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# Computing WEEKLY

2-8 August 1984

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Vol 3 No 31

## Acorn's new machine

ACORN is to launch its new up-market micro in September, aimed at professional, business and advanced home users.

To be called the Professional Workstation Range the machine (previously called the ABM) will be offered in a variety of configurations.

Each will include a built-in monitor and disc drive, and use the 6502 chip — the same as in the BBC machine — as its "core processor."

The 6502 will not, however, be the main processor. It will be used as the controller — handling the keyboard, screen and input/output operations for

a range of other second-processor options. At the low end of the Professional Workstation Range the machine will be offered with a Z80 processor running CP/M. At the upper end of the range the machine will feature the new 32/32 Motorola version of its 68000 chip series, the 68032, running a

Unix-like multi-user multi-tasking operating system — possibly a version of Xenix.

"The Professional Workstation will be core compatible with the 6502. By adding different processors you will be able to add rims of functionality

continued on page 5



## Slow start for MSX companies

MACHINES from the majority of the Japanese MSX companies will not now be available in quantity in shops here, in time for Christmas.

The Hitachi, National Panasonic and Teleton MSX machines will not arrive until next year.

Sanyo, Sony and Canon are all planning their MSX launches in October, but, initially only limited numbers of

Sanyo and Canon machines will be available. David Silver, Sanyo's product manager, commented, "We will be going for full production in early 1985."

Mitsubishi will be making a standard joystick and data recorder available at the same time, with a printer to come in 1985. Sony and Sanyo will also

continued on page 5

## Sinclair to drop 16K from plan

SINCLAIR has announced its plans for the Autumn and the 16K Spectrum is not included.

"We will still manufacture the 16K machine and sell it overseas, but it is not a product we will promote in this country this Christmas," confirmed Anton Boyes, Sinclair's retail business manager. "At the moment 95 per cent of our sales and most of the software is for the 48K machine."

The company has announced a special offer for the 48K Spectrum involving a free gift of £56.70 worth of software and both the QL and the flat-screen TV will be in the high street shops in September.

From August 8, the 48K Spectrum will be sold with a free pack of six programs — *Chequered Flag*, *Scrabble*, *Make-a-Chip*, *Survival*, *Chess* and

*Horace Goes Skiing*. This 'Spectrum Six-pack' offer will continue while stocks — 1/4m packs worth £14m — last, probably until the end of September.

The Microdrives will also be sold as a special pack, from October onwards. With Christmas presents in mind, the Microdrive System Expansion

continued on page 5

## Valhalla's follow-up

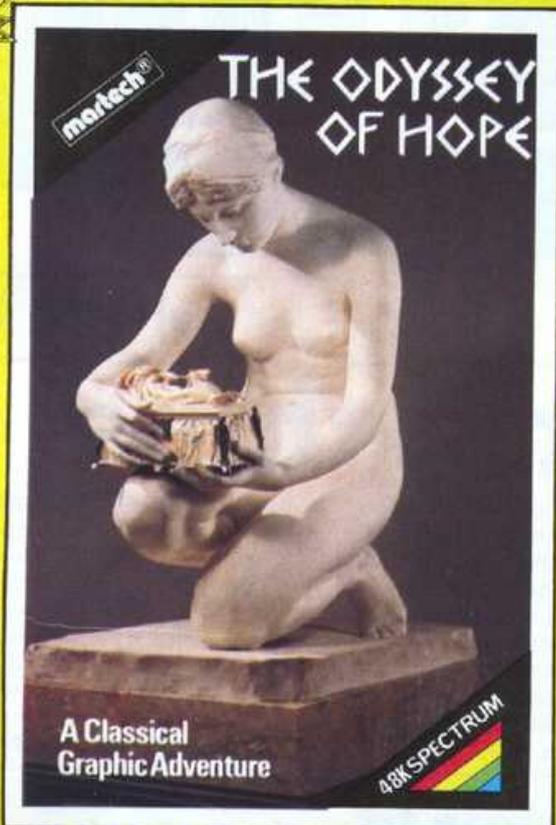
LEGEND'S follow-up to *Valhalla* is called *The Great Space Race*. Details inside.



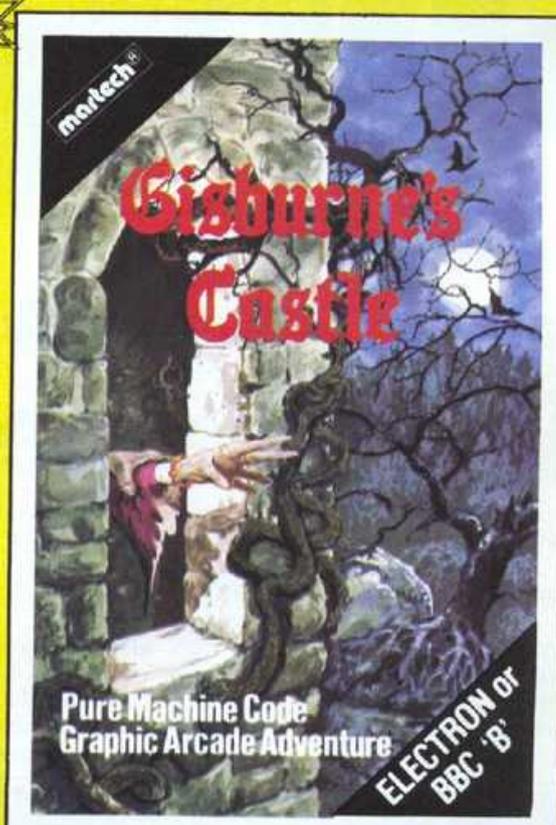
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NEW



NEW



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Once upon a time, Zeus had one of his master craftsmen fashion a mortal of perfect beauty — the first woman — he called her Pandora — meaning "all gifts". Zeus presented her with a golden casket, but bade her promise never to open it, but Pandora grew curious and one day she lifted the lid. With a rush and a cry, out came all the ills that now beset man; disease and sorrow, hate, jealousy, theft, lies and many more. Pandora rushed to close the lid, but all of its contents had escaped, save one, "Hope". Since that ill-fated day when Pandora infested the world with terrible woes and suffering, Hope has always remained a comfort to this troubled world — until now! Someone has stolen Hope, and famine, disease and violence have taken over the world.

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THE Japanese MSX companies work in mysterious ways.

Here you have the world's most successful electronics manufacturers deciding to jointly tackle the micro market.

Yet, instead of a unified launch by the ten manufacturers, well in time for the peak Christmas selling period, they have chosen to act separately, each with its own different launch schedule.

The timings look curious to say the least.

National Panasonic, Teleton and Hitachi will not launch until next year — Hitachi actually announced an '84 launch and then changed its mind. Mitsubishi is hoping for first deliveries in mid-November — too late to make much headway at Christmas. And Sanyo and Canon, though launching in October expect initially to have available only limited quantities of machines.

The only MSX manufacturers which look as if they may get enough machines in the shops to make an impact at Christmas are Sony and Toshiba.

All of which is rather non-plussing. MSX was launched in Japan at the tail end of 1983 and its planned arrival in the UK this Autumn was announced way back in the Spring of this year.

Sinclair, Amstrad, Acorn and Commodore must be watching the proceedings with considerable interest. Amstrad's distribution, which already looks pretty good, should ensure the machine success and Sinclair last week announced that its QL computer will be in the shops in September — again in good time for Christmas.

The MSX standard is a gamble which the Japanese companies will either win or lose.

Not until the Japanese manufacturers can present a concerted attack on the micro market will it be possible to regard MSX as a true 'standard'.

# POPULAR Computing WEEKLY

Vol 3 No 31

## >Presents...

**News** > MSX — from a flood to a trickle > Sinclair's plans for the Spectrum and QL

**Star game** > Nautical, but nice — negotiate the waters of the Mississippi in *Delta Queen* for the 16 or 48K Spectrum

**Baud Walk** > Our networking feature returns with a discussion of the available modems and bulletin boards

**Software reviews** > Create your own graphics with *Simonsoft Sprites* > Take to motorbiking in *Micromega's Full Throttle*

**The QL Page** > Alan Turnbull takes a long hard look at Superbasic

**Commodore 64** > Create your own characters with Mark Gornall's program

**Spectrum** > Part three of the machine code adventure series deals with the computer's responses to commands

**Dragon** > Continuing the series on Assembly language programming

**BBC & Electron** > Potential Picassos can try out their skills with Christopher Bowerman's *Paintbox*

**New releases** > *Graphix IV* — a low-cost C64 Basic extension > *Electron Chess* > *Spannerman* on Amstrad

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## > Futures...

**Baud Walk** — a new weekly networking column . . . how good are the QLs now being shipped — any improvement . . . ? and a program to give you windows on the Commodore 64.

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ABC

**How to submit articles** Articles which are submitted for publication should not be more than 2000 words long. The articles, and any accompanying programs, should be original. It is breaking the law of copyright to copy programs out of other magazines and submit them here — so please do not be tempted. **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.

# Paranoid PETE



Amstrad version  
available September

**UBIK**  
SOFTWARE

Dealer & Distribution  
enquiries welcome

Due to the World-Wide shortage of wheat, Paranoid Pete - the intrepid space farmer - has travelled to the Planet Owwayondah in an effort to grow new crops and send them back to earth. The game starts when Paranoid Pete is beamed onto the Planet surface, he then has to plant the wheat seeds as they fall from the U.S.S. Harvester. This is achieved by digging directly underneath the falling seed with the spade and then filling the hole in, but it is not quite that easy as the planet has been infested with Mega-wibbles, "The greediest little critters in the Universe" and Pete has to defend himself and his crops by giving the Mega-wibbles a sound bash on the head with his spade. Once his plant(s) have been successfully grown the arm of the ever friendly Ubik-Droid collects the wheat and takes it up into the U.S.S. harvester for processing, subsequently, Pete is beamed back on-board to ensure everything runs smoothly because the Mega-wibbles have materialised on board and are intent on destroying Petes cargo of Ubik-Wheat. Pete has to successfully process eight boxes of Ubik-Wheat for every plant grown to gain access to the next level of play. With two highly colourful games screens, three lives and five levels of increasingly difficult play can you help Paranoid Pete to save the world or will the Mega-wibbles have you and the Ubik-Wheat for breakfast.

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## Acorn

continued from page 1

to meet all sorts of needs," explained an Acorn spokesman.

The additional processor units will be linked by a development of Acorn's Tube interface currently used with the second processor add-ons for the BBC machine. "With The



Acorn's managing director Chris Curry

Tube we have a particular advantage over our competitors and we would be foolish not to use it," continued the spokesman.

"What will come out in September will not be another QL — it will be a machine people will actually want to use".

## Legal action over copying

DEVON Trading Standards Authority is the latest body to take legal action over software piracy.

It received a complaint from Crystal Electronics in Torquay, that copies of its *Xtal Basic* program for the Sharp MZ80K and photocopies of the accompanying manual were being hired out in Yorkshire.

Howard Austin, a nineteen year-old from Pudsey in West Yorkshire, pleaded guilty at Teignmouth Magistrates Court to three offences against the Trades Description Act, two against the Copyright Act and one against the Forgery and Counterfeit Act.

Michael Cheney, solicitor for the Trading Standards Authority, said, "We took the view that the accused was in breach of copyright of the printed word in that he was photocopying the program's manual. It is a breach of the Trades Descrip-

## MTX price drop

MEMOTECH will be cutting the price of its MTX 500 machine from September.

Currently selling at £275.00, it will drop to £199.99, and five free games cassettes worth £30 will be included in the package.

## Latest from Legend

THE eagerly awaited follow-up to Legend's *Valhalla* is scheduled for October and will be entitled *The Great Space Race*.

The program, described as a 'spectacular futuristic romp' by Legend will be released for the Spectrum and the Commodore 64 simultaneously.

At first glance the game looks like a radical departure from *Valhalla*. "It's a bit like an arcade game in that you are up against a clock and under continuous pressure but it has a richness of structure hardly found in even the best adventure and strategy games," says Legend's John Peel.

The game is seen as a further development towards the computer 'movie' concept. Like *Valhalla*, characters within the game exhibit independent personalities and the

## MSX

continued from page 1

be launching peripherals — as yet unspecified — with their computers in October, while Yoshio Yamashita, product coordinator for Canon, said that as yet, no peripherals were planned from Canon.

The first MSX machine to arrive in the UK will almost certainly be Toshiba's — in September.

The Toshiba 64K micro, called the HX-10, will cost £279.00, and Toshiba will be launching a standard joystick at the same time for £14.95. In October, a printer/plotter called the HX-P570 at £249.00 and a dot matrix printer at £349.00 will be available.

According to Chris Greet, Toshiba's product manager, the plotter is "a four-pen device with a speed of 285 steps per second which takes any paper up to A4 size and connects with

tion Act to supply something protected as copyright as original when it is not, and we added the offence under the Forgery Act because he was passing the program and documentation off as genuine when it was a copy.

"*Xtal Basic* was only one of the programs on Austin's catalogue of software available."

Austin was fined a total of £40 with £50 costs. He was given a six month conditional discharge.

graphics are controlled by a computer 'director'. "Not only are the graphic displays in true solid 3D but what you see depends on a complex logic controlled by the computer," continued John.

The plot of the game is in two sections. In the first you compete with computer-controlled players to get the best machinery, stores, equipment and personnel for your spaceship. The second section is the race itself — first to reach a distant corner of the universe.

Unlike *Valhalla* which understands a range of typed-in instructions *The Great Space Race* uses a form of single-key press input. "What happens is that for any given situation a number of logical alternatives from which you may choose are displayed in the top of the screen — it is perfectly possible you may never get the same combination of alternatives twice in the game."

The game uses a special operating system Movisoft 2 as its basis — a development of the original Movisoft system used in *Valhalla*. By the time of its release Legend expects to have spent over £0.25m on its development believed to be the largest amount ever spent on the development of a single computer game.

a Centronics interface."

The dot-matrix printer, the HX-P560, prints at 105 characters per second over 80 columns. It operates with tractor or friction feed and again can use any paper up to A4 size. It also connects to a Centronics interface.

However, Toshiba's disc



drive, originally based on the Sony 3 1/2 inch drive mechanism and due here before Christmas will not now appear until next year. "We are now working on a 3 1/2 inch disc drive of our own design and manufacture," continued Chris Greet. "The first of these will come off the production line in Japan just before Christmas."

## Sinclair

continued from page 1

Pack will consist of the micro-drive and Interface 1 plus four microdrive cartridges. These will contain an *Introduction To Your Microdrive* demonstration program, a 'utility' cartridge featuring *Tasword 2* from Tasman and Campbell Systems' *Masterfile*, a games-orientated cartridge with Quicksilver's *3D Ant Attack* and *Games Designer*, and a blank cartridge. Sinclair will be advertising on TV for the first time, with this package.

Sinclair's managing director Nigel Searle cautioned that retail stocks of the QL and flat-screen TV would be limited to begin with, and that demand



would exceed supply. Thorn EMI Datatech's production of the QL is being stepped up to 90,000 units per month, and Sinclair has appointed Timex as a second source for the manufacture of the pocket TV. Two new sub-contractors, AB Electronics of Wales, and Samsung of Korea, have been appointed to assemble the Spectrum.

Nigel Searle also announced that Sinclair was within a week clearing the backlog of QL mail orders — 15-20,000 having been delivered. With the QL available on retail, mail order-advertising has been discontinued.

● Scicon, in conjunction with OE Ltd, will be producing a communications package for the QL. An interface with a terminal emulator comprises one pack, and a modem will also be available. No prices have yet been fixed. More information from Scicon, 49 Berners Street, London W1.

WE are informed by Beau-Jolly, distributors of software under the Imagine label, that it has no evidence of cut-price Imagine tapes having been sold to a German distributor, as reported in PCW, July 12.

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## A turn for the worse

I thought I ought to write concerning your magazine. It has changed from a serious, slim, glossy magazine, to a more news-orientated one, to a games mag. Your editorials appear to be written by Sun journalists — short, snappy and eye-catching. All definitely a turn for the worse.

I'm not too keen on the new layout either — but I'm sure I'll get used to it soon enough. And I've noticed the price-drop too. From 40p to Only 40p.

All I want to know is when is the £1,000,000 Bingo going to start?

Vincent Graff  
147 Wynchgate  
Winchmore Hill  
London N21

There are one or two details still to be sorted out...

## Help for the Beep

With reference to Richard Hyde's questions in *Peek & Poke*, July 19, concerning the Spectrum's *Beep* command, here are two simple-to-use routines which may help. Please note that the numbers preceded by # are in hex.

J D Dalton  
3 Flaxen Walk  
Warboys  
Cambs

```

10
20
30
40 : MUSIC SUBROUTINE
50
60 MUSIC PUSH BC
70 PUSH HL
80 LD A, (HL)
90 CALL #2D28
100 RST #28
110 DEFB #A4
120 DEFB #A4
130 DEFB #04
140 DEFB #05
150 DEFB #38
160 POP HL
170 INC HL
180 LD A, (HL)
190 PUSH HL
200 AND 127
210 CALL #2D28
220 POP HL
230 PUSH HL
240 BIT 7, (HL)
250 : # MUSIC1
260 RST #25
270 DEFB #1B
280 DEFB #38
290 MUSIC1 CALL #03F8
300 POP HL
310 INC HL
320 POP BC
330 DJNZ MUSIC
340 RET
350
360
370 NOTES DEFB 50,1
380
390
400
410 : TO USE THIS ROUTINE
420
430 : LD HL, NOTES
440 : LD B, 1 (NOTE COUNT)
450 : CALL MUSIC
460
470
480 : THE MAXIMUM NUMBER OF
490 : NOTES IS 256.

```

```

500 : DURATION IS SECONDS/100
510 : EG. 50 = .5 SECONDS,
520 : MAXIMUM DURATION IS 255
530 : OR 2.55 SECONDS.
540
550 : PITCH IS AS FOR BEEP
560
570 : FOR NOTES WITH A PITCH
580 : LESS THAN ZERO ADD 128
590 : TO POSITIVE VALUE
600 : EG. 129 = B-1
610 : 146 = B-20
620
630
640
650 : MESSAGE PRINTING
660
670
680
690 : PRMESS XOR A
700 : LD HL, DE
710 : LD HL, DE
720 : LD HL, DE
730 : LD HL, DE
740 : LD HL, DE
750 : LD HL, DE
760 : LD HL, DE
770
780 : MESS DE
790 : M0 DE
800 : M1 DE
810 : DEFB #00
820 : DEFB #10
830 : DEFB #11
840 : DEFB #10
850 : DEFB #11
860 : DEFB #10
870 : DEFB #11
880 : DEFB #10
890 : DEFB #11
900 : DEFB #10
910 : DEFB #11
920 : DEFB #10
930 : DEFB #11
940 : DEFB #10
950 : DEFB #11
960 : DEFB #10
970 : DEFB #11
980 : DEFB #10
990 : DEFB #11
1000 : DEFB #10
1010 : DEFB #11
1020 : DEFB #10
1030 : DEFB #11
1040 : DEFB #10
1050 : DEFB #11
1060 : DEFB #10
1070 : DEFB #11
1080 : DEFB #10
1090 : DEFB #11
1100 : DEFB #10
1110 : DEFB #11
1120 : DEFB #10
1130 : DEFB #11
1140 : DEFB #10
1150 : DEFB #11

```

## Correct order

Thank you for printing my *Moonlander* program in the June 28 issue.

Unfortunately certain parts of the listing have been printed in the wrong order. To get the program to work first type in Lines 1 to 380 from page 37. These should be saved onto tape as the first part (Instructions and UDGs). Then type in Lines 1 to 320 from page 39, followed by Lines 400 to 1080 from page 37 — making the second part (the game). This should then be saved to tape immediately following the first program. Then it should work.

Darren Paterson  
Corby  
Northants

## No sex please...

Recently you have been carrying an advertisement for a program called *Gissa Kiss* from Titan Programs and I feel I must complain.

This is a sex game and the sooner the government bans

games like this the better. As for the magazine, I am shocked that you would even except an advert of this kind. I hope that you will refuse to take adverts from this company in future.

Christopher Bryant  
11 Havenview Road  
Seaton  
Devon

PS I was thinking about subscribing to your magazine but now I've had second thoughts..

We looked at the game before accepting the ad and, while the game may be offensive to some — it is certainly degrading to women, by no stretch of the imagination could it be described as pornographic. In fact I would say the ad may even be a bit misleading. But then, anyone who buys programs in "discreet" brown-paper packages deserves to be disappointed.

## Who will be left behind?

We, as Britons and Europeans, are firmly setting our feet on the road that leads into the dark ages of computer technology.

While British and European manufacturers are developing separate systems which are, almost certainly, by design, not software compatible, the Japanese have between all their major electrical companies produced one specification — MSX — and all their machines are software compatible.

It is fashionable for people in the industry to scoff at MSX for being out of date, but are

we not failing to appreciate the significance of the principle of MSX — the Japanese are working to one standard? At the moment in Europe there is a small body desperately lobbying the high-tech interest groups to agree on a standard computer interface!

Recently Sir Clive was talking excitedly on the TV about the Fifth Generation and AI. The generation of those who will be producing the Fifth Generation are now or will soon be cutting their milk teeth on today's home micros and small business computers. Who would you put your money on to be the first to develop AI? A country where the industry is working together and by consequence pooling its efforts. Or a group of countries where the manufacturers on the whole strive to tell the poor incomputerate that they are 'the only one in step' and sell them systems that run only system-tailored software?

