>=p(r,2) THEN RETURN
1060 LET p(r,2)=t
1070 INK 5
1080 GO TO 1027
```



1010 LET t=-EXP t/80



1010 LET t=COS (t*4)/5

Sound & vision



Sounding in the generation gap

This program, which runs on an unexpanded Vic20, produces sound using all four sound generators.

On running, the screen displays the letters A to D (left) and W to Z (right). After each letter, you must input a series of numbers eg A 128 255 1. The first and second sets of numbers can have any value between 0 and 255, providing the second number is larger than the first. The third number is the *Step* between the first two numbers.

After entering the program, press "2". This will produce a demonstration of a sound routine contained in lines 3999—4150.

Having listened to the demonstration sound, press any key. This will produce the response "Sound 0 or 1 or 2". Pressing 0 or 1 will allow you to hear the sounds produced by the inputted numbers. To change the sound, simply enter "Y" and input the numbers of your choice.

John Ingham

You can share your own favourite Sound or Vision programs with other readers by sending lists with explanations to us at *Popular Computing Weekly.*

WRITE TO: Sound & Vision, Popular computing Weekly, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

```
 1 READIN$,I2$
 6 DATA"ABCD","WXYZ"
 11 FORT=1TO4:B(T)=255:A(T)=128:D(T)=128:E(T)=255:F(T)=1:G(T)=1:NEXT:GOSUB281
 16 A=A(1):B=A(2):C=A(3):D=A(4)
 21 W=D(1):X=D(2):Y=D(3):Z=D(4):POKE36878,15
 26 IFUX=1THEN56
 31 POKE36874,PEEK(36874)+ANDW
 36 POKE36875,PEEK(36875)+ANDX
 41 POKE36876,PEEK(36876)+ANDY
 46 POKE36877,PEEK(36877)+ANDZ
 51 GOTO76
 56 POKE36874,PEEK(36874)ANDAORW
 61 POKE36875,PEEK(36875)ANDBORX
 66 POKE36876,PEEK(36876)ANDCORY
 71 POKE36877,PEEK(36877)ANDDORZ
 76 GET$:IFB$="S"THENGOSUB281
 81 IFPEEK(197)<>64THEN141
 86 A=A+F(1):B=B+F(2):C=C+F(3):D=D+F(4)
 91 W=W+G(1):X=X+G(2):Y=Y+G(3):Z=Z+G(4)
 96 IFA>B(1)THENA=A(1)
 101 IFB>B(2)THENB=A(2)
 106 IFC>B(3)THENC=A(3)
 111 IFD>B(4)THEND=A(4)
 116 IFW>E(1)THENW=D(1)
 121 IFX>E(2)THENX=D(2)
 126 IFY>E(3)THENY=D(3)
 131 IFZ>E(4)THENZ=D(4)
 136 GOTO26
 141 IFPEEK(197)<>64THEN141
 146 POKE36878,0:FORI=0TO4:POKE36874+3,0:NEXT
 151 GETB$:IFB$=""THEN151
 156 FORT=1TO4:IFB$=MID$(IN$,T,1)THENPRINTB$:D$=B$:B$="":GOTO176
 161 IFB$=MID$(I2$,T,1)THENPRINTB$:D$=B$:B$="":GOTO196
 166 NEXT
 171 GOTO141
 176 GOSUB221:PRINT"ENTER START":INPUTA(T)
 181 PRINT"ENTER FINISH" INPUTB(T)
 186 PRINT"ENTER STEP":INPUTF(T)
 191 GOSUB221:GOTO16
 196 GOSUB221:PRINT"ENTER START":INPUTD(T)
 201 PRINT"ENTER FINISH" INPUTE(T)
 206 PRINT"ENTER STEP":INPUTG(T)
 211 GOSUB221:GOTO16
 216 REM DISPLAY
 221 PRINT"■":D$="000":FORI=1TO4
 226 A$=STR$(A(I)):A$=RIGHT$(A$,LEN(A$)-1):A$=LEFT$(D$,3-LEN(A$))+A$
 231 A$="■■"+MID$(IN$,I,1)+"■■"+A$
 236 A1$=STR$(B(I)):A1$=RIGHT$(A1$,LEN(A1$)-1):A1$=LEFT$(D$,3-LEN(A1$))+A1$:A$=A$
 +":"+A1$
 241 A1$=STR$(F(I)):A1$=RIGHT$(A1$,LEN(A1$)-1):A1$=LEFT$(D$,2-LEN(A1$))+A1$
 246 A$=A$+":"+A1$
 251 A1$=STR$(D(I)):A1$=RIGHT$(A1$,LEN(A1$)-1):A1$=LEFT$(D$,3-LEN(A1$))+A1$
 256 A$=A$+"■■"+MID$(I2$,I,1)+"■■"+A1$
 261 A1$=STR$(E(I)):A1$=RIGHT$(A1$,LEN(A1$)-1):A1$=LEFT$(D$,3-LEN(A1$))+A1$:A$=A$
 +":"+A1$
 266 A1$=STR$(G(I)):A1$=RIGHT$(A1$,LEN(A1$)-1):A1$=LEFT$(D$,2-LEN(A1$))+A1$:A$=A$
 +":"+A1$
 271 PRINTA$:NEXT
 276 RETURN
 281 POKE36878,0:GOSUB221:POKE198,0
 286 PRINT"SOUND 0 OR 1 OR 2
 291 GETB$:IFB$=""THEN291
 296 IFB$<"0"ORB$>"2"THEN281
 297 IFB$="2"THENGOSUB3999:GOSUB221:GOTO281
 301 UX=VAL(B$):WAIT197,64:POKE198,0:GOSUB221:POKE36878,15:RETURN
 3999 POKE198,0:W=128:X=128:Y=128:Z=128:PRINT"■■■■■■■■■■D E M O■"
 4000 POKE36878,15:POKE36874,PEEK(36874)AND128ORW
 4010 POKE36875,PEEK(36875)AND128ORX
 4020 POKE36876,PEEK(36876)AND128ORY
 4030 POKE36877,PEEK(36877)AND128ORZ
 4090 A=A+F(1):B=B+F(2):C=C+F(3):D=D+F(4)
 4100 W=W+1:X=X+1:Y=Y+1:Z=Z+1
 4105 GETB$:IFB$<>""THENRETURN
 4110 IFW>255THENW=128
 4120 IFX>255THENX=128
 4130 IFY>255THENY=128
 4140 IFZ>255THENZ=128
 4150 GOTO4000

READY.
```

Dots and dashes fall for beeps

***Paul Newman** presents a morse code trainer for the Spectrum.*

This short program will allow the Spectrum to *Beep* morse characters as they are typed on the keyboard. The character speed as given is quite slow and may be altered to suit by a simple change to line 35. In-code comments should explain most lines, except for line 10 where the morse characters are coded into a *Data* statement.

The morse dots and dashes are represented as binary 0 and 1 respectively. Thus the character "L" which is dot, dash, dot, dot, in morse code, may be represented as the binary notation 0100. In order that successive division by two (effectively binary division) may "strip" each binary digit off in the correct order, the notation is reversed — viz 0010. Finally, the binary notation is given a "guard bit" to form the complete binary representation of "L" — 10010 — which is binary for 18.

The data statement in line 10 contains the representation for 0—9 and A—Z. Note that they are given in the order groupings recommended by the Radio Society of Great Britain (E I S H / T M O etc) which are specially designed to assist in the learning of morse code. I have done it this way to help the user to design his own morse code tutor.

When learning morse code, it is fruitless learning the 'dots & dashes'. The only way of becoming proficient at morse is to learn how each letter sounds.

When altering line 35, remember to preserve the 1:3 dot:dash ratio. If you are seriously learning morse, alter line 35 to BEEP .13+.26*(x=1),0 to give you a reasonably slow character speed. Factors of .07 and .14 will produce a character speed of about 12 words per minute, which is the Radio Amateurs examination speed requirement. Text should be typed in lower case.

Most of the remaining details of the program are indicated in the Rem statements.

The Spectrum can be connected to a radio transmitter using a simple one-chip interface and I/O port.



Paul Newman, founder of the Sunclair Amateur Radio User Group.

Paul Newman is the founder of SARUG UK, the Sinclair Amateur Radio Users Group. He has long been an amateur radio enthusiast. During 1980 he became interested in using microcomputers to control radio equipment. Early in 1981 he bacame the first British member of ASARUG, the American Sinclair radio enthusiasts group. In November 1981 he formed the present UK group, SARUG UK. Members of the group keep in touch over the air and through the pages of the SARUG newsletter which he edits. The group now has 175 members. Membership is £5 and is open to all amateur radio licence holders or anyone with a proven interest in amateur radio. For further information contact Paul Newman (G4 1NP), 3 Red House Lane, Leiston, Suffolk.

```
  1 REM  morse keyboard program
 for SPECTRUM 16k P NEWMAN
  10 DATA 6,17,21,9,2,20,11,15,4
,30,13,18,7,5,15,22,27,10,8,3,12
,24,14,25,29,19,63,62,60,56,48,3
2,33,35,39,47,63: REM morse char
acter data
  11 DIM z(36): REM storage for
cw characters
  20 FOR j=1 TO 36: READ n: LET
z(j)=n: NEXT j: REM store them i
n array z
  21 CLS : PRINT AT 0,0; FLASH 1
;"morse keyboard ready" .