John Mawhood,  
72 Hazlewood Road,  
London SW15

## CP/M users take note

In *Peek & Poke* in the July 12 issue David Brown of Whitby, North Yorkshire asks if there is an organization which loans or gives away CP/M programs. Your answer amounted to saying that no such group existed.

You may have overlooked the CP/M Users Group — CPMUG — or its newly formed British branch, CPMUGUK. Its address is 72 Mill Road, Dartford, Kent. Although it doesn't exactly give away its programs free, once you are a member you may obtain any one of a large collection of CP/M software titles for the price of the disc plus a nominal charge for copying. This is normally onto 8inch discs but a firm called Grey Matter (regularly advertising in *PCW* and other magazines) can solve the format problem. All this software is public domain, and much of it is extremely useful.

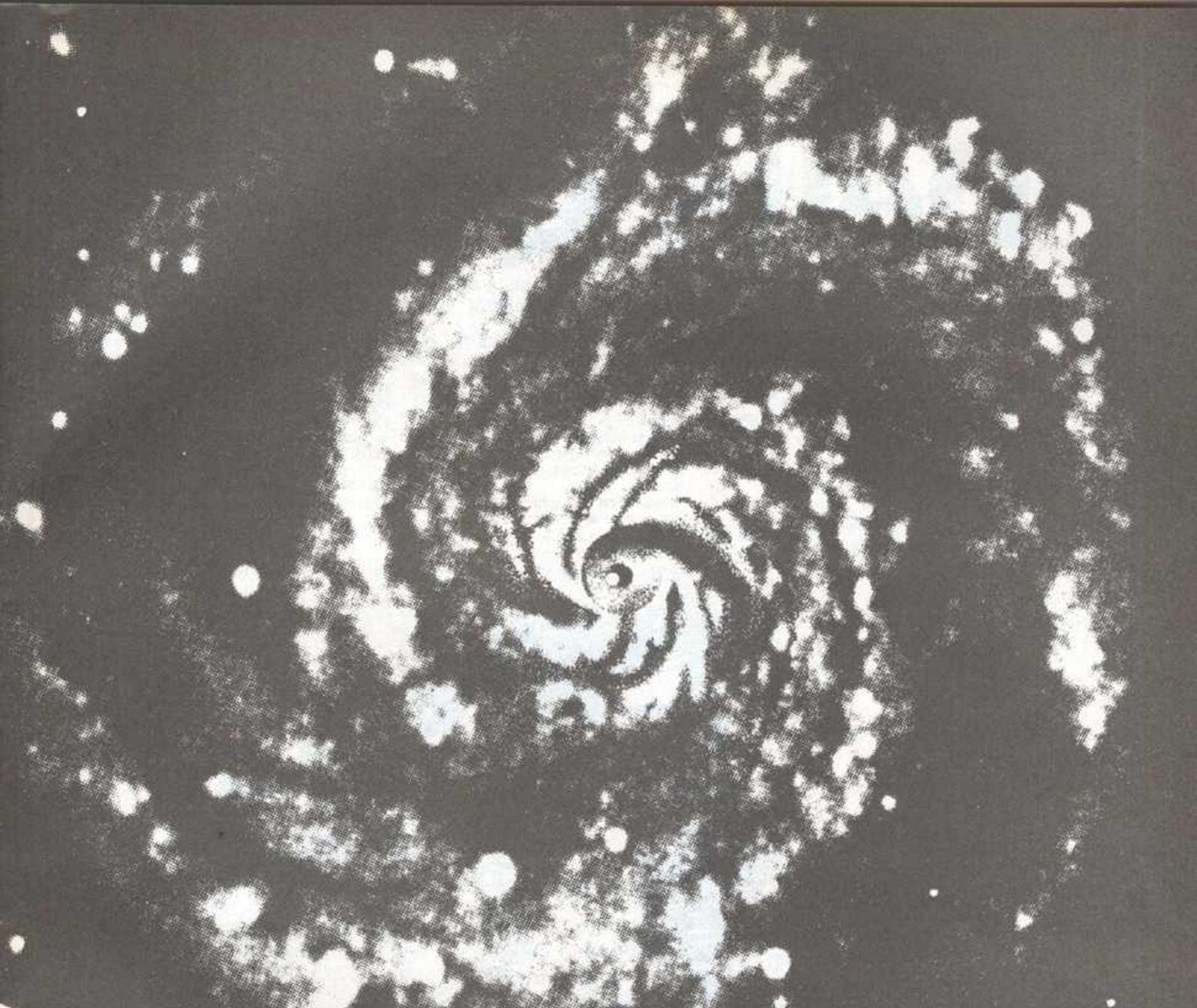
L L Fahidy  
58 Castle Drive  
Horley  
Surrey



But it won't feel right. Can't I pay for it now and then wait?

# THE GREAT SPACER





# RACE

MOVI  
SOFT 2

# Delta Queen

Pilot your paddle steamer up the Mississippi in John de Rivaz's game for the 16 or 48K Spectrum

**A**s captain of the *Delta Queen* you must navigate your way safely up the Mississippi, avoiding the coast, the banks and the bridge supports stretched across the river at various points.

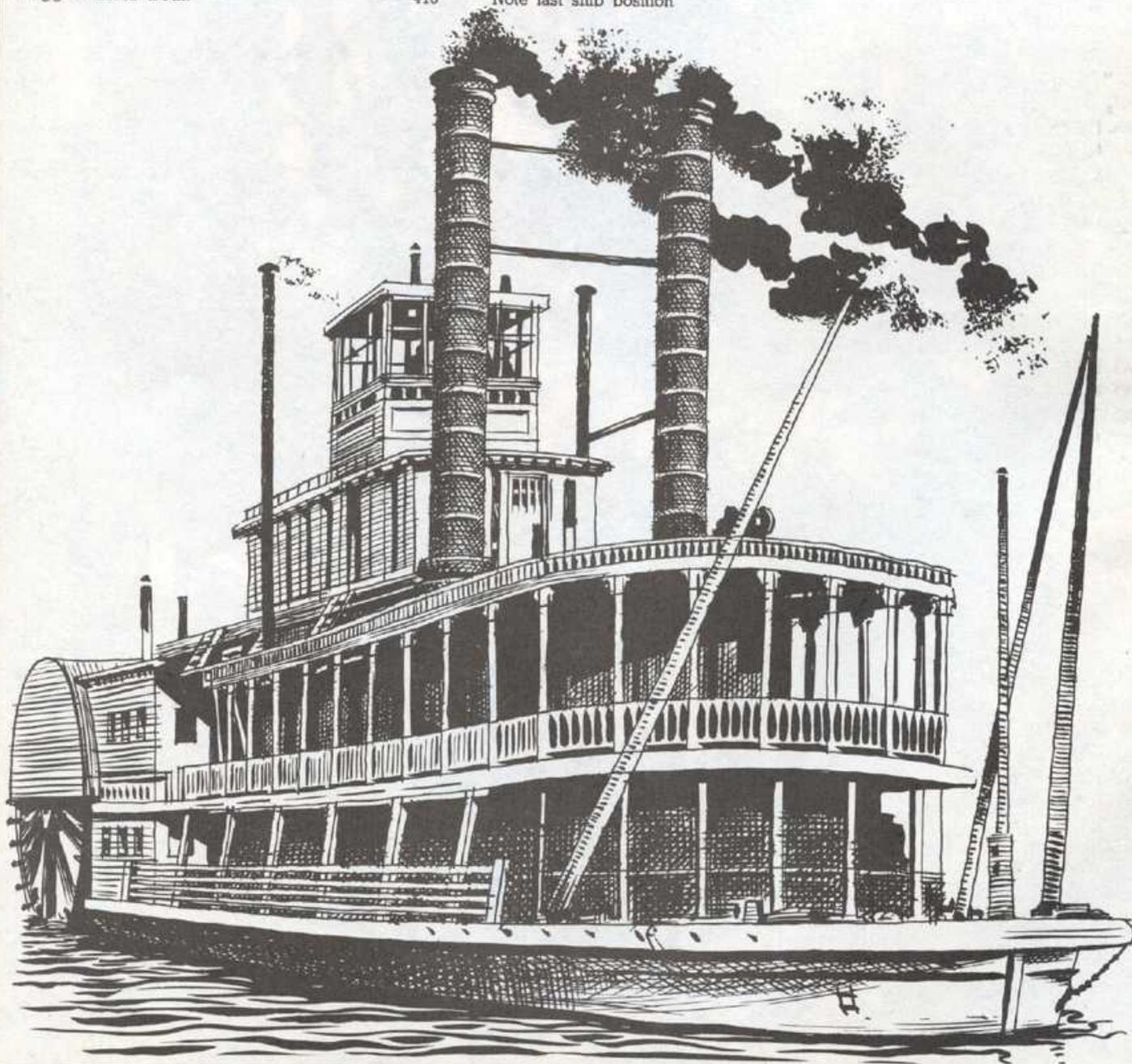
The program could form the basis of a much more involved program but, as it stands, it gives a good game and is still a fairly short listing to type in. For example, one idea would be to give the steering an inertia factor more appropriate to a sluggish river boat.

The score increases with every unit you progress. Hit any object, though, and the *Delta Queen* will veer off into open water — an event announced with a little beep.

**Program notes**

- 130-190 Set up machine code with checksum for any size Spectrum
- 230-260 Print instructions and prepare the screen
- 290 Draw coast and initialise river banks
- 300 Main loop entry point.
- 300-350 Draw a line of picture
- 380 Put in random bridge supports
- 410 Note last ship position

- 420-450 Get user-move and check on screen
- 460 Check for collision: if so zero score and centre ship
- 470 Unplot last ship's position
- 480 Plot new ship's position
- 490 Scroll bottom  $\frac{1}{4}$  screen and update score
- 530-570 If ship hits land or bridge, then push it to open water
- 560 Line inserted in case random routines contain a bug that causes river to be blocked!



```
130 REM Set up machine code
140 REM _____
150 DATA 17,255,71,33,32,0,25,229,213,17,0,88,237,82,209,225,56,5,33,125,92,53,
201,167,6,32,203,22,43,16,251,33,32,0,25,235,24,221
160 LET rt=PEEK 23720+256*PEEK 23731
170 CLEAR rt-39
180 LET rt=PEEK 23720+256*PEEK 23731
190 LET test=0: FOR f=rt TO rt+37: READ a: LET test=test+a: POKE f,a: NEXT f: I
F test<>3608 THEN PRINT "Data error!": STOP
200 LET score=0
210 REM Print instructions etc.
220 REM _____
230 LET s$="": PRINT #1;AT 1,0; PAPER 1;s$;: BO
RDER 1
240 CLS : PRINT "River Navigation: 23 June 1984"
250 PRINT PAPER 5;s$
260 PRINT INK 7; PAPER 1;"You see a coast approaching. You must steer your ship
"" upriver using the 6 and 7 keys. Your score rises with every unit pass
ed, but is reset to zero if you hit anything. Avoid bridges."
270 REM print coast and estuary
280 REM _____
290 LET r1=50+50*RND: LET r2=10: LET j=r1-5: PLOT 127,j: PLOT 255,111: DRAW 0,r
1-111: PLOT 255,r1-r2: DRAW 0,-r1+r2
300 LET score=score+1: LET r1=r1+1-INT (3*RND): LET r2=r2+0.5-RND
310 IF r2>20 THEN LET r2=20
320 IF r2<10 THEN LET r2=10
330 IF r1>111 THEN LET r1=111
340 IF r1<r2 THEN LET r1=r2
350 PLOT 255,r1: DRAW 0,111-r1: PLOT 255,r1-r2: DRAW 0,-r1+r2
360 REM print bridge caissons
370 REM _____
380 IF RND<.05 THEN FOR n=r1-r2 TO r1 STEP 2+2*RND: PLOT 255,n: NEXT n
390 REM user move
400 REM _____
410 LET lj=j
420 LET a$=INKEY$: IF a$="6" THEN LET u=RND: LET j=j-1
430 IF a$="7" THEN LET u=RND: LET j=j+1
440 IF j>111 THEN LET j=112
450 IF j<0 THEN LET j=0
460 IF POINT (128,j)=1 THEN BEEP .5,.5: LET score=0: GO SUB 530
470 PLOT INVERSE 1;127,lj
480 PLOT 128,j
490 LET u=USR rt: PAPER 5: PRINT AT 1,0;s$(LEN STR$ score+7 TO );: PAPER 7: PRI
NT PAPER 2; BRIGHT 1; INK 7;"Score ";Score;
500 GO TO 300
510 REM Stop sailing on land!
520 REM _____
530 LET jp=j: LET jn=j
540 LET jp=jp+1: IF jp<111 THEN IF POINT (128,jp)=0 THEN LET j=jp: RETURN
550 LET jn=jn-1: IF jn>0 THEN IF POINT (128,jn)=0 THEN LET j=jn: RETURN
560 IF jp>111 AND jn<0 THEN CLS : PRINT "You have hit the end of the river!":
STOP
570 GO TO 540
```



# commodore

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# QUO VADIS

*"Commodore 64 owners looking  
for a Mega-game this Autumn will  
not be disappointed"*

## This is the modem world

Robin Wilkinson explains how to get started with Networking on your micro

**T**ired of all those games, frustrated with your latest programming attempt — then its time you got networking.

More and more services are opening up to let your micro do the walking across BT's public telephone network.

Modems are the hardware that allow your micro to connect to the telephone network and together with the relevant communications software open up a whole new world.

Public networking — connecting to such services as *Prestel* with *Micronet 800*, *BT Gold*, the business electronic mail service and the recently announced *Compunet* — is catching on fast.

Add to that a proliferation of bulletin boards — private services where anything can happen! — other on-line information retrieval systems and the ability to swap data with a friend's micro on the other side of the country and you can see how your micro can be turned into a highly versatile and powerful information terminal.

One couple in the States managed to use networking to date and later get married.

There's just one person you have got to keep an eye on — that's Buzby — and the telephone bill can come as quite a shock. But networking can be reasonably cheap if you restrict yourself to cheap call times and concentrate on databases which offer a local call access node (the jargon for a switch to a remote computer service housed in your local telephone exchange). Your time connected to the computer is charged as a local call.

If you really want to get serious, you could take out an account on the public switchstream service which allows you to dial services around the world at cheaper than normal rates — but the minimum payment is out of the reach of most home users who are just getting started.

There are no simple answers to getting hooked up and like everything it all de-

pends on how much you are prepared to pay and what type of service you wish to access.

A list of service providers and modem manufacturers/distributors is shown in the two panels. Generally, modems will operate with a variety of software packages. When you get a modem you will also need the software so that your micro can make sense of what it is hearing from the modem.

Modems receive and transmit data at a variety of speeds — called the baud rate. Normally this will be (receive/transmit), 300/300, 1200/75 or 1200/1200 bits sec.

Modems with only 300/300 baud are generally cheaper ranging from £45. They can connect to a wide variety of services such as bulletin boards. However, transmitting and receiving data at 300 baud can be slow and therefore has an overhead when it comes to your telephone bill.

Modems with only a 1200/75 rating have a more limited range of services available to them although this speed is beginning to gain acceptance on some bulletin boards. This speed is generally used for viewdata services like *Prestel* and *Compunet* where the host main frame or mini is transmitting more data to you than you are sending back to it. In this instance about 1K of data reaches you at 1,200 baud in around seven seconds. You send back at only 75 baud which is quite adequate for electronic messages but not really any good for uploading long files.

A typical *Prestel* page, for example, containing around 120 words (display is in teletext format) transmit in seven seconds. Costs for these 1200/75 only modems start at around £55.

More and more modems now couple 1200/75 operation with 1200/1200 — then you are really in business. You can transmit data back to the host quite quickly or to another micro providing

you have the correct software and compatible modems. Costs for those more versatile units start from £70.

The ideal modem is one which combines all these facilities 300/300, 1200/75 and 1200/1200. Here the cost climbs to above £125 but with component costs still falling and interest high, you can expect prices to drop in early '85.

There is also a wide variety of terminal emulation software around

Below is a compilation of services available to modem owners, together with the baud speed of the access ports. It is well worth checking, where possible, with the system operator, to see whether your software is compatible.

### MAJOR SERVICES

**Prestel Microcomputing including Micronet 800 and Viewfax 258.**

A viewdata service running at 1200/75 baud with local call access around 92% of the country. There is also 300/300 baud access, but only on a London number. Minimum subscription is £20 per year for *Prestel* and £32 a year for the microcomputing section which offers news, downloading of free and commercial software, electronic mail, telex and teleshopping.

Contact: *Micronet 800* (Tel: 01-278 3143) or *Viewfax 258* (Tel: 021-705 0258).

### Compunet

A viewdata system with advanced features for personal computer operated jointly by Commodore and the ADP Network. Local call access at six points around the UK. Facilities include ability to upload your own software or information to the host system. Launch date of service is late September. Port speeds 1200/75 baud.

Contact ADP (Tel: 01-637 1355) or Commodore Information Centre (before August 17 Tel: (Slough) 74111. After August 17 Tel: (0536) 205252).

### BT Gold

Really an up-market electronic mail teletext system but does have special-interest group bulletins. Port speeds 1200/75 or 1200/1200 baud. Mainly for corporate company communications. Tel: 01-403 6777.

### Dialogue

A mammoth database with access via PSS or direct to London. *Dialogue* contains numerous distinct databases on subjects from world affairs through to chemistry, economics and has a special microcomputing section. Operates at 300/300 or 1200/75 baud. You do not need a special PSS account to use (Tel (0865) 730969). SEMI-COMMERCIAL SERVICES

### Maptel

Run by Maplin Electronics, provides tele-ordering of equipment and software using credit-card to existing customers. Runs at 300 baud. (Tel (0702) 552941).

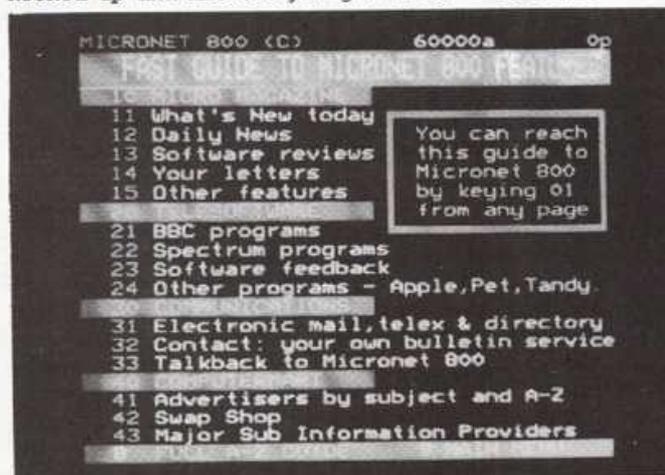
### Distel

Run by Display Electronics, *Distel* offers tele-ordering but also bulletin board-type facilities, gossipe and news. Runs at 300 and 1200/75 baud. Contact Dave Fisher on (Tel 01-679 1888).

### UK BULLETIN BOARDS — ALL FREE

Most bulletin boards operate during the evenings and weekends. Be patient — most operators do it for a hobby. If you get in real trouble type *Help*. Some magazines are even offering their own BB boards now.

*CBS South West* — Tel (0626) 890014. *Mailbox 80 W Midlands* (0384) 635336. *Forum 80 Hull* — (0482) 859169. *Forum 80 London* 01-902 2546. *CBBS London* — 01-399 2136. *Liverpool* — 051-428 8924. *TEBS London* — 01-348 9400. *BASUG* — (0742) 667983. *Computer Answers\**, London — 01-631 3076. *CBBS Surrey* — (04862) 25174. *Blandford* — (0258) 54494. *Southern BB* (0243) 54494. *Birmingham* — (0827) 28810. *Stoke (ITEC)* — (0782) 265078. *West Midlands* — 021-631 3076. *Microweb (BBC Micro User)* — 061-456 4187. *Chiltern* — (07073) 28723. *City London\** — (01-606 4194). *Cumbria\** — (069) 92314. *Manchester* — (061-427 3711. Note: Most BB's operate at 300/300. Those with an asterisk are believed to work at 1200/75.



for home microcomputers ranging from the ZX81, Spectrum, Commodore 64, Dragon, Oric, and BBC up to big-blue IBM, Sirius and Apple.

Most public database providers recommend certain modems and software, which they know operate well with their particular database. Make sure you check on the versatility of the software to connect you to other systems.

If you are looking for a very cheap entry into networking you can do no worse than get a 300/300 modem. Try a user group or a small ad in *PCW* for second-hand one. You



could pick up a cheap modem for £25 and you may get the software for bulletin boards free. However, the level of service and quality of information on these amateur boards varies considerably and they have severe limitations on the number of simultaneous callers possible, and usually only operate at evenings and weekends.

You will find most bulletin board (BB) operators to be enthusiastic and helpful. One of the longest standing is Fred Brown from Hull who operates mainly for Tandy users.

Some commercial services, and indeed some amateur services, are beginning to offer 1200/75 and 300/300 communications.

Professionally operated databases called Remote Computer Services are growing at a rapid rate. They normally operate at 1200/75, 1200/1200 or higher speeds. Examples of these are *Prestel* with a special microcomputing section currently supporting Spectrum, BBC, Commodore 64 and Apple users; *Compunet* for the Commodore 64 (launch due late September); *BT Gold* an up-market electronic mail service with some other features; *Dialogue*, a vast database aimed at researchers; *World Reporter*, a joint BBC/Datasolve service of world news; *Maplin* a catalogue shopping database; and *Distel* a semi-professional bulletin board with commercial teleshopping too, for electrical components.

**Robin Wilkinson is a freelance electronic publishing consultant.**

Next Week *Popular Computing Weekly* begins a new weekly networking column — *Board Walk*.

Any readers with experience of public networking services are asked to send their experiences or news of new services to Robin Wilkinson, *PCW*, 12-13 Little Newport Street, London WC2R 3LD.

He can also be contacted on *Prestel* mailbox 019993737.

Listed below are the major companies who supply modems for the home microcomputer and small business markets. Some sell only modems, others offer modems with a variety of software packages.

Remember, for simple bulletin board use, readily available terminal emulation packages are available, often from the bulletin board operators or user groups. Send a SAE to operators who in most cases will be pleased to help.

Large database operators will often offer more complex software tailored to their systems. In some cases you will need to identify the types of services you wish to use the modem for and buy one or perhaps two software packages.

**Prism Microproducts, 18-29 Mora Street, City Road, London (Tel: 01-253 2277).**

Prism offer a variety of modems and software packages mainly for viewdata use and user-to-user. Their modems can be used for bulletin boards with 1200/75 access but you will need to acquire the software.

**VTX 8000** — purpose built for the Spectrum with software for viewdata and user-to-user. Cost: £99.95 but enquire about rental scheme also. Bauds: 1200/75 1200/1200.

**Modem 1000** — with software on ROM for the BBC to access viewdata and user-to-user. Cost: £89.90. Baud: 1200/75 and 1200/1200.

**Modem 2000** — This modem has software controlled send and receive. Available for the Apple with software. Cost: £120. IBM PC, Sirius and Apricot. Cost: £258.85 including *DBase II* run-time viewdata and user-to-user. Bauds: 1200/75 and 1200/1200.

**Tandata, Albert Road, Malvern, Worcs (Tel (06845) 68421).**

Tandata offer two basic modems with a variety of software packages. Again some are tailored for viewdata.

**Tm110** — basic 1200/75 baud modem, autodial. Price £99.

**Tm120** — same as Tm110 but also with 75/1200, 1200/1200 and 300/300 baud rates. Cost: £165.

Software packages available for both: BBC (£17), Apple II and IIe (£40 or £75), Commodore Pet (£69), Commodore 64 (£42), Vic 20 (£27), IBM PC (£150) and CP/M machines (£125).

**Minor Miracles, PO Box 48, Ipswich (Tel (0473) 50304).**

Company supplies the WS2000 modem which is currently awaiting final BT approval and runs at various speeds.

**WS 2000** — 300/300, 600/600, 1200/1200 baud. Compatible with European and American (Bell) standards. Cost: £129.95 inc P&P. Software offered for BBC and Apple.

**Pace Systems, 92 New Cross St, Bradford (Tel (0274) 729306).**

Originally better known for producing the excellent Commstar software for the BBC, Pace have now launched their own modem.

**Nightingale** — 300/300 and 1200/75 baud. Compatible with European and Bell standards. Cost: £136.85. Software for the BBC (*Commstar*) £34 and Apple either software plus card £120.75 or software £69 and serial card £51.75.

**OEL Ltd, North Point, Gilwilly, Industrial Estate, Penrith, Cumbria (Tel (0768) 66748).**

A long established company offering a variety of modems and software packages.

**Pac-M1** — An acoustic modem, 1200/75 baud. Cost: £99.94.

**Telemod 1** — A 300/300 baud answer and originate modem. Cost: £99.94.

**Telemod 2** — 1200/75 and 1200/1200 baud modem under software control. Cost: £84.95.

**VTX 5000** — Operates at 1200/1200 and 1200/75 baud with integral Spectrum viewdata software. Cost: £99.95.

Software is available for a variety of micros from the BBC cassette viewdata software at £13.00 to Commodore 64 cartridge allowing access to a wide range of services at £74.70.

**Interlekt Electronics, Reacis House, Portman Road, Reading (Tel (0734) 589551).**

**Portman** — a multi-standard modem offering 1200/1200 and 300/300 and 1200/75 baud with other refinements. Cost: £228.

**DaCom Systems, 16 Alston Drive, Bradwell Abbey, Milton Keynes (Tel (0908) 676797)**

**Buzzbox** — Standard 300/300 baud modem. Cost: £79.95.

**DSL 2123** — 1200/1200, 1200/75, 300/300 and 75/1200 baud modem. Cost: £280.

**Display Electronics, 28-32 Biggin Way, Upper Norwood, London (Tel (01-679 4414).**

The company offers its own bulletin board service and specialises in stocking very cheap modems which have been superceded by more fashionable-looking ones. However, if you don't mind a box at least as big, and if not bigger than your micro, then try them. Software, though, is not supported.

**BT 20** — standard robust 300/300 baud modem. Cost: £57.44.

**BT 2B** — standard 1200/75 baud modem. Cost: £97.75.

**Maplin Electronics, PO Box 3, Rayleigh, Essex (Tel (0702) 552911).**

Maplin also run their own service for catalogue subscribers and provide their own 300/300 baud modem in kit-form for £49.00.

**Note:** Some modems are sold without British Telecom approval and your BT engineer — unless the modem is acoustic and does not require a jack point — may refuse to install a socket (if you haven't already got one) if there is not a green triangle approval sticker on your hardware.



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Farridon Road, Market Harborough,  
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GRAND  
TOTAL

all prices include p&hp

Card Number

Access/Visa (Delete as necessary)

NAME

ADDRESS

POST CODE

SIGNATURE

Please rush me details of the "ENTER the BEYOND"  
Software Club . . .

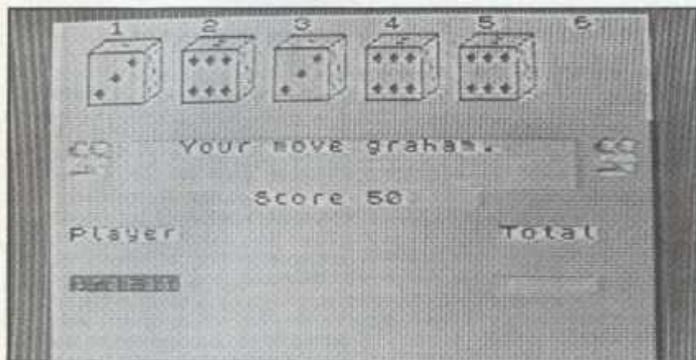
POP2/8

## Confusing

**Program** *Dix Mille Micro*  
Spectrum 48K **Price** £2.99 **Supplier** CCS, 14 Langton Way,  
Blackheath, London SE3.

I was surprised to see this game, as it's the first CCS game I've come across at the cheap price of £2.99.

They well may try to maintain their old prices for their old games, but since this is no better or worse than their others it seems a little confusing.



*Dix Mille* is a very simple gambling game, using dice. Because the instructions were very unclear, though, I spent more time trying to find out how to work the game than I did actually playing it. The game shows reasonable graphic representations of the six dice with which you gamble but after one or two go's, watching them gets rather mo-

notonous, as the screen display rarely changes (only to offer you a new game!)

I have been much impressed by some of the other cut-price software around, in particular from Mastertronic and Atlantis, but this program from CCS is not as good — even though it costs £1 more.

One advantage of *Dix Mille* is that, since it is written in Basic and is totally unprotected, you are able to *List* it to see what techniques the programmer has used. That said, the game is very badly written, and with care could almost certainly have been fitted into a 16K

computer — at the moment it is just for the 48K Spectrum.

Sorry CCS, but you'll have to do better than this, even at the low price. It is cheaper to buy any micro magazine such as this where the games listed inside are just as good.

David Lester



## Amusing

**Program** *Wordgram Micro*  
BBCB **Price** £9.95 **Supplier** Daco Software, 59 Mackenzie Road, Moseley, Birmingham B11 4EP.

After the cleverness of *Readright* and *Storyline* this latest offering from Daco is a disappointment.

It sets out to help people learn about parts of speech: nouns, verbs, adjectives, conjunctions. Like the others in the series it encourages the user to write little stories so that there is a creative aspect to the exercises. The resulting tale is often amusing. From the start you decide whether to use

formal grammatical names or brief descriptions (eg "nouns" or "words for people and things".) A simple menu at the foot of the screen prompts you to pick a type of word, then offers one of that type. If you accept it it joins the slowly building story at the top of the page. Reject it and another is offered. The finished story can be shown on screen in pages or dumped to a printer.

The snag is that the program cannot do much useful checking of the learner's responses. All you really get practice in is recognising what sort of words are "verbs" or "words for action".

Dave Watterson



## Step forward

**Program** *Moder-80 Micro* 16/  
48K Spectrum **Price** £8.95 **Supplier** Seven Stars Publishing,  
15 Gloucester Avenue, London NW1.

*Moder-80* is a machine code disassembler and editor which, together with its companion *Gener-80*, a full assembler, gives very comprehensive facilities for writing, modifying and checking machine-code programs.

It offers all the facilities you would expect from a machine-code de-bugging tool including the ability to display registers, to insert a breakpoint (at which they will be dis-

played) and to single step through a program, again seeing the registers, thus enabling you to discover exactly where (for example) an unintended jump is being made. When an error is found the program can be modified using the simple assembly facilities. Other features include full disassembly of machine code (including the ability to save the disassembled listing to tape for later use with *Gener-80*), Hex arithmetic and hex to decimal conversion, and writing both one and two byte numbers and Ascii strings directly into memory.

The program is compatible with Interface I and can be backed-up to Microdrive.

Simon Springett



## Boobytraps

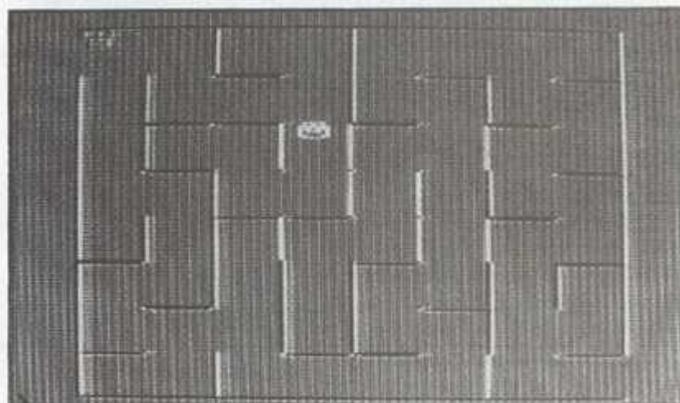
**Program** *Bumpers Micro* Dragon 32 **Price** £7.95 **Supplier** Dragon Data.

*Bumpers* is a maze game for either two players or for one player against the computer. The opponents start off in the top left and bottom right points of the maze and the winner is the first to navigate to the opponent's start point.

which case the zapped victim reappears at a randomly determined point on the maze.

Each game is itself randomly generated and there is only one correct path through. To add further to the hazards, a player can create up to three boobytraps of his or her own at a time during the game and this can be used strategically.

The game can be varied by changing the dimensions of the maze to any size up to a maximum of 13 by 15, and, when playing the computer, 4



There are, as you would hope, some complications. The maze is initially invisible — all that is displayed is a matrix of dots showing the dimensions of the maze and it is only as you touch a wall that a small portion of it appears. Further, dead-ends have one wall boobytrapped and touching that sends you back to the start point. You can zap your opponent when you cross over, in

levels of difficulty are offered. Control is by joystick and since the emphasis is on thinking as much as dexterity, the speed is controlled by the user.

The bleeps from two players in action sounds a bit like massed armies of mice. A simple idea, but good fun nevertheless.

Derrick Trueman



## Thrills 'n' spills

**Program Full Throttle Micro**  
Spectrum 48K Price £6.95 **Supplier** Micromega, 230-236 Lavender Hill, London SW11

**F**ull Throttle is the motorbike equivalent of Psion's *Chequered Flag*. A racing game, where you ride a 500cc bike around any of ten of the world's most famous tracks.

The screen display is almost identical to that of Psion's highly successful game — the road twisting and turning in front of you, with grass either side, and mountains in the distance.

Although *Chequered Flag* is recognised as the best car racing game available for the Spectrum, it does have two faults. Firstly, you can't use a joystick (at least, no ordinary joystick, such as Kempston); secondly, you have to just race

likely game recently released to cause you to break your joystick — you'll become so-engrossed that you'll push it and pull it...then, snap, no more joystick!). And what is more, not only can you race alone, in the 'practice' mode, but you can also race against 40 other bikers.

Racing against the other bikers makes for a much more addictive game. No matter how I tried, I could not do better than finishing 39th out of 40. I actually reached 34th place at one stage in one of the races, but I soon dropped back again. The main reason for my bad performance, is that whenever you hit another bike you are slowed down to 0 mph, and must then accelerate again. Incidentally, acceleration on your bike is rather good — 0 to 175 mph in about 3½ seconds! The problem I had, was that I seemed unpopular — whenever I came up behind a bike and was about to overtake it, it

takes errors in its stride.

The imaginary instruction set includes only the *Load*,

binary form make it easy to see just what is going on as you run, or single-step, your program.

```

Program: DEMO
-----
          IPT
          LDB,C
          IPT
          LDA,C
          ADD,B
          LD,(55),A
          HLT
-----
          TYPE P to EDIT
          TYPE F for a PRINTOUT
          TYPE H to RETURN to MENU
    
```

*Arithmetical, Logical, Comparative Jump and Halt* groups, but nevertheless allows a beginner to make the first steps of machine-code programming. The clear screen display and fairly comprehensive manual, together with the use of decimal values in all registers, and the ability to display output in

Reasonably priced and well presented, this is a good buy for the serious computer user who wants to learn more, but finds the idea of leaping straight into Z80 machine-code a little daunting.

**Simon Springett**



against yourself. Micromega have taken the same idea for a game, changed it slightly (motorbikes instead of cars), and have remedied both of the faults mentioned above. You can use almost any joystick (be warned — this is the most

moved, or whether I am just paranoid, I do not know. But one day I'll show those other riders just what I can do.

**David Lester**



## Mnemonics

**Program Spectrosim Micro**  
Spectrum 48K Price £5.95 **Supplier** Shiva Software, 4 Church Lane, Nantwich, Cheshire CW5 5RQ.

**A**ssembly language allows you to enter machine-code mnemonics — the abbreviated instructions to the processor at the heart of the computer — and have them automatically

converted into the correct numerical form.

One difficulty of learning Spectrum assembly language is the complexity of the Z80 instruction set, which needs to deal with some twenty registers and eight flags, and the problem that a crash is usually fatal to the program itself.

*Spectrosim* gives the beginner a chance to learn about assembly programming on an imaginary microprocessor, which has just four registers and three flags, and which

## Serious study

**Program Microdrive Utility**  
Micro Spectrum 48K Price £4.50 **Supplier** Easyuse Software, 67 Arlott Crescent, Oldbrook, Milton Keynes, Bucks MK6 2RA.

**O**ne of the gripes about Microdrives is the lack of information given by the Basic command *Cat n* which simply displays the cartridge name, a list of the non-protected file names and the remaining available space on the cartridge. The file types are not listed, nor an indication of any faults that might exist.

The *Microdrive Utility Program* (or *MUP*) from Easyuse Software fills this information gap, with a good range of diagnostic tools to investigate a cartridge. After loading the tape (which you can back up to

microdrive cartridge) you are given a menu of options, including some related to the physical state of the cartridge — such as a sector distribution map — and some related to the individual files — you can see the length and position of each program on the tape, for example, or investigate each sector involved, seeing checksums and the initial information on each sector. A *Copy* facility would have been useful to keep a record of useful information. The program assumes a fair knowledge of the microdrive's data structure, but there are plenty of books available to give that information.

*MUP* is useful, cheap and, being entirely in machine-code, fast. Well worth £4.50 for anyone with serious uses for their microdrive.

**Simon Springett**



```

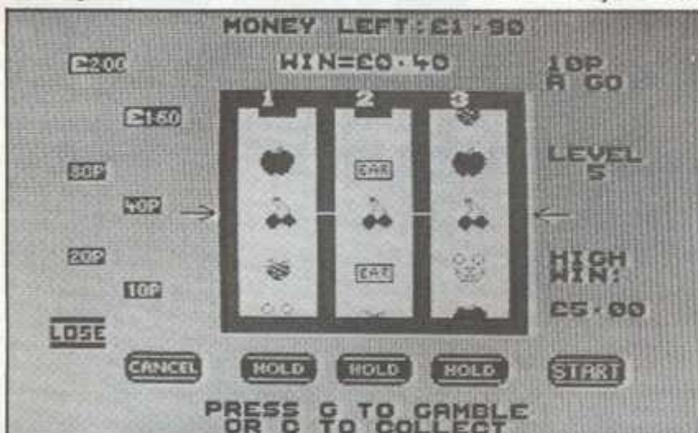
EASYUSE SOFTWARE. MARCH 1982
MICRODRIVE UTILITY PROGRAM V1.1
-----
FUNCTION LIST
-----
0. RETURN TO BASIC
1. BROWSE ALL SECTORS
2. FILE STORAGE ATTRIBUTES
3. SECTOR DISTRIBUTION MAP
4. CARTRIDGE CATALOG
-----
DRIVE: *      FUNCTION:
    
```

## Gamble or collect

**Program** *Jackpot Price* £4.95  
**Micro** Spectrum **Supplier** Michael Horgan.

Although there are quite a number of fruit machine simulations on sale for the Spectrum, I have not seen any of them.

So I looked forward to this game to see how the age-old 'arcade' (the old type) game had coped with its transition to a computer.



I cannot honestly say that it has retained any of its addictive qualities. The original was enjoyable — you could see the wheels spinning and this somehow added to the fascination. This version, though, does not show any such moving graphics, even though it would be a marvellous opportunity to exploit the programmer's talent for high quality graphics — the

program certainly needs something to add a bit of life to it. Instead, when you press the S key to start your go, you hear (if you have good hearing) three miserable beeps, and the new fruit, bar, or whatever, appears on the screen. The Spectrum is not the world's noisiest computer, but a game like this really needs better sound effects which are well within reach from either Basic or machine-code.

If you occasionally play a real fruit machine and want to continue the same excitement in the comfort of your own

home without losing pocket-fruits of 10p's you should not buy this game. If you happen to be uncontrollably addicted to the real thing, then this program is likely to provide cure. I have not been so bored since *Mugsy* and *The Fall of Rome* — the two most overrated games to have been released for ages — came on sale.

**David Lester**

## Flashing dots

**Program** *Admiral Graf Spee*  
**Micro** Amstrad CPC 464 **Price** £7.95 **Supplier** Amsoft, Brentwood House, 169 Kings Road, Brentwood, Essex.

Set in the South Atlantic during World War Two, you are Captain Langsdorff at the helm of the German pocket battleship *Graf Spee* with the objective of seeking out and destroying enemy British ships.

This is quite a good basis for a game but the implementation leaves a lot to be desired. For example searching for enemy ships is simply a matter of

moving the *Graf Spee* around the screen, using either keypad or a joystick, towards intermittently flashing dots whilst trying to conserve fuel.

Compared to this boring search, the battles are quite exciting. The *Graf Spee* must be manoeuvred within range and sight of the target before it can be engaged with guns and torpedos. The targets are able to return fire, with great effectiveness.

Problems are the unresponsive controls, a 'Hold' key that fails to work or else destroys the program and generally sluggish action.

**Greg Pearson**



## Challenging

**Program** *Harrier Attack Micro*  
**Commodore 64 Price** £6.95  
**Supplier** Durrell Software, Castle Lodge, Castle Green, Taunton, Somerset.

The name of the game tells you what it's all about. You have to pilot your Harrier jump-jet from its base on board an aircraft carrier on a mission to destroy the enemy base.

As you fly over enemy territory you are constantly attacked by hostile aircraft, rockets and ground-to-air missiles. You only have a limited supply of rockets and bombs with which to defend yourself, so you have to be careful to leave sufficient for your assault on your target. Fuel must also be conserved by flying at an economical speed, and avoiding too much manoeuvring. If you reach the base and destroy



it, you must then return to the carrier, flying back the way you came.

The graphics and sound are straightforward but effective. The manoeuvrability of the Harrier is nicely reproduced — you can control motion in vertical and horizontal directions, accelerate, decelerate and fly backwards. In order to control all these functions, plus firing rockets and dropping bombs, you need to be able to operate no fewer than seven keys. However, they are sensibly laid out, and fall readily under the fingertips. Quite challenging.

**Richard Corfield**



## Fifteen-two

**Program** *Crib Micro* Spectrum 48K **Price** £5.95 **Supplier** Mutch of Farm Cottage, 28 The Street, Barton Mills, Bury St Edmunds, Suffolk.

Card games don't always transfer very well to a computer but the Farm Cottage version of *Cribbage* is an exception well worth considering if you would like a game and don't have a partner to join you.

The program is an accurate implementation of the original, though plays only the two-player version, with the computer taking the part of one of the players. You play twice round the board, and the human player is given the first

crib, or extra hand (though experienced players will know that this may not help especially: who has the crib may be more important at the end of the game).

*Crib* blends Basic and machine-code, and uses colour and sound well. You are always able to study the game before deciding on your move. All entry is by single key-press and prompts make the game easy to play. My one criticism was that during the pegging section the running total was not displayed, nor prompts of suitable values to get 31 given (such as "26: five's a fix" and "30: one for two"), but don't let this put you off buying.

**Simon Springett**





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## An obvious answer

SuperBasic has many of the powerful features of Pascal including recursive techniques. Alan Turnbull takes a look

One of the most interesting and useful features of the QL for me is its structured programming.