  22 LET a$=INKEY$: IF a$="" THE
N GO TO 22: REM get a key press
  23 IF a$=" " THEN PRINT " ";:
GO TO 22
  24 LET p=CODE a$-96: IF p>=-48
 AND p<=-39 THEN LET p=p+75: GO
TO 26: IF p<1 OR p>122 THEN GO T
O 22: REM only valid keys 0-9,a-
z
  26 PRINT a$;: LET n=z(p): REM
find data
  29 LET x=n-INT (n/2)*2: REM bi
nary division
  35 BEEP .10+.20*(x=1),0: REM x
=1 is dash,beep .3.Dot=0 so beep
.1
  50 LET n=INT (n/2): REM more d
ivision
  70 GO TO 29-7*(n<=1): REM get
another key if n<2
```

Peek & poke

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

TO REVERSE

John Grain of Mill Street, Witney, Oxford, writes:

Q Could you please tell me if there is any way of using a statement to reverse a number just input into the computer (ZX Spectrum), for example to change 1472 to 2714?

I am writing a business program and need this operation to help me with an index code that I am developing. I hope you can help.

A This has already been done. This neat solution was developed by Jeremy Ruston:

```
10 INPUT A$
20 LET B$ = ""
30 FOR T = 1 TO LEN(A$)
40 LET B$ = A$ (T) + B$
50 NEXT T
60 PRINT B$
```

TRANSMITTER LINK-UPS

Sean Connelly of Valley Road, Macclesfield, Cheshire, writes:

Q I will soon be getting a ZX Spectrum. As a great radio enthusiast, I would like to connect my two channel radio transmitter to my computer. Could you suggest an input/output port to do the job? Would a digital/analogue converter be suitable? I would be able to do any such modification myself if necessary.

A The direct answer is that I do not know how to connect a Spectrum to a two way transmitter. If you have access to a copy of our July 1 edition you will see it featured a whole page about SARUG UK, the Sinclair Amateur Radio Users Group in the United Kingdom.

To link a ZX81 to a transmitter, the group reckons that you need a 356 byte program and a I/O port with a single chip interface. For further information contact Paul Newman, (G4INP), 3 Red House Lane, Leiston, Suffolk.

If you find that you still need help, try Stephen Adam's book *20 Simple Electronic Projects For the ZX81 and other Computers*. One of the programs in there is an A/D converter. The book is available from Interface, 44-46 Earls Court Road, London W8 6EJ.

SHARP'S THE WORD

David Hale of Mushoka Avenue, Bents Green, Sheffield, writes:

Q I am looking for a hand held computer that can be used to assist me in my model car racing. It's task would be to take lap times to 1/100th of a second — times taken by hand operated press button — then to time a second car in the same way. The information would be used to immediately calculate where the two cars should be in relation to each other in a given period of time or number of laps, given various speeds.

It would be useful if it could emit sounds instead of necessarily displaying the answer on a screen. I have considered the Sharp PC 1211, but it can only work to 1/10th of a second and it does not have sound.

Last November, Panasonic had a hand held computer at the NEC Birmingham, which could work to 1/50th of a second and had a range of eight octaves. The problem is that it is as yet only available in the US and I do not know if it will do the job. Should I try to import one? Alternatively, could you advise me of another hand held micro that would do the job?

A I have held this letter for a few weeks, vainly waiting a reply from National Panasonic. The company over here know very little. The only information they have is a glossy sales leaflet that they promised to send me some weeks ago. It still has not arrived.

All I can add to what you already know is that it is due for launch over here sometime in mid-1983. I would not advise you to import one on such little knowledge.

As for an alternative, the only one that springs to mind is the new Sharp PC 1500. It is hand held, and does have a tone generator on board. The company to contact, not only about the Sharp but about hand held micros in general, is: Tempus, 38 Burleigh Street, Cambridge CB1 1DG.

EXORCIST'S SUCCESS

Miles Clarke of Worcester Road, Oxford, writes:

Q I am trying to write a program on my Vic20 that will store information. I want to enter numbers and other facts on tape, for use at a later time. However, when I *Load* the tape and *Run* it, the information disappears, even if it was on the screen. How do I store information on a tape?

A The *Run* command clears all variables and starts the program again from scratch. You do not say how you input the information, but I presume that you are using something like *Input* A$. This can be overcome by using the *Goto* command.

You do not give details of the size of your program, nor how many variables you use for other things. All I can do is give a small sub-routine for storing information in a single string, which can be added to. *Run* the program initially, and thereafter *always* use *Goto* 30. This is true whether you want to add more information now, or at a later date after *Loading*. Of course, you can use *Run* if you want to clear the variable and start again.

```
10 INPUT A$
20 PRINT A$
30 INPUT B$
40 A$ = A$=B$
50 PRINT A$
```

PROBLEMS OF TEMPERAMENT

Eric Smith of Lime Street, Grangemouth, Stirlingshire, writes:

Q I have a ZX81 and printer. I have noticed that the printer does not feed the paper very well and quite often stops altogether. This problem only occurred when I started using paper ordered from Sinclair. Is there any answer to this or am I stuck with having to pull the paper through while printing?