I have been used to programming in Pascal for several years, but now I can get most same features in QL SuperBasic — although the data structuring facilities of Pascal are not available on the QL.

As well as structured loops, the programmer can construct procedures and functions, totally transparent in purpose to the user — just as in Pascal, and use them as if they were part of the SuperBasic language.

A special class of procedures and functions — referred to as 'recursive' — are of particular interest to programmers. A recursive object is one which is defined partially in terms of itself. Recursion is *not* the same as one of those 'circular' arguments you start in the pub when you have had one too many! In describing an object recursively, we begin by describing a simple case directly. Solutions to others more complicated are then found in terms of the solution to the simple case.

Unfortunately, early programmers, especially Cobol programmers in the 1960's, looked upon recursion as an ivory tower plaything and ignored it. But recursion, if used wisely, can give the most obvious solution to a complex problem.

Consider the mathematical definition of a factorial. The factorial of  $n$  written as  $n!$ , is defined as the product of all integers from  $n$  down to 1. For example  $6! = 6 \times 5 \times 4 \times 3 \times 2 \times 1$ . There is also a special, so-called 'base case',  $0! = 1$ , which is defined to be true.

From this a recursive definition of factorial can be formed.  $\text{Factorial}(0) = 1$  and  $\text{factorial}(n) = n \times \text{factorial}(n-1)$ . A SuperBasic function can be written directly from this definition — it is shown in Fig.1. Note that the SuperBasic definition looks just like the mathematical definition.

```
100 REMark Factorial function for
    the Sinclair QL
110 REMark July 1984, Alan
    Turnbull
120
130 DEFINE Function FACTORIAL(n)
140 IF n=0 THEN
150 RETURN 1
160 ELSE
170 RETURN n*FACTORIAL(n-1)
180 END DEFINE FACTORIAL
```

Fig 1

From this start with an easy and well-known example, one can progress quite a long way. Strictly for the mathematicians among you a function exists called Ackermann's Function which is used mostly to illustrate recursion to students! It may be summarised as follows:

$\text{ack}(0,n) = n+1$

$\text{ack}(m,0) = \text{ack}(m-1,1)$   
 $\text{ack}(m,n) = \text{ack}(m-1,\text{ack}(m,n-1))$   
 for  $m,n \geq 0$ .

Fig. 2 shows a SuperBasic listing to implement this function. Just try to implement it in Basic on the ZX Spectrum! Indeed, the only way to do it would be to explicitly use a stack and even then, problems of variable clashes would arise.

```
100 REMark Ackermann's Function
    for the Sinclair QL
120
110 REMark      1984, Alan Turnbull
120
130 DEFINE Function ACK(m,n)
140 IF m=0 THEN
150 RETURN n+1
160 ELSE
170 IF m<>0 AND n=0 THEN
180 RETURN ACK(m-1,1)
190 ELSE
200 RETURN ACK(m-1,ACK(m,n-1))
210 END IF
220 END DEFINE ACK
```

Fig 2

Onto procedures and Fig. 3 shows a SuperBasic procedure to sort a numerical array. So what?, you may say. Well, this sorting algorithm is different from the ones you will be used to. For a start, it is not the good old 'bubble sort', which is thrashed out in many articles and secondary school computer studies courses.

```
100 REMark QUICKSORT algorithm for
    the Sinclair QL
110 REMark July 1984, Alan Turnbull
120
130 DEFINE PROCEDURE QUICKSORT
    (array,left,right)
140 LOCAL i,j,median,temp
150 IF left<right THEN
160 LET i=left:LET j=right
170 LET median=array((left+right)
    DIV 2)
180 REPEAT main_loop
190 REPEAT expand_s1
200 IF array(i)>=median THEN
    EXIT expand_s1
    LET i=i+1
210
220 END REPEAT expand_s1
230 REPEAT expand_s3
240 IF array(j)<=median THEN
    EXIT expand_s3
    LET j=j-1
250 END REPEAT expand_s3
260 IF i<=j THEN
270 LET temp=array(i)
280 LET array(i)=array(j)
290 LET array(j)=temp
300 LET i=i+1
310 LET j=j-1
320
330 END IF
340 IF i>j THEN EXIT main_loop
350 END REPEAT main_loop
360 IF left<j THEN QUICKSORT
    array,left,j
370 IF i<right THEN QUICKSORT
    array,i,right
380 END IF
390 END DEFINE QUICKSORT
```

Fig 3

It is 'Quicksort', developed way back in 1962 by Professor Tony Hoare at Oxford University. Why have you not heard much about it, then? The answer lies in the fact that a good many Basic dialects cannot support the concept of recursive procedures and functions, and local variables. BBC Basic can, and so too can Sinclair QL SuperBasic. So the six-month wait was worth it, after all!

The algorithm may be summarised in English as follows:

PROCEDURE quicksort(s)

BEGIN

IF s contains more than one element THEN BEGIN

choose the median element  $x$  from  $s$ , partition  $s$  into sequences  $s_1$ ,  $s_2$  and  $s_3$  with elements

less than or equal to  $x$ , equal to  $x$  and greater than or equal to  $x$ ;

quicksort( $s_1$ );

quicksort( $s_3$ )

END

END

To call the procedure, you should state its name in a SuperBasic statement, with three parameters: the array you wish to sort, the lower bound of the array and the upper bound. A typical call to sort an array dimensioned as DIMension array\_1(100) would be quicksort array\_1,1,100

In Fig. 3, note that LET statements are used throughout. SuperBasic defines the keyword LET to be optional but I have left it in to aid clarity. The Pascal REPEAT/UNTIL and WHILE/DO loops are both replaced in SuperBasic by the REPEAT/EXIT/END REPEAT construct.

It is easy to see that the While and Repeat constructs in Pascal, and the REPEAT construct in SuperBasic compare in the following manner:

WHILE (condition) DO	REPEAT (loopname)
BEGIN	IF NOT (condition)
statements	THEN EXIT (loopname)
END;	statements
	END REPEAT (loopname)
REPEAT	REPEAT (loopname)
statements	statements
UNTIL (condition);	IF (condition) THEN
	EXIT (loopname)
	END REPEAT (loopname)

Note that the Quicksort algorithm is very fast (subject, of course, to the speed of the system it runs on) and that it may be used as a direct command or as a program statement. This could perhaps, be a procedure you may wish to place in a file called Boot, on MDV\_1, so that upon the QL bootstrapping, it loads the procedure into memory ready to be used. This way, one could develop a QL turn-key system!

I hope this article proves to be a good introduction for readers to the concept of recursion in programming.

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## Character forming

Create any characters of your choice with Mark Gornell's character generator program

The program lets you create a character of your choice, but it is quicker, easier and simpler than using pen and paper as it would normally have done. You control a cursor on an eight by eight grid and plotting points on the grid forms the character.

When you have finished using the grid the space bar is pushed, the program then displays your newly formed character and the data that created it. If you are not happy with the character, just go back to the grid and try again. Once you set the character you want you can write down the data and use it in your own programs! If you do not fully understand programmable characters then I suggest you read the Programmer's Reference Guide, pages 107 to 114.

When you have created a character on the grid you should position the grid's cur-

sor over a plotted point before pressing the space bar, this is just so the computer won't count the cursor as a plotted point.

There is an automatic erase built into the cursor, so when you plot a point and move back across it you will erase it. When the cursor is on top of a plotted point that you want to keep, just press the key to plot before you move again.

The advantages of using the program are that you can make many more characters than the ones found on the keyboards, these may range from digital lettering to roman numerals.

The character set is moved from Rom to Ram at the beginning of the program because the characters can only be changed once they are in the Ram, as the Rom characters always stay the same.

### Keys

D-Moves cursor left  
A-Moves cursor right  
W-Moves cursor up  
X-Moves cursor down  
S-Plots a point on the grid  
Z-Clears the whole grid

### Abbreviations

[CLR]-Shift clr/home  
[CBM4]-Commodore key and 4  
[CUR]-Cursor right  
[CUd]-Cursor down

### Program notes

50-60 Set up screen  
70-130 Move character set  
135 Set variables  
140-280 Set up screen  
290-350 Check key pressed  
370-400 Calculate data  
420 Create new character  
455-550 Print character and data  
5000-5040 Draw grid  
6000-6060 Check move

```

1 REM *** P.C.G. - MARK G,1984 ***
50 POKES3280,12:PRINT"[CLR][CBM4]
THE CHARACTER
SET IS BEING TRANSFERED"
60 POKES3281,12:PRINT"FROM ROM TO RAM,
PLEASE WAIT."
70 POKES6334,PEEK(56334)AND254:POKE1,
PEEK(1)AND251
80 FORI=0T0128:FORJ=0T07
100 POKE12288+I*8+J,PEEK(53248+I*8+J)
110 NEXTJ:NEXTI
120 POKE1,PEEK(1)OR4:POKE56334,PEEK(56334)OR1
130 POKES3272,(PEEK(53272)AND240)+12
135 S=1024:C=55296:X=7:Y=5:P=43
140 PRINT"[CLR][CUR][CUR][CUR]PROGRAMMABLE
CHARACTER GENERATOR"
150 PRINTTAB(3)"DDDDDDDDDDDDDDDDDDDDDDDDDDDD
DDD":REM *** 32 SHIFTED D'S ***
190 GOSUB 5000
200 PRINTTAB(20)"[CUd][CUd][CUd][CUd][
CBM4]D-LEFT"
210 PRINTTAB(20)"A-RIGHT"
220 PRINTTAB(20)"W-UP"
230 PRINTTAB(20)"X-DOWN"
240 PRINTTAB(20)"S-PLOT"
250 PRINTTAB(20)"Z-CLEAR"
260 FORI=1T05:PRINT"[CUd]":NEXTI
270 PRINTTAB(4)"PRESS SPACE BAR WHEN FINISHED"
280 POKES+X+40*Y,160:POKEC+X+40*Y,0
290 GETI$:IFI$=""THEN290
300 IFI$="D"THEN GOSUB 6000
310 IFI$="A"THEN GOSUB 6000
320 IFI$="X"THEN GOSUB 6000
325 IFI$="W"THEN GOSUB 6000
330 IFI$="S"THEN P=160
340 IFI$="Z"THEN GOSUB 5000:GOTO280
350 IFI$<>" "THEN290
369 REM *** CALCULATE DATA ***
370 FORI=0T07:FORJ=0T07
390 IF PEEK(1238-J+40*I)=160THENA(I)=A(I)+2↑J
400 NEXTJ:NEXTI
419 REM *** CREATE NEW CHARACTER ***
420 FORI=0T07:POKE12512+I,A(I):NEXTI
455 PRINT"[CLR]YOUR NEW CHARACTER:"
460 FORI=0T016
470 POKES+120+2*I,28:POKEC+120+2*I,I
480 NEXTI
490 PRINT"[CUd][CUd][CUd][CUd][CUd][CUd]
[CUd]DATA:[CUd]"
500 FORI=0T07
510 PRINTA(I);
520 IFI<>7THENPRINT",";
530 NEXTI
540 FORI=0T05:PRINT"[CUd]":NEXTI
550 PRINTTAB(5)"CREATE ANOTHER
CHARACTER? (Y/N)"
560 GETI$:IFI$=""THEN560
570 IFI$="N"THENEND
580 IFI$<>"Y"THEN560
590 CLR:GOTO135
4999 REM *** DRAW GRID ***
5000 FORI=7T014:FORJ=5T012
5020 POKES+I+40*J,43:POKEC+I+40*J,0
5030 NEXTJ:NEXTI
5040 RETURN
5999 REM *** CHECK MOVE ***
6000 POKES+X+40*Y,P:POKEC+X+40*Y,0
6010 IFI$="D"THENX=X+1:IFX=14THENX=14
6020 IFI$="A"THENX=X-1:IFX<=7THENX=7
6030 IFI$="X"THENY=Y+1:IFY>=12THENY=12
6040 IFI$="W"THENY=Y-1:IFY<=5THENY=5
6050 P=43:POKES+X+40*Y,160:POKEC+X+40*Y,0
6060 RETURN
READY.

```



# Catalogue of errors

Alan McDonald explains the error table in Part 3 of his adventure series

This week we shall be doing the following:

- 1) Expanding the error table.
- 2) Dealing with movement, eg, *Go North* and
- 3) Taking a look at how the *Get*, *Drop* and inventory routines work.

## The Error Table

If you examine this week's assembler listing, you should see a section headed the Error Table. In fact, it isn't an error table, but instead a quick way of printing messages, such as 'Ok..' or 'I don't understand'. Messages are printed to the screen:

```
LD B, message no.
CALL PRINT
JP INPUT
```

As you can see, using the above format is not always desirable. Obviously the message 'Ok..' is used a great deal in adventures, and to keep on using the above format for printing messages uses up a great deal of unnecessary memory. The following is much easier.

```
JP_OUT CALL PRINT ; call the print routine
        JP INPUT ; jump to the input routine.
```

## Movement

Movement is very easy to control. We used six variables to store the directions which can be moved to, from the player's current location, ie NOR, SOU, EAS, WES, UP, DOW. Remember 0='You can't go in that direction.' As an example, say the player wanted to move North:

- 1) Test the value held in the variable NOR
- 2) If it's 0 then print 'You can't go in that direction.'
- 3) put the value in NOR into X
- 4) Jump to the PLOC routine. (Print location.)

In machine code that's:

```
G.NOR LD A,(NOR) ; A holds the value in NOR.
      CP 0 ; is it 0?
      JP Z,ERR_4 ; if yes print 'You can't go in
                ; that direction.
      LD HL,NOR ; HL points to NOR
      LD A,(HL) ; now A hold its value.
      LD (X),A ; put it into X
```

## Get and Drop

Take a look at this week's assembly listing and you should see two tables called get and drop. You should however ignore these as they deal with the get and drop all routines.

Imagine the player typed *Get Cage*. Once the computer has found the word *Get* it calls the *Getit* subroutine. Once the *Getit* routine is entered, checks need to be taken to see what object the player wants to take or drop. The routine to do this is called *Test2*, each object is tested in turn. The *Test2*

routine also checks for 'ALL'.

Once an object has been identified, the C register is given a value which corresponds to the object. Take a look at the first part of the series; remember the keys are object 1. Therefore if we entered *Get Keys*, the computer would load the C register with 1. However, sometimes two objects are used to represent only one object, eg:

```
A TORCH WHICH IS OFF
and
A TORCH WHICH IS ON.
```

Remember that only one object can exist at any one time. Therefore, if the existence of one of the torches is 3 (does not exist) then C is loaded with the object number of the other torch, ie:

```
T2 DEFM "TORC"
NEXT2 LD HL,T2 ; is it the torch?
      CALL FIVE
      JP NZ,NEXT3 ; if no check next object.
      LD HL,EXE+1 ; the torch which is on.
                ; (object 2)
      LD A,3
      CP (HL) ; does it exist.
      JR Z,O.TOR ; if no then it must be the
                ; other torch
      LD C,2 ; C= the torch which is on.
      JP FINISH ; exit test routine.
O.TOR LD C,3 ; C= the torch which is off.
      JP FINISH ; exit the routine.
```

We now know the object's number (it's held in the C register.) Before it can be picked up, several questions need to be answered,

- 1) Is it at the same location as the player?
- 2) Can it be picked up; ie, is its existence 0.
- 3) Can the player carry any more objects?

This is done by checking the variable INV, if its value is greater than four, then no more objects can be carried. You can change this to any value you require. Note: you will need to change the CP 4 in the GET (get all) routine as well. The get all routine simply works by testing all of the objects in turn. Also note the routine labled *DISS*, simply prints the object to the screen; ie:

YOU TAKE:

The torch which is off.

The variables NT and ROU are used by the *DISS* routine.

## The Inventory Routine

The inventory routine simply checks to see if you are carrying an object. If you are, then it's printed to the screen. This can easily be done by testing the existence of each object, ie, seeing if it's 1.

However, you should note that the inventory routine which I have written also checks to see if you are wearing an object, ie, if the existence is 4. If you are going to use this facility in your own adventure then

you must change the value into line 8000.

If message 10 in your program is—(which you are wearing.) Then change the line into LD B, 10.

Note: the inventory routine first checks to see if you are carrying anything with you. If you are not then the computer will display:

You are carrying nothing with you.

Note: As with all the routines which deal with the objects, you will need to tell the computer how many objects your adventure has; ie, change all the 14's to what ever value you have, and all of the 15's to the value you have +1.

Next week sees the final part in this series of adventure writing.

```
4730 ; Error table:
4740 ; The appropriate
4750 ; error message
4760 ; is printed.
4770 ;
4780 ;
4790 ;
4800 ERR_1 LD B,1
4810 JP JP_OUT
4820 ERR_2 LD B,2
4830 JP JP_OUT
4840 ERR_3 LD B,6
4850 JP JP_OUT
4860 ERR_4 LD B,7
4870 JP JP_OUT
4880 ERR_5 LD B,8
4890 JP JP_OUT
4900 ERR_6 LD B,9
4910 JP JP_OUT
4920 ERR_7 LD B,10
4930 JP JP_OUT
4940 ERR_8 LD B,19
4950 JP JP_OUT
4960 ERR_9 LD B,20
4970 JP JP_OUT
4980 ERR_10 LD B,21
4990 JP JP_OUT
5000 ERR_11 LD B,24
5010 JP JP_OUT
5020 ERR_12 LD B,25
5030 JP JP_OUT
5040 ERR_13 LD B,26
5050 JP JP_OUT
5060 ERR_14 LD B,27
5070 JP JP_OUT
5080 ERR_15 LD B,28
5090 JP JP_OUT
5100 ERR_16 LD B,29
5110 JP JP_OUT
5120 ;
5130 ;
5140 ; This routine does
5150 ; the equivalent of:
5160 ; CALL PRINT
5170 ; JP INPUT.
5180 ;
5190 ;
5200 JP_OUT CALL PRINT
5210 JP INPUT
5220 ;
5230 ;
5240 ; The Movement
5250 ; routines:
5260 ; Controls movement
5270 ; of player.
5280 ; e.g GO NORTH.
5290 ;
5300 G_NOR LD HL,NOR
5310 JR DOIT
5320 G_SOU LD HL,SOU
5330 JR DOIT
5340 G_EAS LD HL,EAS
5350 JR DOIT
5360 G_WES LD HL,WES
5370 JR DOIT
5380 G_UP LD HL,UP
5390 JR DOIT
5400 G_DOW LD HL,DOW
5410 JR DOIT
5420 DOIT XOR A
5430 CP (HL)
5440 JP Z,ERR_4
5450 LD A,(HL)
5460 LD (X),A
5470 PLOC
5480 ;
5490 ; Get routine.
```