While on this subject do you know if it is possible for the Sinclair printer to be interfaced with the TI158 calculator? The cost of the Texas Instruments printer is prohibitive.

A Problems seem to be cropping up with the ZX printer at the moment. Whether this is just a case of one bad batch, or an as yet undiagnosed design fault, I cannot say. I know that my printer has given me no problems whatsoever, though I have had to deal with a temperamental one here in the office.

First, check that the printer is clean and set up correctly. This may sound obvious, but dirt does build up and if it clogs the rubber roller it will stop the paper moving.

Another alternative is to slightly tighten the two springs that hold the lower roller in place. Finally, you can slightly widen the Vs in which the paper roll spindles are located, though I would not advise this unless all else has failed.

When pulling the paper through, do not pull it very hard. A firm even pressure is what is needed. If this does not work, then wiggle the paper from side to side. If the machine is not sparking, this will often get it going, though I do not know why.

I do not know if the Sinclair can be interfaced directly to the TI158, but I would doubt it. Your best bet is to get in touch with Microtanic Software of 235 Friern Road, Dulwich, London. They make a 'Printerface' which allows the ZX printer to be used with several computers.

●*Stop agonising over that problem. Write to Ian Beardsmore, Peek & Poke, Popular Computing Weekly, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.*

Classified

DRAWING BOARD 16K ZX81
Save, recall, scroll (4 ways), merge pictures using machine routines. Draw using pixels (black/white) or any character, cursor control. Pictures can be used in your program and DB deleted. **Only £4.20.**

DATABASE 16K ZX81 or Spectrum
Business or home. Telephone numbers, addresses, stock control, etc. With demo program — steam loco numbers. **Only £4.95.**

CADSOFT, 24 ST JAMES STREET CHELTENHAM, GLOS GL52 2SH

ACORN ATOM Floating Point EPROM, £15.00; Utility EPROM, £18.00. Bargain price, £30.00 pair. Davidson, 109 Highgate Lane, Farnborough, Hampshire.

BBC MICRO Pools Predictor. Model A or B. Easy data entry. Uses powerful mathematical and statistical forecasting model. User tunable facility. On cassette with full instructions, £4.99. Mayday Software, 181 Portland Crescent, Stanmore, HA7 1LR.

VIC20 SOFTWARE (unexpanded). Two hi-res action games: "Meteors" and "Toader" for £4.00. Two easy to play beginners/younger children's games: "Fruit Gatherer" and "Spademan" for £4.00. S & T Lepojevic, 2 Piccadilly Way, Cheltenham, GL52 5DQ.

ZX81 16K plus software and magazines. £70.00. Tel 691 3294 after 4.30 pm.

ZX81 Machine Code Loader. Enter the exciting world of machine code. 1K and 16K versions supplied. Both include Hex loading, saving, editing, running etc. Includes cassette and documentation. Only £1.95 from Chris Davison, 67 Seymour Road, Newton Abbot, Devon, TQ12 2PX.

DK TRONICS 4K. Graphic ROM board with 1K U.D.G. RAM, £25. Telephone Chesterfield 201263 evenings.

BYTE-MAN, with Star-Fighter and Bomber — three quality fast moving machine code games for the price of one, for the ZX81 16K. Why pay more for less? Only £2.95. "Mindseye" 12 North Grove Drive, Leeds LS8 2NJ.

BBC MICRO MODEL B (avoid the queue), various software and hardware. £380 ono. Tel: Horley (029-34) 4405.

SPORTING FORECASTS

Professor Frank George's well-known Football Pools Forecasting program is now available on the

SINCLAIR ZX81 16K

and 8 other micros

A Horse-Race Forecast Program in preparation.

Write to: Professor F.H. George Bureau of Information Science Commerce House, High Street, Chalfont St. Giles, Bucks.

SPECTRUM GAMES CASSETTE: Zombie, Life, Balloon, Hanoi, £4. M. Chambers, 6 Beresford Close, Parkstone, Poole, Dorset BH12 2HF.

VIC20 for sale plus cassette deck. Super Expander joystick and software, as new, £220, worth £280. Phone Trowbridge 61409.

ACORN ATOM 12/12K including Joystick, software and books, £160. Tel: (0632) 666120.

VIC HANGMAN, good graphics, entry checks, sound effects, music, many other features, £2.75. A. Lambert, 19 Cedar Road, Marple, Cheshire.

A1 SOFTWARE presents a multigame cassette for the Sinclair ZX Spectrum. Blitz, Dropout, Breakout, Racer and a UDG generator all on one tape for £9.95 or separately for £3.95. For details send a stamped addressed envelope to Mouse Hall, Bolney, Sussex RH17 5 RY.

SPECTRUM PROGRAMS. Word processor — screen editing, insert, replace, delete, word-wrap, justification, file-handling, £15. L-game, new, different, testing, £5. Graphics Generator makes it easy, £5. All include cassette plus instructions. Brian Hebbes, 6a Newlands Avenue, Southampton.

SPECTRUM CHARACTER GENERATOR. Modify selected characters or redefine the complete character set with an 8X magnification display. Save your character sets on tape for later use. If you need specialist alphabets or graphic characters for games then this program is a must. Cassette with full instructions, £3.45. J. Taylor, 28 Azalea Close, London W7 3QA.

BBC SOFTWARE
Educational and leisure programs

Space Academy 32K. Driving Test 32K. Invisible Snakes and Ladders 32K. England 32K. Bunny/train 16K (for young children). Maths for fun 16K (for young children). Programs £4 inc. Two for £6 inc. S.A.E. for details.

Sent by return of post after cheques/POs cleared. Mail order only.

SWIFT LINK SOFTWARE
118-120 WARDOUR STREET, W1V 4BT

ZX81 16K Ram plus keyboard graphic Rom and software, £100 ono. Tel: Sheffield (0742) 368577.

ZX SPECTRUM MISSILE COMMAND. Hi-res, colour, sound, fast moving graphics, bargain, only £2. P. Darling, Mill Lodge, Mill Green, Stonham Aspal, Stowmarket, Suffolk.

STARTING FORTH by Leo Brodie, £13.75 including p & p. Access/Barclaycard 0923-23324. Come and browse or send sae for lists. Watford Technical Books, 105 St Albans Road, Watford, Herts.

WANTED. Spectrum 16/48K system, software, after 10 pm or anytime Sunday. 01-5802181.

ZX81 (CONVERTED 80) 16K Ram. Complete with pack, pocket books, cassette, £60 ono. 01-5802181.

ZX SPECTRUM GAMES: Ten Minutes To Live, Air/Attack, Lasered Staircase and Monster Maze, on cassette, £4.75. B. Baker, 87 Murray Avenue, Bromley, Kent BR1 3DJ. Sae for more details.

SPECTRUM SPEAKER, volume control, cased, complete, ready to use, £5.50 inclusive. J. Hunter, 11 Nettleton Close, Poole, Dorset.

VIC20 and cassette unit plus Vic Revealed, joystick, invaders, Pacman, £150. Telephone Clitheroe 24516.

PLAY DOMINOES against your ZX81. Different 16K game every "RUN" computer printed listing £1. P. Aitken, 1 Clochbar Avenue, Milngavie G62 7JW.

MINI MICRO COMPUTER for sale. DEC data system, digital PDP 11/23 including two disc drives, also separate VDU (VT100) and printer (DEC Writer 111), £5,000 ono. Contact Rullion UK Ltd., 061-228 2582.

WINGED AVENGER

Mk 2. Spectrum and ZX81 16K 3 Waves, seven skill levels. Mother ship, Re-fueling, Smart Bombs, Rapid Firing, Laser Shield, High Score and Replay. Machine Code. Arcade action. From now to Christmas only **£4.50** inc.

Work Force, 140 Wilsden Avenue, Luton, Beds.

DUST COVERS for all computers, printers, disk drives, monitors, etc: Vic/BBC/Atom £2.95; Sharp MZ 80K/-MZ 80/A £5.50; Genie/TRS80 £3.95; Printers £3.95. Please ring for other prices. Trade enquiries welcome. Access/Barclaycard/cheque. Sherbourne Designs, 9 Leighton Home Farm Court, Wellhead Lane, Westbury, Wilts. Tel: 823764 (24-hr service).

BBC MODEL A 32K, 2 months old with books and software, £315. Tel: Martin Crawley, 01-730 4544, ex 321 (office hours).

T199/4A SOFTWARE on tape, from £1.95. Sae list ATL, 115 Crescent Drive South, Brighton, BN2 6SB.

Swapshop

01-930 3266
Are you one of the thousands of owners of an old computer? Do you want to sell it?
Why not sell it through Swap Shop?
In each issue between now and the end of October we will publish a FREE entry in Swap Shop for anyone who has a computer to sell. All you have to do is phone Swap Shop on 01-930 3266 and tell us your name, address, telephone number, the type and specification of the computer you have to sell, and the price you want for it.
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Competitions

Puzzle No 22

Here is the second of the Ancient Algorithms where cavemen rearrange piles of stones into other piles of stones in interesting ways.

What is being calculated this week?