continued over the page

```

6410 ;This routine is
6420 ;called
6430 ;by 'get all'
6440 ;The main routine is
6450 ;entered at GETIT.
6460
6470 GET XOR A
6480 LD (NT),A
6490 LD (ROU),A
6500 LD HL,LOC
6510 LD DE,EXE
6520 LD B,0
6530 LOOP_B LD A,(INU)
6540 CP 4
6550 JP NC,ERR_7
6560 LD A,(DE)
6570 CP 8
6580 JR Z,PASS
6590 INC HL
6600 INC DE
6610 LD A,B
6620 CP 14
6630 JR NZ,LOOP_B
6640 PASS LD INPUT
6650 LD A,(X)
6660 CP (HL)
6670 JR Z,ADD_IT
6680 ADD_IT CALL DISS
6690 LD A,(DE)
6700 LD A,(INU)
6710 INC A
6720 LD (INU),A
6730 JR LOOP_B
6740
6750 ; Drop routine.
6760 ; Ditto for GET.
6770
6780 DROP XOR A
6790 LD (NT),A
6800 LD A,1
6810 LD (ROU),A
6820 LD HL,LOC
6830 LD DE,EXE
6840 LD B,0
6850 LOOP_C LD A,(DE)
6860 CP 1
6870 JR Z,CHAN
6880 BACK_2 INC HL
6890 INC DE
6900 LD A,B
6910 INC B
6920 CP 14
6930 JR NZ,LOOP_C
6940 CHAN CALL INPUT
6950 XOR A
6960 LD A,(DE)
6970 LD A,(X)
6980 LD A,(HL)
6990 LD A,(INU)
7000 DEC A
7010 LD (INU),A
7020 LD A,(INU)
7030 CP 0
7040 JP Z,INPUT
7050 TEST2 JR BACK_2
7060 LD C,8
7070 CALL HL,Z18
7080 JP NZ,NEXT1
7090 LD C,255
7100 NEXT1 JP FINISH
7110 LD HL,T1
7120 CALL FIVE
7130 LD NZ,NEXT2
7140 LD C,1
7150 NEXT2 JP FINISH
7160 LD HL,T2
7170 CALL FIVE
7180 LD NZ,NEXT3
7190 LD HL,EXE+1
7200 LD A,3
7210 CP (HL)
7220 JR Z,_TOR
7230 O_TOR LD FINISH
7240 LD C,3
7250 NEXT3 LD FINISH
7260 LD HL,T3
7270 CALL FIVE
7280 LD NZ,NEXT4
7290 LD HL,EXE+3
7300 LD A,3
7310 CP (HL)
7320 JR Z,_BOT
7330 O_BOT LD C,4
7340
7350 JP FINISH
7360 LD C,5
7370 NEXT4 LD FINISH
7380 LD HL,T4
7390 CALL FIVE
7400 LD NZ,NEXT5
7410 LD HL,EXE+8
7420 LD A,3
7430 CP (HL)
7440 O_BOT LD C,5
7450 FINISH
7460 LD C,5
7470 NEXT5 LD FINISH
7480 LD HL,T5
7490 CALL FIVE
7500 LD NZ,NEXT6
7510 LD HL,EXE+8
7520 LD A,3
7530 CP (HL)
7540 JR Z,_CAGE
7550 O_CAGE LD C,9
7560 NEXT5 LD FINISH
7570 LD C,12
7580 NEXT6 LD FINISH
7590 LD HL,T5
7600 CALL FOUR
7610 LD NZ,NEXT6
7620 LD C,10
7630 NEXT6 LD FINISH
7640 LD HL,T6
7650 CALL FIVE
7660 LD NZ,FINISH
7670 LD C,14
7680 FINISH LD A,C
7690 CP 8
7700 RET
7710
7720 ; The Get routine is
7730 ; entered from here.
7740
7750 GETIT CALL TEST2
7760 JP Z,ERR_5
7770 CP 255
7780 JP Z,GET
7790 LD A,(INU)
7800 CP 4
7810 JP NC,ERR_7
7820 LD HL,LOC-1
7830 LD B,0
7840 ADD HL,BC
7850 LD A,(X)
7860 CP (HL)
7870 JP NZ,ERR_5
7880 LD HL,EXE-1
7890 ADD HL,BC
7900 LD A,(HL)
7910 CP 8
7920 JP NZ,ERR_5
7930 LD A,1
7940 (HL),A
7950 LD A,(INU)
7960 INC A
7970 LD (INU),A
7980 DEC B
7990 XOR A
8000 LD (NT),A
8010 LD (ROU),A
8020 CALL DISS
8030 JP INPUT
8040
8050 ; The Drop routine is
8060 ; entered from here.
8070
8080 DROPIT LD A,(INU)
8090 CP 0
8100 JP C,INPUT
8110 CP 0
8120 JP Z,INPUT
8130 CALL TEST2
8140 LD Z,ERR_6
8150 CP 255
8160 JP Z,DROP
8170 LD HL,EXE-1
8180 LD B,0
8190 ADD HL,BC
8200 LD A,(HL)
8210 CP 1
8220 JP NZ,ERR_6
8230 XOR A
8240 LD (HL),A
8250 LD HL,LOC-1
8260 ADD HL,BC
8270 LD A,(X)
8280 LD (HL),A
8290 LD A,(INU)
8300 DEC A
8310 LD (INU),A
8320 LD B,C
8330 DEC B
8340 XOR A
8350 LD (NT),A
8360 LD A,1
8370 LD (ROU),A
8380 CALL DISS
8390 JP INPUT
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## Buildings in motion

Jason Orbaum and Geoffrey Campbell continue their series on assembly programming

This week all is revealed about "scroll buildings" routine. The first eight lines (up to the line before FPAST) find the distance of the plane from the ground, as it would hardly be fair to scroll the buildings to above the plane (quite interesting to play thought!). The result is placed in *Line*, and is used to load the X and Y registers at FPAST.

This is done by loading them with the addresses for the top and second-top rows respectively, and then taking 32 from them for the number of times held in the A register.

The last part of the routine is a fairly standard block-copy, where the original address is held in the X register, and the target address is held in the Y register.

### SUBROUTINES

The first of these (PAUSE) generates a random pause the length of which is

dependent on the contents of the timer (stored at \$1\$13). It is used to allow the contents of the timer to change between buildings, so that they are of different heights. Without this pause, all the buildings are the same height.

The next routine (BANG) generates the sound when the buildings are put up, and also when the plane crashes. Dragon sound will be covered in two weeks time, with a routine to give a sound of any pitch and duration.

INV is a routine to invert the contents of the screen, when the plane crashes. This will change any block to one of a different character, except the black blocks, which are compensated for by replacing them with a green space. This is, in turn, compensated by the next routine, GREEN, which replaces all green blocks with black ones. This, unfortunately, loses all the green

buildings on the screen, but this does not matter much as it is at the end of the game. HUMM is more sound, which produces the background noise.

NOPRES is only executed when there is no bomb dropping, and was covered last week.

At the end of each wave, control is passed to FIN, which prints up the score (in another subroutine), pauses and makes a sound by calling ZAP 40 times. It changes the delay variable in WAVE, and then starts again from BEGIN.

ZAP is another sound routine, and SCR prints up the score. This is done in a fairly devious way. First of all, six zeroes are printed on the screen, and then, using a counter held in score, the first digit is incremented that number of times. Each time it is incremented, the character is compared with the colon (first character after the nine) to check for an overflow. If an overflow has occurred, then the program moves on to the next digit, and does the same.

The only drawback with this method is that it will move past the sixth digit and onto the screen display proper (but we have yet

2000	*			210A	8840	GPAST	EORA	#64
2000	* SUBROUTINES			210C	A780		STA	,X+
2000	*			210E	8C0600		CMPL	##600
2000 3420	PAUSE	PSHS	Y	2111	25EF		BLO	GBEG
2002 10BE0113		LDY	\$113	2113	3522		PULS	Y,A
2006 31A8EC	DELAY	LEAY	-20,Y	2115	39		RTS	
2009 26FB		BNE	DELAY	2116		*		
200B 3520		PULS	Y	2116		*		
200D 39		RTS		2116	8E0400	GREEN	LDX	##400
200E	*			2119	A684	GRLOOP	LDA	,X
200E	*			211B	818F		CMPL	#143
200E 3412	BANG	PSHS	A,X	211D	2602		BNE	GRPAST
2000 B6FF23		LDA	65315	211F	8680		LDA	#128
2003 8A08		ORA	#8	2121	A780	GRPAST	STA	,X+
2005 B7FF23		STA	65315	2123	8C0600		CMPL	##600
2008 7F0147		CLR	327	2126	25F1		BLO	GRLOOP
200B 8EB798		LDX	#47000	2128	39		RTS	
200E A680	GLOOP	LDA	,X+	2129		*		
20E0 8D0F		BSR	SOUND	2129		*		
20E2 A680		LDA	,X+	2129	3432	HUMM	PSHS	A,X,Y
20E4 8D0B		BSR	SOUND	212B	B6FF23		LDA	65315
20E6 7A0147		DEC	327	212E	8A08		ORA	#8
20E9 26F3		BNE	GLOOP	2130	B7FF23		STA	65315
20EB B6FF23		LDA	65315	2133	B6FF03		LDA	65283
20EE 3512		PULS	A,X	2136	84FE		ANDA	#254
20F0 39		RTS		2138	B7FF03		STA	65283
20F1 B40147	SOUND	ANDA	327	213B	8E0003		LDX	#3
20F4 B7FF20		STA	65312	213E	86FD	HMLoop	LDA	#253
20F7 8641		LDA	#65	2140	B7FF20		STA	65312
20F9 4A	GDEL	DECA		2143	8D1C		BSR	HMDL
20FA 26FD		BNE	GDEL	2145	7FFF20		CLR	65312
20FC 39		RTS		2148	8D17		BSR	HMDL
20FD	*			214A	301F		LEAX	-1,X
20FD	*			214C	26F0		BNE	HMLoop
20FD 3412	INV	PSHS	X,A	214E	B6FF03		LDA	65283
20FF 8E0400		LDX	#1024	2151	8A01		ORA	#1
2102 A684	GBEG	LDA	,X	2153	B7FF03		STA	65283
2104 8180		CMPL	#128	2156	B6FF23		LDA	65315
2106 2602		BNE	GPAST	2159	84F7		ANDA	#247
2108 868F		LDA	#143	215B	B7FF23		STA	65315

to see anyone get over 3000!). This routine also calls ZAP, which slows down the routine slightly, but it is still fairly fast.

This last routine can be changed to handle on-screen scoring while a game is running, simply by incrementing it one at a time, rather than using a counter; and without the sound as is demonstrated later in the series.

Lets look at the general structure of the program itself, and the way it has been presented. The program starts with copy-right declaration (which anyone may put on a program that is their own work), and a date. The date is especially useful when looking abck to the program, and for filing of the various listings.

The 'V2.0' means second version, no amendments made. This is because the first version was lost in a massive crash and the program had to be re-typed from the listing.

The constants are defined at the beginning of the program and the program contains a liberal amount of REMS (\*\*s).

The program does not, though, encourage a Modular approach to programming.

## BASIC LOADER PROGRAM.

```

8 REM ELITZ
5 CLEAR 200, 20000 :CS=0
10 FOR N=20001 TO 26705
20 READ A#
30 A=VAL("LH"+A#)
40 POKE N,A
50 CS=CS+A
60 NEXT N
70 IF CS<>72470 THEN SOUND 1,1:PRINT"DATA ERROR." END
80 PRINT"ALL CORRECT":SOUND 200,1 END
90 DATA CC,9,1,FD,7,D7,96,1,87,7,D9,CC,0,0,FD,7,00,86,0,87
100 DATA 7,02,CC,4,3,FD,7,D3,8E,4,0,CC,90,80,ED,81,8C,6,0,25
110 DATA F9,10,8E,0,10,86,1,13,84,3,34,2,06,10,3D,0B,0F,35,2,8B
120 DATA 7,09,8E,5,FF,34,20,30,1F,31,3F,26,FA,25,20,E7,84,36,88,EA
130 DATA 4A,26,FA,17,1,37,17,1,26,31,3F,26,DA,8E,7,D3,8C,5,FF,10
140 DATA 17,1,41,17,1,37,17,1,0,17,1,FD,80,90,5,27,FB,81,27,10
150 DATA 26,FF,71,39,86,7,02,81,1,26,8E,7,05,30,86,20,8F,7,05
160 DATA A6,84,81,80,27,5,FD,7,00,03,0,1,FD,7,00,8E,7,05,86,2A
170 DATA A7,84,86,80,38,88,80,A7,84,FC,7,05,10,83,5,E,1,25,0,86,8
180 DATA B7,7,D2,8E,7,05,86,80,A7,84,CC,FF,FF,FD,1,50,FD,1,52,FD
190 DATA 1,54,FD,1,56,FD,1,58,8D,86,6,10,27,1,3E,86,7,02,81,1
200 DATA 27,11,17,1,50,86,1,87,7,02,FC,7,03,83,8,1,FD,7,05,8E
210 DATA 7,03,30,1E,86,80,A7,80,86,30,A7,80,4C,A7,84,17,0,02,8E,7
220 DATA D9,81,3,10,25,FF,3E,86,1,13,81,7,D9,10,22,FF,34,8E,0,87
230 DATA 7,0A,FC,7,03,83,0,20,10,83,4,0,25,5,7C,7,0A,20,FC,7C
240 DATA 7,0A,86,7,0A,10,8E,4,20,8E,4,0,30,88,20,31,8E,20,4A,26
250 DATA F7,ED,81,ED,81,10,8C,6,0,25,FA,8E,7,05,30,88,80,8F,7,05,17,0,11
260 DATA ED,81,10,8C,6,0,25,FA,8E,7,05,30,88,80,8F,7,05,17,0,11
270 DATA 15,FE,DE,34,20,10,8E,1,13,31,86,ED,26,FA,25,20,39,34,12,86
280 DATA FF,23,8A,0,87,FF,23,7F,1,47,8E,87,96,86,90,90,7,86,80,50
290 DATA B,7A,1,47,26,FA,8E,FF,23,25,12,39,84,1,47,87,FF,20,86,41
300 DATA 4A,25,FD,35,34,12,8E,4,0,8E,84,81,80,26,2,86,1,88,40,87
310 DATA 80,8C,6,0,25,EF,35,22,39,8E,4,0,86,84,81,8F,26,2,86,80
320 DATA A7,80,8C,6,0,25,F1,39,34,32,86,FF,23,8A,0,87,FF,23,86,FF
330 DATA 3,84,FE,87,FF,3,8E,0,3,86,FD,87,FF,29,80,1C,7F,FF,20,60
340 DATA 17,30,1F,26,FA,86,FF,3,8A,1,87,FF,3,86,FF,23,84,FF,87,FF
350 DATA 23,32,29,10,8E,7,07,31,3F,26,FC,39,10,8E,4,65,31,3F,26
360 DATA FC,15,FE,CF,80,4B,8E,0,29,17,0,13,80,1F,26,F9,FC,7,D7,83
370 DATA 0,80,FD,7,D7,7C,7,D5,15,FD,C2,34,32,86,FF,23,8A,0,87,FF
380 DATA 23,8E,0,1,86,FD,87,FF,20,8D,17,7F,FF,20,8D,12,30,1,8C,0
390 DATA 37,25,ED,86,FF,23,84,FF,87,FF,23,35,32,39,1F,12,31,3F,26,FC
400 DATA 39,86,30,C6,30,FD,4,2D,FD,4,2F,FD,4,31,10,8E,4,31,8E,7
410 DATA D8,8C,0,0,26,1,39,86,A4,4C,81,3A,27,7,87,A4,30,1F,26,FA
420 DATA 39,86,30,A7,84,8D,80,31,3F,A6,A4,4C,81,3A,27,7,87,A4,10,8E
430 DATA 4,31,20,E4,39,0

```

215E	9532		PULS	A,X,Y	21B3	84F7	ANDA	#247
2160	39		RTS		21B5	B7FF23	STA	65315
2161	10BE07D7	HMDEL	LDY	WAVE	21B8	3532	PULS	A,X,Y
2165	313F	HMDEL1	LEAY	-1,Y	21BA	39	RTS	
2167	26FC		BNE	HMDEL1	21BB	1F12	ZDEL	TFR X,Y
2169	39		RTS		21BD	313F	ZDEL1	LEAY -1,Y
216A	*				21BF	26FC	BNE	ZDEL1
216A	*				21C1	39	RTS	
216A	108E0465	NOPRES	LDY	##465	21C2		*	
216E	313F	NPRDEL	LEAY	-1,Y	21C2		*	
2170	26FC		BNE	NPRDEL	21C2	8630	SCR	LDA #48
2172	16FECF		LBRA	NOKEY	21C4	C630		LDB #48
2175	*				21C6	FD042D		STD 1069
2175	*				21C9	FD042F		STD 1071
2175	8D4B	FIN	BSR	SCR	21CC	FD0431		STD 1073
2177	8E0028		LDX	#40	21CF	108E0431		LDY #1073
217A	170013	FLOO	LBSR	ZAP	21D3	BE07D0		LDX SCORE
217D	301F		LEAX	-1,X	21D6	8C0000		CMFX #0
217F	26F9		BNE	FLOO	21D9	2601		BNE SLOO
2181	FC07D7		LDD	WAVE	21DB	39		RTS
2184	830080		SUBD	##80	21DC	A6A4	SLOO	LDA ,Y
2187	FD07D7		STD	WAVE	21DE	4C		INCA
218A	7C07D9		INC	INC	21DF	813A		CMFA #58
218D	16FDC2		LBRA	BEGIN	21E1	2707		BEQ CHANGE
2190	*				21E3	A7A4		STA ,Y
2190	*				21E5	301F	SLL0	LEAX -1,X
2190	3432	ZAP	PSHS	A,X,Y	21E7	26F3		BNE SLOO
2192	B6FF23		LDA	65315	21E9	39		RTS
2195	8A08		ORA	#8	21EA	8630	CHANGE	LDA #48
2197	B7FF23		STA	65315	21EC	A7A4		STA ,Y
219A	8E0001		LDX	#1	21EE	8DA0		BSR ZAP
219D	86FD	ZPLOOP	LDA	#253	21F0	313F		LEAY -1,Y
219F	B7FF20		STA	65312	21F2	A6A4		LDA ,Y
21A2	8D17		BSR	ZDEL	21F4	4C		INCA
21A4	7FFF20		CLR	65312	21F5	813A		CMFA #58
21A7	8D12		BSR	ZDEL	21F7	27F1		BEQ CHANGE
21A9	3001		LEAX	1,X	21F9	A7A4		STA ,Y
21AB	8C0037		CMFX	#55	21FB	108E0431		LDY #1073
21AE	25ED		BLO	ZPLOOP	21FF	20E4		BRA SLL0
21B0	B6FF23		LDA	65315	2201			

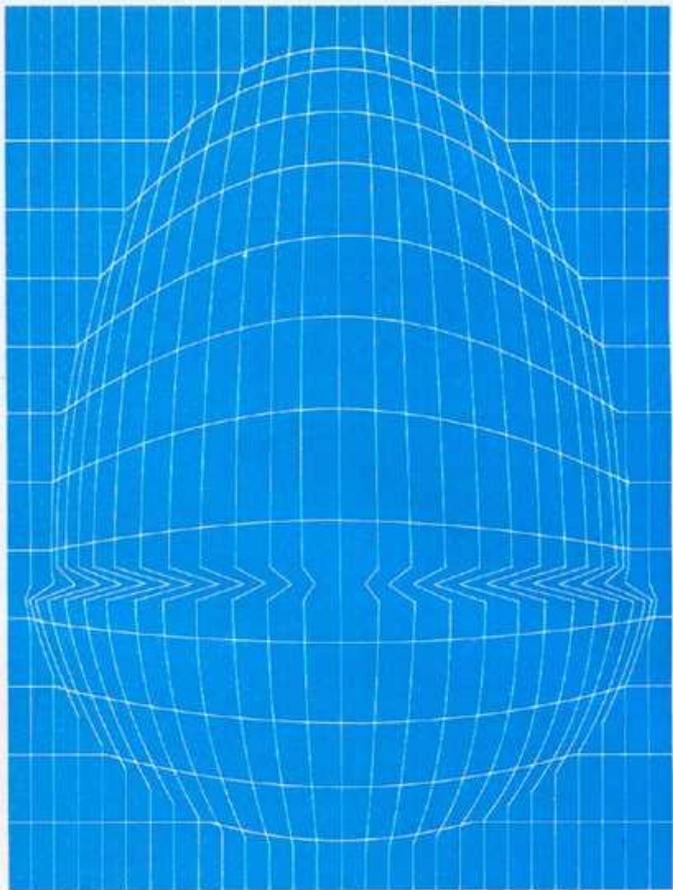
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# Artistic licence

Try out your airbrush technique with *Paintbox* — a graphics program by Christopher Bowerman

Computer generated art is a fascinating, rewarding area for computer users to explore. However, the graphics commands of the BBC micro and the ways in which they interact are far too complex to be able to readily predict the resultant effect.

*Paintbox*, although not the most sophisticated of graphics programs, overcomes this problem by providing an environment comprehensible to the novice, yet providing more sophisticated features for those wishing to delve deeper into the system. To this end I have endeavoured to make the system as user friendly as possible, but, as I was determined that the program should run on a model A, some of the prompts do tend to be rather mnemonic.

The main features are: painting with either an airbrush or a paintbrush, line drawing, polygons, area-fill, four paint colours and *Saveing* to and *Loading* from tape. The main options are available via function and other keys without having to answer any prompts.

The program comes in two halves, the first of which *Chains* the second, after having set up the function keys, set *Page* to a suitable level, and having instructed the user on the use of the system. The second program is the main one and should be typed exactly as it is written (for model A machines). Model B users could change *MODE5* to *MODE1* and gain the benefits of a higher resolution.

As is often the case with computers, there can be no substitute for "hands-on" experience and the following presumes that you are trying things out as they are detailed. The *Break* key has been defined to exit the program without corrupting the program.

When the program runs the start prompt "Set up Y/N/Q/L/S" appears. To set up a particular background, mode of plot, start position, brush size paint density, hit Y. Pressing N makes the computer set up these values. Q will quit the program. L loads a picture from tape and S saves the current screen to tape. When saving, the usual *Record*, then *Return* prompt will be displayed, but press *Return* twice so that a set of data will be recorded immediately after the picture. The data saves the background colour so that alterations can be made on subsequent loadings. Hitting *Escape* at any time will return you to the start prompt.

The cursor should now be flashing in the centre of the screen. It is moved by the following set of keys QWEASDZXC (Fig.1) which are arranged like the points of a compass. W=up, D=right, S=paint in same area, X=down, etc. Diagonals QEZC are also available. Move the cursor to a suitable

position. Now select a colour, function keys 0 to 3, and move the cursor; you will be in paintbrush mode. colour can be changed (Fig.2) by pressing function a key at any time.

To change from brush to airbrush hit function key 4, and move the cursor. Pressing key 4 again will change back to paintbrush. To move without erasing, select the key for background colour (black or fkey 3, in this instance) and move to a new position, then select a new colour and move off again. If you make a mistake you can clear the whole screen with *Ctrl C*.

Alternatively, you could erase with the cursor. First select background colour (erasing only works in background colour), then press function key 6 to turn erasing on, move the cursor over the mistake and it will be erased. Now hit fkey 6 again to turn erase off, so that you don't erase accidentally next time background colour is selected! Now choose a fresh colour and move off again.

Next line drawing. Lines are drawn from the current position, in the currently selected colour — so ensure they are set as desired before hitting T R or L. Press T to trace a line. A dot will mark the start position, move the cursor to the end position and press *Return* — a line is drawn between the two points.

If you wish to draw a line from the start position of the last line drawn press R (repeat line), move to the end position and hit *Return*. Repeat line can be called ad. infinitum, and was used in drawing the sun in the sample picture.

Hitting I (increment) is useful for grid drawing, etc, but first let's clear the mess we've created, by pressing control C. First trace a line to the right with the T option. Now move, in background colour, a few places directly upwards, then re-select the paint colour and press I. Now tap the space bar a few times and *Return* to finish. Then hit R, to draw from the end of the last line, and move upwards to the top of the lines you just drew and press *Return*. In background colour, move directly right a few places, select a new paint colour and hit I. Then tap the space bar a few times and a grid should be completed.

By diagonally offsetting the second point all sorts of slanting, warped grids can be produced. This was used to produce the ladder and to make the sun stripy. One more thing; lines can be either dotted or solid (Acorn's descriptions not mine). To select dotted lines, press fkey 5, hitting this again will revert to solid lines.

Polygons are selected by pressing P. A prompt "Fill/Wire" will appear, F will give coloured-in polygons and W gives outline polygons. The next prompt "sides/R" re-

quires the number of sides and the radius of the polygon (separated by a comma) to be entered. The polygon will now be drawn in the currently selected colour at the current cursor position.

However, there are, as always, other facilities allowing polygons to be drawn in perspective — this also provides ellipses; eg, the cone and dustbin. Clear the screen again and hit fkey7, now draw a Filled polygon, with 20 sides and a radius of 100. An ellipse is drawn; ie, a circle in "perspective". Pressing fkey7 made the polygon routine take note of the height-width ratio set by fkey 8.

Normally horizontal polygons will be drawn, but if fkey 8 is pressed and you again key in the information for a filled, 20 sided polygon, hen vertical ellipses result. If key7 is hit again, the polygon routine will ignore the horizontal/vertical setting of fkey8 and normal, full view polygons are drawn.

To change the size of the brush, press L (levels) and the prompt "area, density" appears. Two numbers separated by a comma should be entered. Area controls the size of the brush or airbrush and density controls the number of dots within that area (airbrush mode only). Any numbers can be used for these parameters, but 1 to 10 are designed to give reasonable results.

To move the cursor to a specific (x,y) co-ordinate, hit M, key in the x and y co-ordinates as two numbers separated by a comma and press *Return*.

Graphics background and mode of plot may be changed by hitting (Fig.3) G. In reply to "Bgnd Col Mix Wipe" press either C, M, W, or S to keep the same parameter as last time and *Return*. C is ordinary plotting (GCOLOR,x), M is OR plotting (GCOL1,x), and W is AND plotting (CGOL2,x). The normal option is C, but M can be useful as it mixes with the colours already there. W also allows mistakes to be erased or particular colours.

If you are familiar with the CGOL parameters 0 to 4, these can be entered (as numbers) instead, and, even if you're not, entering a number greater than 4 will give striped colours and access to shades. The background colour is the next prompt to appear, simply hit an fkey (function key) from 0 to 3 — they represent their usual colours — and *Return*. The next prompt asks for the foreground mode of plot and this works in the same way as for the background mode of plot; ie, C M and W have the same function and numbers can be entered if preferred — try a number greater than 4!

If you wish to default to the last known parameter on the L (area/density) or G (colours) options press S for Same, and they will not be changed.

The final facility available, used to make most of the street scene picture, is triangle area-fill. This fills in a triangle in the current paint between the next three points visited. To use this hit function key 9; your present

position is the first point and a dot is left as a reference. Now move the cursor to the second point and hit *Return*, then move to the third point and press *Return* — the area will be filled in.

When using the T (trace) and R (repeat) options, don't hold the key down for too long because the auto-repeat of the key will cause an error and this may, on model A's, be "fatal".

Model A owners should type lines 310 and 330 as below to account for the lower address of screen memory:

```
310 *SAVE P 1A80 3FFF
330 *LOAD ... 1A80
```

```
10REM (c) 7/4/83 Christopher Boverna
n
20REM PAINTBOX FOR THE BBC-micro
30REM MODELA OR B
40MODE7
50*K.0111A
60*K.1111B
70*K.2111C
80*K.3111D
90*K.4111H
100*K.5111F
110*K.6111G
120*K.7111E
130*K.8111J
140*K.9111I
150FDRA=0T01:PRINTTAB(10,2+A);CHR$141
;CHR$157;CHR$129;"PAINTBOX ";CHR$156:N
EXT
160PRINTTAB(2);CHR$131;"A sophisticat
ed drawing and";CHR$131;"painting prog
ram for the BBC-micro";CHR$130;"Allow
ing drawing in four colours of";CHR$13
0;"lines;polygons,cones etc. by brush o
r";CHR$130;"airbrush."
170 PRINTTAB(2);CHR$134;"Colours are
selected by the function";CHR$134;"ke
ys f0,f1,f2,f3 and it is";CHR$134;"pos
sible to switch from";CHR$134;"brush t
o airbrush by means of f4"
180PRINTTAB(2);CHR$134;"Cursor moveme
nt is via keys";CHR$129;SPC(4);"O.W.E
.A.S.D.Z.X.C";CHR$134;"U moves UP, D r
ight, X down, A left";CHR$134;"S stati
onary, and diagonals are";CHR$134;"Q/E
/I/C ie. D is left and up, E is";
190PRINTCHR$134;"right and up":A=GET
200PROCBBND(132,130)
210PRINTTAB(2);CHR$131;"Erasing of
errors can be done";CHR$131;"by select
ing background";CHR$131;"colour, turni
ng erase on with f6";CHR$131;"moving t
o erase and then hitting";CHR$131;"f6
again.CTRL-C clears the screen"
220PRINTTAB(1);"Polygons are drawn in
the currently";CHR$131;"selected point at the
current cursor";CHR$131;"position.Hit P to draw
polygons."Then F for coloured, and W
for";CHR$131;"outlined shapes"
230PRINT"Number of sides,separated by
a ";CHR$131;"comma and the radius followed by
the";CHR$131;"RETURN key must now be entered"
f7 controls the height-width";CHR$131;"proporti
ons of the polygon, which";CHR$131;"is set by
f8"
240A=GET:PROCBBND(129,131)
250PRINT"Touching f7 tells the polyg
on";CHR$131;"routine to take note of the ratio
set";CHR$131;"by f8.Touching f7 again will make
it";CHR$131;"ignore the ratio.Normally the rati
o";CHR$131;"is set to give horizontal polygons"
but touching f8 will give vertical"
260PRINT;"ones, hitting f8 again retu
ras";CHR$131;"to horizontal ones"
270PRINT"to change paintbrush size"
hit L.The first number is the";CHR$131;"brush
size the second is the";CHR$131;"amount of pai
nt used by the";CHR$131;"airbrush."
280PRINT"Graphics colours are change
d by";CHR$131;"hitting G.C is normal colouring
";CHR$131;"S being hit allows you to move the "
cursor to a specific (X,Y)";CHR$131;"co-ordin
ate"
290A=GET:PROCBBND(130,132)
300PRINT"to trace a line from the pre
sent";CHR$131;"position hit T, move the cursor"
to a new position and hit RETURN";CHR$131;"T
o repeat a line from the last";CHR$131;"start
position hit R, move to a";CHR$131;"new positi
on and hit RETURN";CHR$131;"The increment opti
on";
310PRINT;" is "
320PRINT"useful for grids and is avai
lable";CHR$131;"upon hitting I after first";CHR$131;"mo
ving the cursor"
330PRINT"Lines drawn can be dotted o
r";CHR$131;"solid.This attribute is changed by"
f5.If you do not wish to change";CHR$131;"att
ributes after hitting";CHR$131;"L,M,G then typ
e S (same) and these";CHR$131;"attributes will
be left unchanged"
340PRINT"Hit f9 for triangle area-f1
11.";CHR$131;"Then move to 2 new points hitting
";CHR$131;"RETURN each time.The triangle";CHR$131;"boun
ded by the spots will be filled"
350A=GET:PROCBBND(129,135)
360PRINTTAB(2);"ESCAPE will return to
the start";CHR$131;"prompt."";CHR$131;"0 allows you to
leave the program";CHR$131;"Y will allow you t
o set up the";CHR$131;"colours and brush size
and N";CHR$131;"lets the program do all that fo
r";CHR$131;"you";CHR$131;"S will save the screen to ta
pe"
370PRINT"L will load a screen from t
ape";CHR$131;"if a recorder is connect
ed";CHR$131;"
380PRINT;CHR$146;STRING$(35,CHR$(112)
);PRINT;CHR$130;"PLEASE WAIT FOR THE PR
OGRAM TO LOAD";PRINT;CHR$148;STRING$(35
,CHR$(163))
390PRINT"You will need to choose one"
of the above options for the";CHR$131;" first
prompt";CHR$150;CHR$154;STRING$(34,C
HR$(112))
400PRINTTAB(5);"(c) C.Boverna. 1983"
410*K.10PA.=&C001H?&E00=32:Y&E01=409:1H
D.:M
420VBU2B,0,0,0,0;PAGE=&C00;CHAIN"
430END
440DEFPROCBBND(TF,TB)
450VBU2B,0,24,39,0;CLS
460FDRA=0T024:PRINTTAB(0,A);CHR$TB;CH
R$157;CHR$T;:NEXT
470VBU2B,3,24,39,0
480VBU30
490ENDPROC
```

Fig.2 SUMMARY OF CONTROLS

FUNCTION KEY	NAME	PURPOSE
F-0	RED	SELECT RED PAINT
F-1	YELLOW	YELLOW
F-2	WHITE	WHITE
F-3	BLACK	BLACK
F-4	AIR/PAINT	SWITCH BETWEEN AIRBRUSH & PAINTBRUSH
F-5	DOT/SOLID	SWAP BETWEEN DOTTED AND SOLID LINES
F-6	ERASE	TURN ERASE ON/OFF
F-7	HALF RATIO	ENABLE KEY B/DISENABLE
F-8	VERT/HORTZ.	SWAP BETWEEN VERTICAL AND HORIZONTAL POLYGONS
F-9	FILL	FILL A TRIANGLE WITH COLOUR
T	TRACE	DRAW LINE BETWEEN 2 POINTS
R	REPEAT	REPEAT LINE FROM START OF LAST LINE
I	INCREMENT	DRAW LINE PARALLEL TO LAST
G	GRAPHICS	BACKGROUND/FOREGROUND MODE AND COLOUR
M	MOVE	MOVE TO (X,Y) POSITION
P	POLYGON	DRAW REGULAR POLYGON
L	LEVEL	BRUSH SIZE

TRLC  
CONTROL C  
CLEAR SCREEN

Fig.3 "G" OPTION GRAPHICS COMMANDS

ANSWER TO PROMPT	EFFECT	EQUIPMENT	COMMENT
C	NORMAL	GC0L0.x	ORDINARY PLOT
M	OR	GC0L1.x	MIX COLOUR
W	AND	GC0L2.x	WIPE COLOUR
3	EOR	GC0L3.x	EXCLUSIVE OR COLOUR - TRY Bcmd mode 3, F2
4	NOT	GC0L4.x	INVERT COLOUR - TRY Bcmd mode 4, F2
>4	Stripes	GC0Lx.x	Shade facility for numbers greater than 4

x IS USUALLY A FKEY BETWEEN 0 AND 3, OR A NUMBER BETWEEN 0 AND 3 FOR SOLID FOREGROUND COLOURS, AND BETWEEN 129 AND 132 FOR SOLID BACKGROUND

Fig.1 KEYBOARD CURSOR CONTROL

Q	W	E
A	S	D
Z	X	C

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## Mean

on Vic20

This is an interactive program to calculate the Mean, Sd and Variance of a set of numbers. The program runs on an unexpanded machine. It can be amended for higher memory capacities by altering the Dim() in line 50 and the Z upper limits in 80 and 85.

### Variables

Z=DDATA ITEM NUMBERS:SS=SOUND

REGISTER:a() = DATA  
 ARRAY:B()=FREQUENCY ARRAY  
 P='N' DATA: Q=TOTAL DATA: L=DATA SQUARED  
 S=UPPER PART OF THE STANDARD DEVIATION FORMULA ( $L=PX(Q/P)X(Q/P)$ )  
 $D=S/P(P-1)$ ; SD=SQUARE ROOT OF D

The program calculates the following variables: mean; sum of scores; sum of squares; mean squared; stand deviation (N-1); standard deviation (N); variance. These can be then inserted into other mathematical/statistical formulae.

### Program notes

Lines 30-60 Set up screen and give instruction.  
 Lines 70-220 Prompt for input of data and test for limits.  
 Lines 1040-1070 Calculate the total of the data and the total of data squared.  
 Lines 1000 Tests for division by zero.  
 Lines 1140-1606 Calculate the mean and SD and variance for N or N-1.  
 Lines 1610-1620 Return to the mean section on demand or terminate.  
 Line 90 is twenty 'shift' + ""; other lines contain 'reverse' or colour change which can be omitted or altered as desired for conversion.

```

3 REM##MEAN,SD & VAR.##BY C.WALTERS*****
5 PRINT"POKE36879,25"
10 PRINT"MEAN"
20 PRINT"STANDARD DEVIATION"
30 PRINT"VARIANCE":PRINT
35 PRINT:PRINT"50 DATA ENTRIES MAX.":PRINT
40 PRINT"ENTER INDIVIDUAL DATA ":PRINT"FOLLOWED BY FREQUENCY"
45 PRINT"ENTER '0' TO END DATA INPUT"
50 DIMA(50):DIMB(50)
60 Z=1:SS=36875:POKE36879,10
70 REM##ENTER DATA****
80 IFZ=45THENPRINT"WARNING: ONLY FIVE MORE DATA":POKESS,210
85 IFZ=50THENPRINT"WARNING: END DATA":FORT=1TO100:NEXTT:GOTO1000
90 PRINT"-----"
100 PRINT"DATA ITEM";Z;"(0=END)"
110 INPUT X#
120 IFX#="0"THEN GOTO 1000
130 N=VAL(X#)
140 A(Z)=N
150 PRINT"ENTER FREQUENCY"
150 INPUT F
200 B(Z)=F:POKESS,0
220 Z=Z+1:GOTO70
1000 P=0:Q=0:L=0:POKESS,100
1030 FOR W=1TOZ
1040 P=P+B(W)
1050 Q=Q+B(W)*A(W)
1060 L=L+B(W)*A(W)*A(W)
1070 NEXTW:PRINT"J"
1080 IFF=0THENPRINT"WILL NOT COMPUTE":RUN10
1110 PRINT"MEAN=":PRINTTAB(2)Q/P
1130 PRINT"N=":PRINTTAB(2)P:PRINT
1140 PRINT"SUM OF SCORES=":PRINTTAB(2)Q;TAB(15)"(SS)":PRINT
1150 PRINT"SUM OF SQUARES=":PRINTTAB(2)L;PRINTTAB(15)"(SSQ)":PRINT
1160 MS=(Q/P)*(Q/P)
1170 PRINT"MEAN SQUARED=":PRINTTAB(2)MS;PRINTTAB(15)"(MS)":PRINT
1180 PRINT"FOR STANDARD DEVIATION"
1190 PRINT"HIT ANY KEY":POKESS,0
1200 GET A#:IF A#=""THEN1200
1210 PRINT"J":PRINT
1300 PRINT"STANDARD DEVIATION":PRINT:PRINT
1310 PRINT"POPULATION N-1":PRINT
1315 IFF-1=0THEN:PRINT:PRINT"WILL NOT COMPUTE;N=1":GOTO1520:PRINT
1320 S=L-P*(Q/P)*(Q/P)
1330 D=S/(P-1)
1340 SD=SQR(D)
1350 PRINT"SD(N-1)=":TAB(11)SD:PRINT
1360 PRINT"VARIANCE=":TAB(11)SD*SD
1400 PRINT:PRINT:PRINT"FOR SD(N)"
1450 PRINT"FOR MEAN PRESS 'M':PRINT"X00"
1460 GET A#:IF A#=""THEN1460
1500 PRINT"J"
1520 PRINT"POPULATION N":PRINT
1550 PRINT"SD(N)=":TAB(11)SQR(S/P):PRINT
1560 PRINT"VARIANCE=":TAB(11)(SQR(S/P))*(SQR(S/P)):PRINT"X000"
1600 PRINT"FOR MEAN PRESS 'M':PRINT"X00"
1605 PRINT"TO ESCAPE PRESS "
1606 PRINT"RUN STOP' & 'RESTORE'"
1610 GET B#:IF B#<" "THEN 1610
1620 IFB#=""THEN1110
    
```

Mean  
 by Colin Waterson

## Draw

### on Spectrum

This is a short but effective drawing routine for the Spectrum which allows you to draw pictures in different colours on the screen.

Z Left 0-7 Colours  
X Right 8 Change Colours  
P Up 9 Draw Circle

L Down

#### Program notes

30-80

7000-7130

9000-9020

Main Loop, after the screen has been drawn by 20. Checks what key is being pressed.  
Draws Screen, prints possible colours sales ink to black and cursor to middle.  
Inputs new colour, rubs out

9990-9993

#### Variables

X  
Y  
ink  
rad

input, returns.

Radius of circle, draws circle, rubs out input.

X Coordinate  
Y Coordinate  
ink colour  
Distance of radius of circle.

```

10 REM Spectrum Draw
15 REM
20 GO SUB 7000
30 IF INKEY$="Z" THEN LET X=X-
1: IF X<5 THEN LET X=5
40 IF INKEY$="X" THEN LET X=X+
1: IF X>186 THEN LET X=186
50 IF INKEY$="L" THEN LET Y=Y-
1: IF Y<5 THEN LET Y=5
60 IF INKEY$="P" THEN LET Y=Y+
1: IF Y>170 THEN LET Y=170
70 IF INKEY$="0" THEN GO SUB 9
000
75 IF INKEY$="9" THEN GO SUB 9
990
80 PLOT INK ink,X,Y
85 GO TO 30
7000 CLS : BORDER 6: LET ink=0
7010 PLOT 0,0: DRAW 0,175: DRAW
255,0: DRAW 0,-175: DRAW -255,0:
PLOT 192,0: DRAW 0,175
7020 PRINT AT 1,26; INK 1; "■"; I
NK 0; "=1": BEEP .5,1
7030 PRINT AT 3,26; INK 2; "■"; I
NK 0; "=2": BEEP .5,2
7040 PRINT AT 5,26; INK 3; "■"; I
NK 0; "=3": BEEP .5,3
7050 PRINT AT 7,26; INK 4; "■"; I
NK 0; "=4": BEEP .5,4
7060 PRINT AT 9,26; INK 5; "■"; I
NK 0; "=5": BEEP .5,5
7070 PRINT AT 11,26; INK 6; "■";
INK 0; "=6": BEEP .5,6
7080 PRINT AT 13,26; INK 0; "■";
INK 0; "=0": BEEP .5,8
7100 PRINT AT 15,26; "7=rub": BEE
P .5,9
7110 PRINT AT 17,26; "8=new"; AT 1
9,26; " col": BEEP .5,10
7120 LET X=100: LET Y=88: PLOT X
,Y
7130 RETURN
9000 INPUT "What colour ?";ink
9010 INPUT "
9020 RETURN
9090 INPUT "Radius ?";rad
9091 CIRCLE INK ink,X,Y,rad
9092 INPUT "
9093 RETURN
    