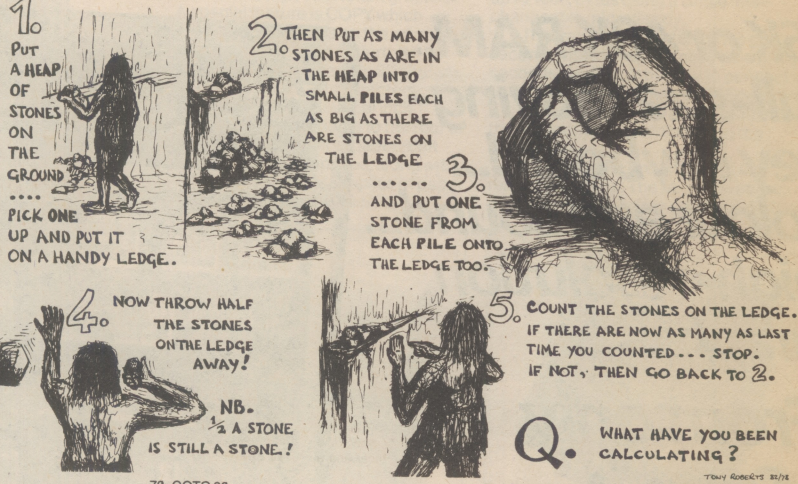
Tony Roberts

Rules

The winner of the puzzle will be the reader who, in the opinion of *Popular Computing Weekly*, has submitted the best and most imaginative solution.

Envelopes containing entries should be clearly marked 'PUZZLE'.

The closing date for the competition is Tuesday, September 28.



Solution to Puzzle No 18

To find the number of cars on each occasion use the formula $N \times (N + 1)/2$ to find successive triangular numbers, T. This expression can then be used in a program like the one shown here to find the answers:

```
10 LET C = 0
20 LET N = 2
30 LET T = N* (N + 1)/2
40 LET X = SQR T
50 IF ABS (X – INT (X + 1E – 8)) <0.000001 THEN
   GOSUB 100
60 LET N = N + 1
70 GOTO 30
100 PRINT T
110 LET C = C + 1
120 IF C = 3 THEN STOP
130 RETURN
```

Line 50 checks to see if the square root of each T is an integer (or near enough, allowing for the accuracy of the square-root function). If the T value is a square it is printed out and the program will stop after three such numbers, when $C = 3$.

On the first day there were 36 cars in the park. Two weeks later there were 1225 cars present. The next possible number that is both a square and a triangle is 41,616. This is 204 squared so the car park is 204 spaces square. Since each space is 12 × 6 feet the car park is 2448 feet long and 1224 feet wide.

Winner of Puzzle No 18

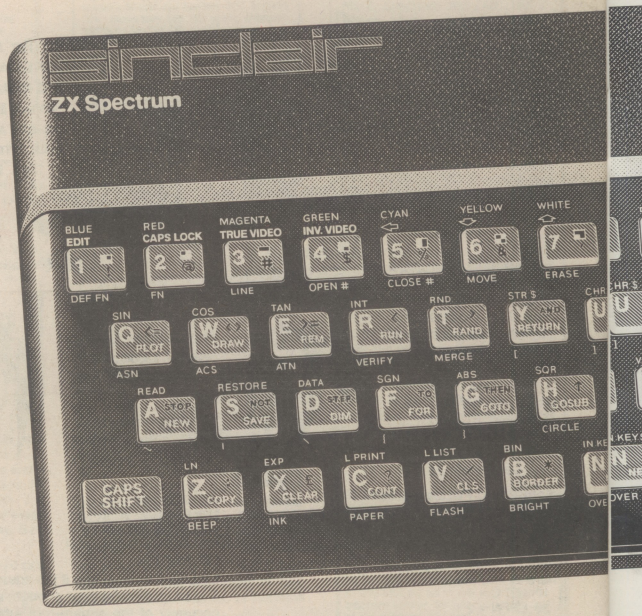
The winner is P Rankilor, Rue Sauvage, St Sampsons, Guernsey, Channel Islands, who receives £10. He adds: The last answer is more cars than in the whole of Guernsey!



Sinclair ZX Spectr

16K or 48K RAM... full-size moving-key keyboard... colour and sound... high-resolution graphics...

From only £125!



First, there was the world-beating Sinclair ZX80. The first personal computer for under £100.

Then, the ZX81. With up to 16K RAM available, and the ZX Printer. Giving more power and more flexibility. Together, they've sold over 500,000 so far, to make Sinclair world leaders in personal computing. And the ZX81 remains the ideal low-cost introduction to computing.

Now there's the ZX Spectrum! With up to 48K of RAM. A full-size moving-key keyboard. Vivid colour and sound. High-resolution graphics. And a low price that's unrivalled.

Professional power– personal computer price!

The ZX Spectrum incorporates all the proven features of the ZX81. But its new 16K BASIC ROM dramatically increases your computing power.

You have access to a range of 8 colours for foreground, background and border, together with a sound generator and high-resolution graphics.

You have the facility to support separate data files.

You have a choice of storage capacities (governed by the amount of RAM). 16K of RAM (which you can uprate later to 48K of RAM) or a massive 48K of RAM.

Yet the price of the Spectrum 16K is an amazing £125! Even the popular 48K version costs only £175!

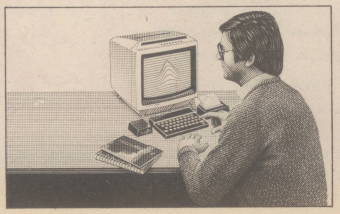
You may decide to begin with the 16K version. If so, you can still return it later for an upgrade. The cost? Around £60.

Ready to use today, easy to expand tomorrow

Your ZX Spectrum comes with a mains adaptor and all the necessary leads to connect to most cassette recorders and TVs (colour or black and white).

Employing Sinclair BASIC (now used in over 500,000 computers worldwide) the ZX Spectrum comes complete with two manuals which together represent a detailed course in BASIC programming. Whether you're a beginner or a competent programmer, you'll find them both of immense help. Depending on your computer experience, you'll quickly be moving into the colourful world of ZX Spectrum professional-level computing.

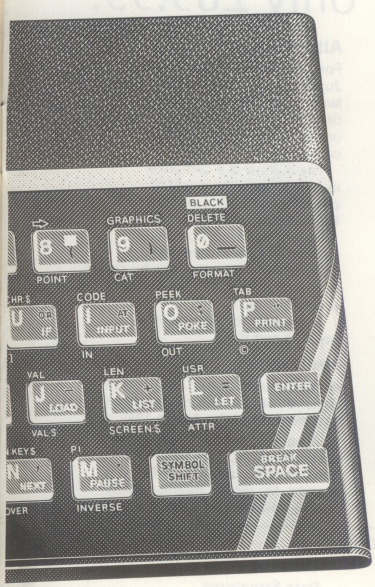
There's no need to stop there. The ZX Printer – available now – is fully compatible with the ZX Spectrum. And later this year there will be Microdrives for massive amounts of extra on-line storage, plus an RS232 / network interface board.



Key features of the Sinclair ZX Spectrum

- Full colour – 8 colours each for foreground, background and border, plus flashing and brightness-intensity control.
- Sound – BEEP command with variable pitch and duration.
- Massive RAM – 16K or 48K.
- Full-size moving-key keyboard – all keys at normal typewriter pitch, with repeat facility on each key.
- High-resolution – 256 dots horizontally x 192 vertically, each individually addressable for true high-resolution graphics.
- ASCII character set – with upper- and lower-case characters.
- Teletext-compatible – user software can generate 40 characters per line or other settings.
- High speed LOAD & SAVE – 16K in 100 seconds via cassette, with VERIFY & MERGE for programs and separate data files.
- Sinclair 16K extended BASIC – incorporating unique 'one-touch' keyword entry, syntax check, and report codes.

'um



The ZX Printer – available now

Designed exclusively for use with the Sinclair ZX range of computers, the printer offers ZX Spectrum owners the full ASCII character set – including lower-case characters and high-resolution graphics.

A special feature is COPY which prints out exactly what is on the whole TV screen without the need for further instructions. Printing speed is 50 characters per second, with 32 characters per line and 9 lines per vertical inch.

The ZX Printer connects to the rear of your ZX Spectrum. A roll of paper (65ft long and 4in wide) is supplied, along with full instructions. Further supplies of paper are available in packs of five rolls.

The ZX Microdrive – coming soon

The new Microdrives, designed especially for the ZX Spectrum, are set to change the face of personal computing.

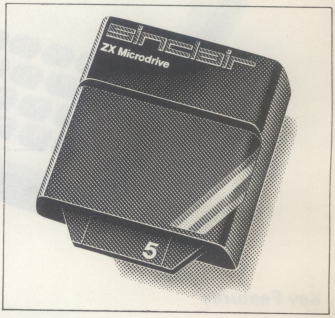
Each Microdrive is capable of holding up to 100K bytes using a single interchangeable microfloppy.

The transfer rate is 16K bytes per second, with average access time of 3.5 seconds. And you'll be able to connect up to 8 ZX Microdrives to your ZX Spectrum.

All the BASIC commands required for the Microdrives are included on the Spectrum.

A remarkable breakthrough at a remarkable price. The Microdrives are available later this year, for around £50.





How to order your ZX Spectrum

BY PHONE – Access, Barclaycard or Trustcard holders can call 01-200 0200 for personal attention 24 hours a day, every day. BY FREEPOST – use the no-stamp needed coupon below. You can pay by cheque, postal order, Access, Barclaycard or Trustcard.

EITHER WAY – please allow up to 28 days for delivery. And there's a 14-day money-back option, of course. We want you to be satisfied beyond doubt – and we have no doubt that you will be.

RS232 / network interface board

This interface, available later this year, will enable you to connect your ZX Spectrum to a whole host of printers, terminals and other computers.