```

Draw

by Alex Reeves

## Microradio

GW6JJN



### Input and output

New from Number One Systems of 9A Crown Street, St Ives, Huntingdon, Cambridgeshire, comes an electronics circuit computer aided design (CAD) program for the Spectrum, BBC B and Newbrain computers. It must be stressed that this is a serious program designed for people who wish to test a proposed circuit on the computer without the need to set the circuit up.

With this program, there is no need to actually solder

anything. All one needs to do is to come up with the idea of a circuit on paper and, using the extensive instructions provided with the package, transfer the circuit to the computer. Once details of the circuit are in the machine, then the behaviour of the circuit will be simulated and can be analysed for input and output impedance, and gain, both magnitude and phase at any frequency both linearly or logarithmically spaced.

If you don't know what I'm talking about, then the program is probably not for you. If designing and testing circuits are exactly what you want to do with your machine, then read on. The program will simulate the behaviour of resistors, capacitors, inductors, transformers and both field effect transistors and the common or garden bipolar transistor. The

ac performance of circuits containing up to 60 of these components situated around up to 16 nodes can be evaluated over a large frequency range without even the need to have the components concerned.

The sort of circuit that the program takes in its stride are filters, audio and wideband amplifiers, radio frequency amplifiers, linear integrated circuits and many more. An interesting feature is the program's ability to deal with operational amplifiers as integrated components in themselves. This opens up a wide range of possibilities as you can imagine.

It does not incorporate graphics which are memory hungry, but it has the facility to store circuits on tape and any circuits that do not measure up to expectations can have their parameters changed as well as

any components. A serious program with a serious price, it costs £35.

I hope to demonstrate the use of the program in a future Microradio, but until then any further information can be obtained by writing to the above address or by contacting Adrian Espin or Martin Morris at Number One Systems, on 0480 61778. As far as radio computing enthusiasts are concerned, I should add that the program will deal with frequencies between 0.01 Herz and 1.1 GigaHerz.

Ray Berry GW6JJN

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

## Eerie green landscape

Software companies are all hurriedly climbing into their tanks and lining up to take pot shots at each other across 'an eerie green landscape of pyramids and squares'.

After a thousand and one versions of *Pengo* they finally seem to have turned their hands to producing *Battlezone* clones.

For the Spectrum there have long been two very respectable versions namely Artic's *3D Combat Zone* and Crystal's *Rommel's Revenge*. Although I think the graphics of the latter are better (if you like the wire frame effect of the arcade original) it is a matter of personal choice which game is regarded as more playable. However, there is now a new release, *3D Tank Duel* from a new company called Real Time which is faster than both the earlier games and extremely playable. It uses a slightly different approach to the landscape graphics but is an exciting program and worth a look for those of you who haven't already bought one of the others.

*3D Tank Battle* for the BBC from Dynabyte at first sight appears superb. Not surprisingly the Beeb's graphics allow a better

attempt at vector graphics than the Spectrum can manage and this looks a lot like the original game. Unfortunately you are only allowed to be in charge of a gun emplacement and not a tank, so you cannot manoeuvre to chase or hide. It is a perfect example of how to turn a tense game involving strategy into a bland shoot 'em up. I hope the company aren't discouraged if sales of the game prove less than they hoped because the BBC badly needs some original programming talent to stretch its abilities and match the progress made with

### Vector graphics

the Commodore and Spectrum.

However, when writing a game it is as important to pay attention to what makes a game addictive as it is to produce good graphics. To prove the point *Encounter* from the American company Novogen for the Commodore and Atari machines is a *Battlezone* version that has received rave reviews over there even though its graphics are rather block-like (they seem to have

abandoned any attempt at vector graphics with the resolution possible on a home micro). Yet the game is outstanding because it is what *Battlezone* should be, very fast and very exciting.

Whilst on the subject of arcade copies if you want a really good version of *Zaxxon* for the BBC then run out and buy *Fortress* by Amcom. This easily matches the "official version" sold for the Atari in this country by Centresoft, and shouldn't be missed.

Alligata have released *Loco* for the Commodore which is an arcade copy even though the original game never really took off and will not be familiar to most people. It involves "shooting down" various airplanes and the like by firing steam from your locomotive before they can blow you up. The graphics and sound are excellent.

Finally, *Moon Alert* from Ocean is one of their best releases to date and was well worth the extremely long wait since the adverts first appeared. This company gets better and better and have produced without doubt the best version of *Moon Buggy* for the landscape jumping over craters and rocks and shooting upwards at a collection of motley aliens.

Tony Kendle

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# Tony Bridge's Adventure Corner



## Instant death

Last week, I finished off by talking about *The Devil to Pay*, by Computascope For Fun, and had a few sharp words to say about the spelling, grammar and general layout of the program.

I realise that spelling is not everyone's strong point, but the market for silly howlers has been cornered by Carnell, and in other programs, careless mistakes just become tiresome — at best, exasperating. When, as in *The Devil to Pay*, we are treated to consistently mis-spelt words and bad grammar, one can only wonder if even the author has bothered to look at the game.

On to more new releases. First off, let's get the bad news over with. A considerable amount of high-powered advertising has been taking place over the past couple of months, in order to get you to part with your hard-earned cash in exchange for CRL's new adventure, *War of the Worlds*.

According to the very glossy adverts, it's a "strategic arcade adventure" — yet another combination of sales grabbing words. We'll come back to those classifications in a moment, but for now, let's look at the program.

After the titles, we're straight into the main playing area — almost, anyway! It's up to the player to find out that he has to touch a key before anything happens. This sort of thing is pretty obvious, I know, but it is the smallest effort to inform the user. Once into the game, we are presented with a condensation of the first few chapters of the book, complete with a feeble Spectrum-

ised version of the famous Jeff Wayne-written music; it's a pity that this opening sequence has to be sat through every time you want to play the game. Now to the game proper — you'll find it reminiscent of *Valhalla*, with your little man striding across the screen before a background of suburban semi-detached houses. The graphics are not exactly state-of-the-Art; the little stick-man is bearable, but the scrolling is very coarse and unconvincing.

The object of the game is your search for Carrie, the girl you love, and your adventures in this quest.

The Martians are invading the Earth and it is when they appear that the faint stirrings of doubt in the player's mind reach a crescendo. Despite the fact that the player may be getting along well in the adventure and strategic departments, suddenly along hops a 30-foot spider and zaps you with a red line! Well, it wobbles about a bit, luring you into thinking that you might escape it, but I'm afraid that skill has no place in *War of the Worlds*, and you are doomed to become Martian fodder.

It's a pity that the "arcade" (CRL's term for the extremely wimpish and unfair instant death) part of WOW makes the adventure parts so unrewarding to play.

*The Odyssey of Hope* comes from Martech games, and is a graphic adventure. The tape contains two programs — on the first side, instructions and game, on the other side, the game alone, which seems a good idea. The instructions need a program all of their own, taking the form of an on-screen book. As you press Enter, the pages turn, and reveal the story of Pandora's Box. Hope has been stolen from the box, the Gods are angry, and it is your mission to recover it.

The graphics are pretty simple, but a constant on-screen read-out of visible objects and strong colours add to the interest.

Vic20 owners have had a rather rough time lately, with not many new adventures being released. It's nice to report, then, that a Vic owner (not an established software house) has taken matters into his own hands, and released *Adventure School* for his machine.

Richard Terry tells me that "as you might imagine, it is set in and around school. You start in a fish and chip shop and have to find five valuable objects. When these are found, you give them to your Mummy to

receive a surprise!" Probably a clip round the ear — you should be at home eating your dinner! For £4.50, or £4.00 if you enclose your own tape, you too can experience the delights of the local Chippy. Write to Richard at Stable Cottage, Englefield, Nr Teale, Reading, Berks RG7 5EL.

Artic were really the first adventure-writers for the ZX machines, and their infuriatingly simple-looking programs have been causing loss of hair, divorces and smashed television sets for many years now. Each new adventure has been received with gratitude by just about every Sinclair adventurer.

I'm afraid, though that the latest is a disappointment — which is unfortunate for the program's author, because A, B, C, and D (and, to a lesser extent E, *Golden Apple*) are all extremely hard to follow. The latest program, *Ground Zero*, is not, in itself, a bad adventure; the scenario has you in the wasteland of post-nuclear Britain. The problems you will meet are the ones you might expect — it's a pity, however that the location descriptions, as far as I've seen, are not particularly atmospheric.

This is, as Artic say, "a very large adventure", and these are first impressions. Gilsoft are entitled to a mention somewhere, Artic, so if you reprint this one, please ensure that mention is made of The Quill's involvement.

Talent Computer Systems is funded, in part, by the University of Strathclyde. They have recently released several programs — the one that interests us at the moment is *West*, a graphic adventure for the CBM64 and BBC/Electron. It's set in the year 1884, somewhere in the Wild West, and you are on the trail of a notorious gang of bank robbers. You must outwit and outgun them and recover the loot.

This is a very professional-looking program, well laid-out and with, thankfully, no spelling mistakes. The main picture is of the Main Street, and, as the day progresses, you will see the sky changing colour. The picture is generated by Talent's own graphic utility, *Panorama* — if this is the sort of picture that can be drawn with it, then *Panorama* can be recommended.

Apart from the bad habit of the Commodore's keyboard to hold your keypresses, the game is conducted very quickly. An adventure, in sum, about which I expect to get many questions. Buy it now from Talent Software, Curran Building, 101 St James Road, Glasgow G4 0NS.

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## Key decision

R McKean of Higher Blackley, Manchester writes:

**Q** I am considering the purchase of the Casio MT 200 keyboard featured on the cover of *PCW* dated May 24, but would like to make sure that the keyboard and necessary interface are compatible with my Dragon 32.

Also, could you give me any information on where to obtain details of the PA1 interface, as I am doing this as a college project.

**A** The Casio keyboard requires that the micro be able to receive the Centronics interface, which your Dragon can. To obtain more details of the PA1 interface you should ring Casio on 01-450 9131.

## The age of Aquarius?

**Q** At Christmas I acquired an Aquarius computer. The main difficulty I find with it is the software (or lack of it). I have enquired in a number of local shops, which stock Vic 20, Electron etc software, but with no sign of anything for the Aquarius. Surely with all the publicity that was given this computer at Christmas time there should be by now more software available.

I would be grateful for any advice you can give me.

**A** The Aquarius has suffered from the cut-throat competition for space on the software shelves. As it did not make a major impact in the market it lost out in the software

stakes. Also, the decision by Mattel to drop the machine did nothing for its popularity with retailers or software houses. There is as you say a dearth of software for this machine.

Do not lose heart however, Radofin Electronics who manufacture the Aquarius and are committed to its continued development. My advice is to write them asking for the address of your nearest stockist of Aquarius computers as they will also stock the software. Radofin's address is: Radofin Electronics (UK) Ltd, Home Computer Division, Hyde House, London NW9 6LG.

## A waiting game

E Sanders, Leamington Spa, Warwickshire writes:

**Q** I have long intended buying a computer, but because of the many new models coming on the market, I have deferred buying until things settle down.

I did have a ZX81, but something went wrong with it and I put it aside to wait for something better. Last week on the spur of the moment I bought a small computer, a Tandy MC10. It had been reduced to £39.95 as it is now obsolete. The machine has been described as a ZX81 with colour, and I thought it might be a more interesting machine to study machine code on. However, since buying it I have come to realise that although it is a very good quality machine there is very little in the way of books or software available for it. My local Tandy shop is no help, they seem to know less about computers than I do.

There appear to be no clubs or magazines which might help me, so I am writing to you in the hope that you can advise me. It is possible to upgrade this machine to 20K but there is not point in wasting more money if no information is available on the machine.

**A** Two possible sources of information for you are the Tandy User Group Remsoft, 18 George Street,

Brighton, and, of course, Tandy themselves at Tandy (UK), Tanmeway Tower Bridge Street, Walsall WS1 1LA.

I must say that I have a lot of sympathy for you, having held off for so long before buying a machine. I am surprised that your Tandy shop is no help as I have always found the staff in those shops to be particularly helpful.

I don't think that I would recommend that you upgrade your machine, at least until you have contacted the two addresses above and have determined what software and support is available for it.

## Speed essential

M Symonds of Minsterworth, Glos writes:

**Q** I am a regular reader of your magazine. I own a Commodore 64 and would like to purchase a disc drive. I have seen the VIC 1540 drive but it is slow in disc terms, ie it takes 18 seconds to save a 6K program and 12 second to load it back. I would like to know if you can buy a disc drive which can load and save faster than the Vic 1540 disk drive.

**A** Commodore announced a new disc unit for the and Plus/4 at the Chicago CES which is claimed to be four or five times faster than the present unit. It should be available in this country in time for Christmas.

Commodore disc drives are notoriously slow. Even if you can't wait for the new drive to arrive, I don't know of any faster Commodore compatible drives that are available on the UK market at the moment.

One small point, if your interest is in merely saving and loading programs faster, why not buy one of the many cassette fast-load programs available for the CBM 64 to speed up cassette loading time.

## Joystick trouble

Andrew Sweeney of Glasgow writes:

**Q** I hope that you can help me. For Christmas I was given a Cheetah 32K Rampack making my Spectrum into a 48K one. A few weeks ago, for my birthday, I was given a Kempston joystick interface. When I tried to use my joystick with the rampack I discovered to my horror that I could not. When I plugged in the interface I could not plug in the joystick.

Please could you give the name and address of someone who could help me? I just want to use the joystick for 48K games.

**A** I suggest that you contact Timedata, 16 Hemmels, Laindon, Basildon, Essex SS15 6ED who should be able to fix you up with a suitable connector. One last point, Cheetah maintain that their Rampack is "fully compatible with all accessories", have you put your problem to them?

If not I would, at least they will then be aware of the difficulties of using certain devices with their 32K Rampack.

## Starting young

Mark Hadman of Whittlesey, Cambs writes

**Q** Could you please help me with the following. I am nine years old and I would like to buy a cheap, easy to use Vic 20 machine-code book for complete beginners.

**A** Anyone who wants to learn machine-code at nine years old has got to have a future in this business. As a start, you could try *Advanced Basic and Machine Code Programming on the Vic* published by Duckworth. This retails at about £6.95 and is one of the cheapest and easiest books I've found

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek* it to Phil Rogers and every week he will *Poke* back as many answers as he can. The address is *Peek & Poke, PCW, 12-13 Little Newport Street, London WC2R 3LD*



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**DRAGON 64** plus single disk drive, many books and games, plus joysticks, taperecorder £800 ono. Can be sold separately. Ring Ongar 363991 evenings only.

**DRAGON 32** boxed, two joysticks, £150 of software, B/W television plus lots of magazines, manual and handbook. Sell for £230. Ring 01-680 3901 (evening).

**DRAGON SOFTWARE** worth £100 ie Donkey King, VGH, Frogger etc. Books worth £20.00 + lots of magazines. £50. Tel: 01-233 4407 (day)

**DRAGON 32** + 2 joysticks, Trojan Light Pen + loads of s/w and mags inc: Donkey King + 747 etc. Boxed as new. £145 ono. Tel: Marlow (06284) 2936.

**DRAGON S/W** for sale, £5. Inc: Hungry Horace, Kriegsviel, Android Attack, Crazy Painter, Cuthbert — Jungle, Minimouth Minotaur 09T2, Dragon Mountain, Special Selection one. Tel: (0482) 502389.

**DRAGON 64** £50 worth of s/w. 2 joysticks, tape recorder, mags + books. Offers. Tel: 0229 31542.

**DRAGON 32,** cassette recorder, leads, joystick, 15 original games, cartridge, 7 books, mags, manuals £150 ono. Tel: Swindon 893867.

**DRAGON 32,** £70 of s/w, 2 program books, £200. Tel: 01-272 2573 after 5pm (Buyer collects)

**DRAGON 32** unwanted prize + Kriegspiel tape used one £100 ono. Corsham, Wilts 0249 715380.

**DRAGON 32/64** ROM cartridges — Cosmic Invaders, Berserk, both in excellent condition, will sell for £10.00 each or consider swapping each one for two cassette based programs. Tel: Bradford (0274) 583734.

## Acorns for sale

**BBC B 1-2 OS** + WH Smith tape player + Clares Joysticks + cover + over £200 software only 8 months old. £400. Ring 061 223 9430.

**BBC B 1-2** still boxed ie cassettes £325.00. No offers. Sittingbourne

521518.  
**BBC MICRO** model B, 32K + s/w and all leads, boxed. Extra roms. £375 or offers. Eprom programmer + eraser. Both for £120. Tel: Newcastle (0632) 737654.

**16K SOLI DISK** sideways Ram board for BBC. Supplied with over £2000 of original Roms. Worth over £2000. Sell for £150. Tel: 05867 09152.

**BBC A OR B** damaged or malfunctioning. Wanted for circa £100. 35, Galsworthy Ave, Cheetham, Manchester, M87SU.

**BBC 32K** tape or disk quality program listings (only) 1-25p 5-£1 10-£1.50. Any more at 25p inc. p.p. P.O.s to S. Weir, 42 Elie Ave, Deans Livingstone, W. Lothian EH54 8ET.

**BBC SOFTWARE** for sale. All titles only £2.50. Including Zalaga, Rocket Raid, Xanadu Adventure, Time Traveller, plus many others. Also 1-2 OS only £5. Tel: Frome (0373) 61552. Jonathan.

**BBC COMPUTER.** Excellent condition complete with leads, manual and s/w £325. Also brand new Centronics 700 printer with 14 1/2" carriage and lead for BBC only £350. Tel: 0734 863351.

**BBC SOFTWARE,** Planetoids, Structured Basic, Making the Most of the Micro. Also, selection of BBC books. All half price. All as new. Phone Dundee 542106 after 6pm. Ask for Ewan.

**BBC MICRO** games tapes, all originals, JCB, Aviator, Dr Who, 2002, Colditz, Seawolf, Sentinel, Dambusters, Dodgy Dealer, Pinball Arcade, Tree of Knowledge, Educational progs. All £2. Telephone Littlehampton 714507.

**BBC MICRO** model B1-2 O/S + Microvi-Tex colour monitor 1 s/w + mags. £500. Tel: 01 807 8270.

**BBR B 1-2 OS** Torch Z80DP monitor (HR 720 pixels). Perfect s/w £200.00 worth of games and s/w. Shinwa CP80 printer etc. Worth £2500.00. Sell for £1600.00 due to migration. Tel: 01-452 0343.

**BBC MODEL B** with view and screen dump Roms. 1-20 OS £300 Epson FX80 printer. Centronics interface £300 or £550 together. 01-568 6006 evenings.

**APPLE COLOUR CARD.** For Apple II or any compatible module. £45 ono. Tel: Doug 0727 34 351-x34 day. Tel: 01 445 429 eves.

**ACRON ELECTRON** + 199 of s/w. Best offer of swap for CBM64. Tel: Tiltwich 715898.

## ZX81s for sale

**ZX81.** Faulty. Ideal for spare parts. New pressure keyboard £6 inc p.p. ZX81 + Fuller keyboard-case in-treared. By previous owner, but keyboard works OK. Hence price only £17 inc p.p. Tel: 0274 873122.

**16K RAM** For ZX81 unboxed. £11 inc p.p. Tel: 0274 873122.

**ZX81 CASSETTE.** Cost £35. Sell for £10. Also machine code book £9. Sell for £4.00. Together £12.00. Tel: 0902 725 762.

**16K ZX81** built into Fuller keyboard. Joystick interface. All manuals. Leads. Plenty of software, Chess II Football manager, Asteroids etc. Ferguson cassette recorder. All perfect working order £75. Newbury (0635) 40131.

**ZX81 GAMES** For sale, most 16K. Include Night Gunner, Gobbiers, Galaxians, and many more from just £2.00. All original. I will sell all six for £15 own. Phone 0202 514977.

**16K ZX81,** manual and leads, about £40 worth of software (9 tapes). Good condition. £50. Redhill 86911.

**ZX81 GAMES** QS Asteroids, Raiders, Swamp, Brickstop Brickbat, £1.99 each or swap for Spectrum game(s). Tel:

:0932) 229825 after 6pm.