The potential is enormous. And the astonishingly low price of only £20 is possible only because the operating systems are already designed into the ROM.

To: Sinclair Research, FREEPOST, Camberley, Surrey, GU15 3BR. **Order**

Qty	Item	Code	Item Price £	Total £
	Sinclair ZX Spectrum – 16K RAM version	100	125.00	
	Sinclair ZX Spectrum – 48K RAM version	101	175.00	
	Sinclair ZX Printer	27	59.95	
	Printer paper (pack of 5 rolls)	16	11.95	
	Postage and packing: orders under £100	28	2.95	
	orders over £100	29	4.95	
			Total £	

Please tick if you require a VAT receipt ☐

*I enclose a cheque/postal order payable to Sinclair Research Ltd for £

*Please charge to my Access/Barclaycard/Trustcard account no.

*Please delete/complete as applicable

Signature

PLEASE PRINT

Name: Mr/Mrs/Miss

Address

POC 809

FREEPOST – no stamp needed. **Prices apply to UK only.** **Export prices on application.**

ZX Spectrum

Available only by mail order and only from

sinclair

Sinclair Research Ltd,
Stanhope Road, Camberley,
Surrey, GU15 3PS.
Tel: Camberley (0276) 685311.

Probably the fastest microcomputer in the universe

the JUPITER ACE only £89.95.



All inclusive Price

For £89.95 you receive your Jupiter Ace, a mains adaptor, all the leads needed to connect to most cassette recorders and T.V.s (colour or black and white), a software catalogue and a manual.

The manual is a complete introduction to the world of personal computing and a course in FORTH programming on the Ace.

Even if you are a complete newcomer to computers, the manual will guide you step by step from first principles to confident programming.

The price includes postage packing and V.A.T.

Available soon

- **16K memory expansion for around £35.00. This will increase the memory of the Ace to 19K.**
- **A parallel printer Interface for around £25.00. This will convert the Ace to anything from fast dot matrix to letter quality daisy wheel printers**

Key Features

- Revolutionary microcomputer language FORTH.
- Full-size moving-key keyboard.
- User-defined high-resolution graphics.
- Programmable sound generator.
- Floating point arithmetic.
- Fast cassette interface.
- Upper and lower case ascii character set.
- 24 x 32 character flicker-free display.

The Jupiter Ace uses FORTH

The Ace is set apart from all other personal computers on the market by its use of a revolutionary language called 'FORTH'. Some computer languages are easy for humans to understand, others are easy for computers; FORTH is most unusual in being both. Its underlying principles are so simple that it takes even a newcomer to computers only a few minutes to learn how to do calculations on the Ace, yet the very same principles are powerful enough to allow you to invent your own extensions to the language itself.

At the same time, the memory-saving coded form used to store your programs inside the Ace allows it to obey them very fast — typically in less than a tenth of the time it would take to do the same thing using a different language. Amongst other things, this makes the Ace ideal for games.

FORTH's unique combination of speed, versatility and ease of programming has already made it a prime choice for professional applications as diverse as pub games and radio telescopes, and gained it an enthusiastic national user group. Now the Jupiter Ace can bring this addictive language into your own home.

Designed by Jupiter Cantab

Leading computer Designers Richard Altwasser and Steven Vickers have a reputation for pushing technology forwards. After playing the major role in creating the ZX Spectrum they formed Jupiter Cantab to develop their latest brainchild the Jupiter Ace.

Technical Specification

Hardware

Processor/Memory
Z80A running at 3.25 MHz. 8K bytes ROM 3K bytes RAM.

Input
40 moving-key keyboard with auto-repeat on every key.

Output
Memory-mapped 32 x 24 character display with high resolution user graphics. Output to drive normal UHF TV set on channel 36.

Sound
Provided by internal loudspeaker.

Cassette
Load Save & Verify at 1500 baud, separate data storage.

Software, FORTH

Data Structures
Integer, Floating point and String data may be held as constants, variables or arrays with multiple dimensions and mixed data types.

Control Stuctures
IF-THEN-ELSE, DO-LOOP, BEGIN-WHILE-REPEAT, BEGIN-UNTIL, all may be mixed and nested to any depth.

Operators
Mathematical +, —, X, ÷.
Logical AND, OR, NOT, XOR.
Comparison <, >, =.

Program Editing
FORTH words may be listed, edited and redefined. Comments are preserved when words are compiled.

Order Form

The **Jupiter Ace** is available only by mail order. Please allow up to 28 days for delivery.

Send cheque or postal order with the form to:—

JUPITER CANTAB, 22 FOXHOLLOW, BAR HILL, CAMBRIDGE CB3 8EP

Please send me:—

☐ JUPITER ACE MICROCOMPUTER(S) @ £89.95.

Name. Mr/Mrs/Miss

Address