**ZX81 WITH** Memotech: 64K Ram, Wordprocessor, Centronic interface and lead, keyboard, assembler. Also programmable sound unit. Full instructions. (Wordprocessor has very reliable 2400 baud for tape.) Software. All for £70. Phone Swindon 25128.

**16K ZX81 + FULLER** FD42 keyboard, large amount of s/w inc. Compiler, Flight Simulation, Chess, Invaders + book on m/code programming. £80.00 ono. Tel: 041 884 2153. Derek.

**16K ZX81**, Filesixty keyboard, printer with paper, Sweet Talker synth., eleven games cassettes, all leads and manual. Worth £170. Sell for £110 ono. Tel: Cardiff (0222) 489335 after 6pm.

**ANRRIG DIGITAL** board for ZX81, four channel input, no extra Ram needed. Original instructions inc £18. New. Only £10 ono. Tel: David, Oxford 0865 735936.

**16K ZX81** plus £75 worth of software 8 months old. V.g.c. Plus mags and books, leads and manuals, £85 ono. Tel: Dorling 887619.

**ZX81 FOR SALE** plus 16K ram, complete with learning lab with programme cassettes, books, all boxed. Worth £100 plus, inc. magazines and books. Sell for £35. Tel: Windsor 54907.

**COMMODORE 1520** printer/plotter. V. good, £65. Word-Wizard word processing tape (works with 1520) £4.00. Commodore 64 programme book (Vince Apps). New condition £4.00. (Originally £5.95. Nottingham 264486.

**ZX81 + 16K**, 32K expansion modules, 6 games, all unused. Offers. Tel: 01 646 1601.

**ZX81 16K + S/W**, books and mags, 7 months g/tee. £35. Tel: 01 894 7919.

**ZX81 16K RAM**, 7 games + all leads £40. Tel: Dronfield 418068.

**ZX81 16K RAM** mags + 7 games £49. Tel: 4pm weekdays. 0246 418068.

**ALPHACOM PRINTER** for Spectrum or ZX81 £45. Currah Micro-Speech for Spectrum. £20. both as new. Tel: 021 778 1719 after 6pm.

**ZX81 £15.00** 16K Ram pack £8.00. £21.00 worth of software £10.00. Spare manual £1.00. Spare power pack £3.00 or the lot £35.00 or swap for ZX interface 2 and joysticks. Tel: Halifax 247456.

## Ataris for sale

**ATARI VC5** in mint condition with 15 titles including Vanguard, Megamania, Asteroids, Star-master, Pac-Man, Demon-Attack, plus accessories, making a total of £350 but only asking £109. Telephone 693 4238.

**ATARI Vera** Writer drawing tablet. Cost £240. Will sell for £75 ono. Tel: 01 571 1309 after 8pm.

**ATARI VCS 5** cartridges ie Combat, Space Invaders, Pac Man, Night Drive, Bowling. £99 ono. Tel: 061 226 7941.

**ATARI 400** 32K memory, boxed as new. Games available £95. Tel: 0734 869 259.

**ATARI VCS** and 13 cartridges, joysticks, paddles and cartridge holder. Cartridges include Demon Attack and Asteroids. Sell for £140. Phone Neil on Brighton (0273) 414587, after 7pm.

## Tandys for sale

**TANDY** extended Basic 16K colour computer. 5 books, 1 Rom cartridge game, 1 microcassette. John Stevens. £80. Bristol 277528.

**TANDY 4** colour printer/plotter excellent condition. 3 rolls of paper. Cable to suit Dragon. Will send print sample. £90.00. Tel: (0202) 692633 after 6pm.

**TANDY GP 115** printer. New with Dragon cable £80 ono. CBM 64, Future

Finance (disk) £40 ono. Tel: Robil 01-650 1365 (after 6pm).

**COLOUR GENIE** 32k two manuals, s/w little used £100 or swap for 48K Spectrum in similar condition. Ring Blandford (0258) 56248.

**APPLE II** disk drive, assorted s/w. Language card. DOS 3.3. Price £650. Tel: 01 985 4622 day. Eves 01-267 1975 (Jon).

## Wanted

**SWAP 48K SPECTRUM** with joystick and interface, cassette recorder, some software, dust cover. (still under guarantee) for Commodore 64 with or without extras. Must be under guarantee. Phone 907 1204.

**PENFRIEND WANTED** for TRS-80 Model I. Owner can be boy or girl, wants to swap ideas; games, hardware. Write to J. Brods, 39 Tetbury Drive, Wamdon, Worcester WR4 9LG. Tel: Worcester 53248.

**WANTED 8K RAMPACK** for Sharp PC 1500. Up to £35. Tel: Triverton (0884) 256119.

**WANTED ZX81 16K** with software if possible. Also with cassette recorder. Pay up to £60. Tel: 0472 812345 (after 8pm).

**SPECTRUM S/W** to swap. Graf Spee, Dictator, Trans Am, Stokers, and others for Text Advent (not Artic). Mills, 9/1 Cobbinshaw House, 16 Calder Gds, Edinburgh or tel: 031-453 2931.

**WANTED BBC B 1.2 (OS)**. Phone 0332 556381.

**SWAP HALLS** of the Things for H.U.R.G. or Splat. Steven Swindells, 2 Willow Bank, Cheadle Hulme, Cheadle, Cheshire SK8 7NR.

**WANTED VIC-20**. Swap for Aquarius home computer + cart. + books, manuals, leads etc. Tel: (0204) 594353 (after 5pm).

**SWAP BBC** disc s/w ie: Aviator, Zaxxon, Cybertron, Pool, Horse Race, Corborale, Climber, Pango + JCB Digger. Phone Pete on Harrogate 711939.

**WANTED BBC B. 1.2 O/S**. A/O Qumania disc drive (BBC): 9.30-6pm. 061-723 2487.

**SPECTRUM S/W** not for keeps — just to swap for 1 week or 2. ie: Chucky Egg, Jet Set Willy, Blue Finger, Blade Alley etc. Tel: 0636 78108 after 4pm.

**VIC 20 SWAP** for BBC. 206 games, C2N deck. Tel: 800-1307.

**WANTED CBM 64 + disc drive**. Reasonable Price. F. L. Cox, tel: 0952 86333.

**ALL CBM 64** users, s/w wanted. Swap or sell. Tel: (174) 22938.

**WANTED COMMODORE 64** with C2N cassette deck. £120. Spectrum £60 and BBC B £200. BBC Monitor £120. Phone (05827) 69152.

**CHEAP 16** (preferably) 48K Spectrum with manual etc. London area. Tel: Chris on 01-735 3426.

**C64 S/W** esp Valhalla + Hobbit, Quicksat, 2 joystick. Tel: Richard 051-733 0070. (after 4pm).

**SINCLAIR SPECTRUM** s/w (all originals) to sell or swap. Tel: Havant: 0705 47368.

**BELGIUM: CBM64 + VC1591** swap programs (more than 400). Write to: Jacques de Jonghe, 56 Rue Richard Orban 4351 Berloz, Belgium. Tel: 013/325336 in Belgium. Please contact me!

**COMMODORE 64**, C2N recorder, joystick and over £100 of software. Including Duckworth extended Basic. Swap for Electron + Recorder + £50 (negotiated for software) or large sum of money. (01) 853-3501 London.

**COMMODORE 64** Radar Rat Race, Rom Pack and a Speech Synthesiser, will swap for Microdrive or sell. Offers. Model I Tandy Expansion Interface

Wanted, will swap for Spectrum. Worc. 53248.

**WANTED SUPERBASE** 64 Bristol 833617.

**SECOND-HAND SPECTRUM** games wanted! Originals only (with inserts, etc) disliked/overzapped/disappointing games — I'll buy them! offer by return post! Gordon Ingus, 37 Cockburn Street, Edinburgh EH1 1BP.

**WANTED CURRAH** speech unit. About £20. Telephone (0592) 262894 after 5pm weekdays and 2pm weekends.

**SPECTRUM COMPUTING** No. 2 cassette wanted. Will pay high price and postage. Send proposition to R. Betz, Chemin du Moulin 38 — 1328 Ohain, Belgium.

**WANTED NON-WORKING ZX81s** and Spectrum — for cash. Any condition 0772 632666.

**COMMODORE 64** speech synthesiser, will swap for Spectrum Interface I or sell, offers. Wanted TRS-80 Model One Expansion interface, no memory needed. Also Vic 20 16K Ram Pack. Tel: Work 53248.

**WANTED 48K** issue 2/3 Spectrum, software not needed, but will consider add-ons. Telephone Hemel Hempstead 63977 evenings and w/ends.

**COMMODORE 64** software available for swapping. Many American titles. Telephone 0900 4633.

**BARGAIN £70** worth of Spectrum books including The Spectrum Handbook and 4 Melbourne House Titles. Will swap for Spectrum Interface I or £35. Wanted E/I for Tandy Mod I. Worc 53248.

**WANTED CP** Soft Superchess 3.0. Will swap for other Spectrum software. Tel: 051-430 6504.

**SPECTRUM SOFTWARE** to swap; including Domsday Castle, Alchemist, Boogaboo, The Flea, Zip Zap. Telephone Jason on Pontefract 703036 between 4-9pm.

**WANTED TI-99/4A** Mini Memory and manual. Also expansion box etc. If reasonably priced. Tel: (0782) 627561.

**WANTED BBC** Model B (software if possible). Swap for 48K Spectrum including joystick, software, magazines. Plus Atari VCS with six cartridges. Both in excellent condition. Please contact Somerby 418 (Leics).

**SWAP COMMODORE 64** Hobbit for Ultisynth or Multisynth tape for 64. Phone Irvine (0294) 73445 after 7pm.

**SWAP ELECTRON** software. Phone Harpenden (05827) 5232. Ask for Ian. After 5pm.

**SPECTRUM 48K + £100** software, joystick interface, joystick + cassette recorder to swap for BBC Model B 1.20/S. Tel: 0865 721541 (Oxford) after school time (4pm) please.

**SPECTRUM SWAPS** Valhalla for Hobbit, JetSet Willy for Codename Mat, Atic Atac for Fred. Please write to: T. Williams, Blaenllyn Nanteris, Newquay, Dyfed or Phone 0545 560660 after 6pm.

**VIC 20 SOFTWARE** to swap or sell. Arcadia £3.50, Catcha Snatcher £3.50, Flight 015 £4.00. All in good condition. Contact J. Boyer, 30 Nightjar Close, Creekmoor, Poole, Dorset. BH17 7YN.

**ACORN ELECTRON** games wanted in exchange for Spectrum games. I have Spectrum games from Silversoft, Psion, Imagine, and want games for the Acorn Electron. Ring (0323) 891871 after 4 o'clock.

**FOR SWAP** or sale (Spectrum Software) Zoom, Planetoids, Espionage Island or Flix for Trashman, Krakatoa Night-gunner or disabled. Ring 061-928 8354 (after 5 o'clock).

**WANTED SCREW** thread zoom lens for use on Practica camera. Wide range of Spectrum software to swap for it.

Send offer to Mike, Misty Willows, Hall Road, Tiptree, Essex. CO5 0BJ.

**SWAP MY** Spectrum software for yours (originals only) including Zaxxon, Rider, speed duel +20 more. Send to I. Bristow Eastside Brinkworth Chippenham Wilts SN15 5DX enclosing list.

**WANTED CBM 1540** disk drive in good condition for Vic20. Give £135 and p&p Tel: 0232 61950 after 6pm or write to P. Cassidy, 29 Riverdale Park East, Belfast.

**WANTED 8271** floppy disc controller chip for BBC Micro. Please write stating required price: Jerry Lakin, 6 Ullswater Avenue, Edith-Weston, Oakham, Leics. LE15 8JD.

**SWAP SPECTRUM** s/w, hunchback, meteor storm, eye of Star Warrior, Spectrum Invaders and Planet of Death for Oric Atmos s/w. Tel: (0582) 599576.

**SWAP ORIGINAL** Spectrum Tapes Planetoids Galaxians Hungry Horace Miner Cavern Fighter Arcadia Crazy Kong Ring Sheffield 0742 461623.

**SPECTRUM KEYBOARD** wanted. Swap for s/w. Tel: Llandudno 75404 after 5pm.

**WANTED URGENTLY** plug in Ram extension board for issue 1. Spectrum Tel: 01-868 1815 Peter Rider.

**SWAP SPECTRUM** s/w Inc: Pogo, Crash Rider, Jet Set Willy, Hurg, & others. Tel: John 476 8884.

**SPECTRUM GAMES** to swap. Timegate, Ship of the Line, Chequered Flag, Transversion, Ground Attack, Test Match, Snooker (Visions), Flight Simulation, Harrier Attack. Tel: (0977) 43367. Ask for Alan.

**SPECTRUM PRINTER** urgently required, willing to pay or swap games. P060, Chequered Flag, Thrusta, Ometron, Firebirds, Hard Cheese or Bubble Trouble. Over 150 titles available. Phone after 7pm. Ask for Haggis 041 771 1164.

**WANTED** issue one Ram Upgrade to bring my Spectrum up to the full 48K. Willing to pay £15. Phone Carrickfergus 65 797 and ask for Sean.

**WILL SWAP** my Drone Datatank original tape for original copy of Danger Ranger. Phone Hamilton 422997. Ask for Paul.

**WANTED**. Faulty computers for spares. Will pay £20 Vic, £20 Spectrums, £100 BBC B. Will collect. St Albans 61203.

**SWAP MY** BMX Mongoose Bike in excellent condition, in part exchange for BBC Model B. Must be in perfect working order. Tel 01-701 1806.

**SWAP VALHALLA** By Legend in exchange for The Quill; must be original. Send me your game for immediate reply. First come first served. Tel: 03543 2420.

**VIC 20 S/W** swap or sell. Cartridge: Star Battle, Mission Impossible, Mole Attack, Menagerie. Cassettes: Catcha Snatcha, Wacky Walters, Scramble, Night Crawler, Space Phreks, 3D Time Trek. All original. Cheap if buying. Tel: Simon Andrew Jnr. 041 772 1478.

**SPECTRUM AND DRAGON** software swap. Many titles. Write for details to Robin England, Church on the Way, Churchill Rd, Thetford, stating which computer you have.

**WANTED** any system with 32K Ram disc or just interface. Must have good graphics. Tel: Jeff (0525) 384874 (eves).

**SWAP 48K** Spectrum + £100 games tape recorder for C64 + tape recorder. S/w not needed. Tel: 0622 673259. Jason (after 4pm).

**DRAGON SOFTWARE** swap — wanted: Composer, Fitty, Sprite Magic. I have Defense, Glaxxons, Gridrunner, The King, Zaxxon, Defender. Two for one basis. Write to Paul, 58 Balfon

Crescent, Earnock, Hamilton, Lanarkshire.  
**SWAP** complete photographic dark room for dragon disc drive. 0274 599959 after 5.30pm. Anthony Howarth-dnorth.  
**ATARI DONKEY KONG** for sale or swap. Tel: 422 6375 after 4pm.  
**BLACK CRYSTAL** for 48K Spectrum, Alchemist. Swap for Digger Dan or Dig Dug. Tel: Northampton 0604 718557. Ian.  
**S/W EXCHANGE.** I have over 300 BBC programs (on disc and tape, all originals). For Spectrum, or CBM 64 programs. Tel: 05827 69152.  
**WANTED ATOM** programs suitable for 12 x 12 machine. Any kind considered. Must be cheap. Also Atom Books. Write with details and price to Steve Woolley, 43 Jetson Street, Gorton Manchester M18 8SX.  
**CBM 64 C2N** recorder EC Basic cartridges. s/w inc. International Soccer, Forbidden Forest, Aztec Challenge, joystick, manuals, mags. Cost £370. Accept £225 ono or swap BBC B + money. Tel: Reading 874769.  
**SWAP CBM 64** s/w inc: International Soccer. Phone Jane. 021 556 8201.

### For sale

**ORIC MCP40** colour printer with paper hardly used 5 weeks old £100 ono Tel: Rochdale 31239 Mrs Bleene  
**TRS80** level 1, basic instructions part (4 cassettes) £5.00 Tel: 0793 870827  
**SHARP MZ 80K** & lots of S/W, games education and utilities. Assembler & disc assembler £190 ono Tel: 0229 37853  
**LYNX 96** good condition with leads, manual & some S/W. £190. or swap Acorn Electron. Tel: Ramsey (0487) 841677  
**LYNX 48K.** Excellent condition still under guarantee. Book & £40 of S/W. Will swap for good condition CBM64 or £135 ono Tel: 01 527 8589 after 6pm  
**SHARP MZ80 B** disc S/W. All originals & manuals, accounts, data base, wp, mail pro, super calc, m, basic, c basic, & many games £250 ono The lot. Tel: Mal (0222) 552228  
**ZX PRINTER** for sale. Brand new £32.00 reason for sale upgrading. Tel: 01 340 1119  
**METTEL** Intelevison — with assorted cartridges. All offers. Tel: 01-458 7826  
**WALTER** Printer WU2000 + screen dump program for BBC B. Unused, original packing. Urgent sale required. Offers invited. Tel: 021 458 3637  
**INTERFACE 1,** microdrive and cartridge all as new. £80 Dennis Waugh, 7 Nursery Lane, Brigsthorpe, Northampton NN2 7QG  
**SAKER Z80** data entry pad. As new, much operating s/w available. Retails £689, only £250 or swap BBC B or similar micro or printer, other hardware. Details 0491 874117.  
**TI994A,** Speech synthesis, j/sticks, recorder and leads, beginner's basic cassettes, slick stick, Atari interface and manuals. £130 or swap for Atari 800 with recorder. Tel: 01-607 7440 also ten modules (POA).  
**MACHINE CODE PACKAGE.** Any Spectrum includes picturesque assembler and editor, CP assembler, disassembler, 2 machine code books by Melbourne House, Softek Compiler, m/c magazine. As new just £22. Tel: Colchester 68921.  
**COLECOVISION** with Turbo and Donkey Kong £105 ono or swap for 48K Spectrum (good condition only). Tel: 01-701 4380.  
**SHARP PC1211** programmable computer + manuals £200. Tel: 794 3372.

**2 ROM CARTRIDGES,** Munchman + Zero Zap. 1 joystick interface + cassette leads. For T199/4A £25.00. Maidstone 47501 after 6pm.  
**400K DISK DRIVE** for sale with over £100 of BBC s/w inc Disc Doctor Rom, Business and the latest games. Value £1200+. sell for £450. Tel: (05827) 69152.  
**16K SOLIDISC** sideways Rom for BBC supplied with over £1500 of s/w inc. most Roms on the market. Worth over £1500. Sell for £150. Duplicated prize. Tel: (05827) 69152.  
**SHARP PC 2600** complete with built in Thermal printer + magnetic card reader, price £30 ono. 01-735 3426.  
**DISC DRIVE.** Olivetti 5 1/4" as used by Acorn. S/s s/d 100K with leads, manual, utility disc. 7 months guarantee £100. DFS £15. Speaking watch £30. Telephone phone Hornchurch (04024) 71789 after 6pm.  
**GAMES DESIGNER** for 48K Spectrum for sale £8.00. Tel: (0702) 41940.  
**MICRODRIVE** plus seven cartridges plus interface one £75. Also several rolls of Sinclair printer paper. Rickmansworth (0923) 777049 (NW London).  
**FOR SALE** Oric-1 48K Interface plus Quickshot Atari joysticks. Also Invaders, Brickly Hopper, Galaxians, Hunchback, Acheron, Loki, Mushroom, Starfighter, Xenon-1, Zorgon, Fantasy, Hobbit, worth £300. Sell for £170. Phone 0642 311132.  
**LYNX 48K,** with cassette recorder, books and software including data file £130 ono. Tel: 061 633 7988.  
**CBM 1515** and 1520 printer plotter, pens, ribbons, paper, manuals, etc. Both full working order £250. Tel: 01 840 3610.  
**LYNX 48K** boxed, cassette recorder, manuals, leads, machine code book, chess game, Introtape. 60 + mags. Cost £320. Sell for £170 ono. Tel: Bolton (0204) 62085.  
**ONE MICRODRIVE** Interface 1, 3 blank cartridges. £80.00. Tel: 01-688 6797.  
**INTELLIVISION** games system 9 months old with sound module. 3 sound cartridges + 28 other cartridges. Bargain at £350. May split. Some colecovision cartridges for sale. 01-764 4075.  
**GAMES DESIGNER** £10. Valhalla £10. Doomsday Castle £4. Adstra £4. Molar Mawl £2. Arcadia £3. Zoom £4. Ashton

£3 for Spectrum, all originals. Tel: 893 077 Nottingham.

**ORIC 48K** book + cassettes ie, Machine Code Forth and Hunchback, £90.00. Tel: 01 393 8550.

## ADVENTURE HELPLINE

**Escape from Pulsar Seven/Golden Baton.** How do you find the light. How do you find the parchment and how do you use the quartz against the lizard man? Leon Bolt, 72 Latimer Rd, Whipton, Exeter, Devon.

**Denis through the Drinking Glass on Spectrum.** I cannot find the flask of drink. Robert Nunn, 38 Palm Rd, Romford, Essex.

**Espionage Island on Spectrum.** I can't get further than the native woman. Edward Callan, 48 Raheen Ave, Tallaght, Dublin 24.

**Planet of Death of Spectrum.** I have got past the forcefield but I cannot get my space ship free. What does 'no dusty bin rules' mean in the lift, and can you shoot the guard? Mark Rugman, 734 Derby Road, Wingerworth, Chesterfield.

**The Hobbit on Spectrum.** How do I avoid recapture after escaping from the goblin's dungeon? Where is the magic ring? John Hedeas, Flat 5, 55 Oxford Rd, Littlemore, Oxford.

**Ring of Power on Commodore 64.** On the second level, having crossed the sea, there is an exit 'up' on the beach. But when I try the location is merely repeated. How do I go 'up'? P Barnard, 16 Ashwood Rd, Ru-

dloe, Corsham, Wilts.  
**Fantasia Diamond on Spectrum.** I can't cross the river; what does 'wait for it' mean? Kevin Doull, 5 Lindsay Place, Wick, Caithness.

**Murder at the Manor on Spectrum.** Where is the ladder? Where is the manor? GUR Howard, 31, Springfield Rd, Windsor, Berks.

**Zork 1 on Commodore 64.** How do I get into Hades and how do I open the grating? Nigel Norse, 11 Green Leaf Ave, Wheatley Hills, Doncaster.

**McKensie on Spectrum.** How do I get out of prison? What is the rusty robot for? Mark Hutchinson, 61 Church Rd Church Hotel, Franworth, Bolton.

**1915 Pirates Cove on Vic20.** We cannot get out of alcove and do not know any magic words. Mrs S Johnson, Greenbanks, St Austell Rd, Probus, Cornwall.

**Alchemist on Spectrum.** I cannot find the spell of destruction or any more locations. Tim Hortopp, 53 Walcheren Place, Hamworthy, Poole, Dorset.

**The Quest of Merravid on Vic20.** Once you have killed the dragon, how can you get the firestone? Ian Swan, Nether Cambushinnie Cottage, Kinbuck, Dunblane, Perthshire.

**Dungeon on Spectrum.** I can't get past the giant rat. I can't get past the swirling grooved rock. I can't enter where the splintered flint hurls you back. J E Tyson, Post Office Langport Somerset.

## Diary

Event	Venue	Dates	Admission	Organisers
Electron and BBC Micro User Show	UMIST Manchester	Aug 31-Sept 1 10.00am-6.00pm Sept 2 10.00am-4.00pm	£2.00 adults £1.00 children	Database Publications 68, Chester Road Hazel Grove, Stockport 061-486 8383
Games Day 84	Royal Horticultural Society's New Hall, Greycoat St London SW1	Sept 1 10.30am-6.00pm Sept 2 10.00am-5.00pm	£1.25	Games Workshop 27/29 Sunbeam Road, London NW11 01-965 3713
Hampshire Computer Fair	Guildhall Southampton	Sept 6 11.00am-9.00pm Sept 7 10.00am-5.00pm	Trade - free Public - £2.00	Testwood Exhibitions 0703 31557
Walthamsoft 84	Main Exhibition Hall Waltham Forest Technical College Forest Road, London E17	Sept 8th 10.00am-5.00pm	£1.00 adults	London Exhibitions and Promotions 38 Exeter Gdns., Ilford, Essex 01-554 6039
ZX Microfair	Alexandra Palace London N22	Sept 8	£1.00 adults 50p children	ZX Microfairs 71 Park Lane London N17 0HG 01-801 9172

## Arty

*Graphix IV* is probably the cheapest Commodore 64 extension to Basic program I've yet seen at £9.99. And as any C64 owner will be only too aware the machine could do with one.

This program adds 16 new commands to the machine, all of which are concerned with graphics. The actual program resides at \$C800, and so doesn't conflict with ordinary Basic.

*Colour* sets the foreground and background plotting colours in high res. *Draw* draws a line from a point previously defined. Other commands include *Paint*, *Plot* and *Character* which allows the character set to be easily redefined.

The program comes with a useful manual explaining how to use the new commands.

*Graphix IV* may not have the extra sound commands of some other Basic extensions but then look at the price difference.

**Program** *Graphix IV*  
**Price** £9.99  
**Micro** *Commodore 64*  
**Supplier** *Zipprint*  
*96 Bournemouth*  
*Road*  
*Parkstone*  
*Poole*  
*Dorset BH14 9HY*

## Get the Bird

Fantasy have previously been known for arcade games like *Pyramid* where you zapped a variety of aliens in seemingly endless chambers. To a certain extent then *Beaky and the Egg Snatchers* is a break with tradition.

Although featuring the usual high quality sprite graphics this game has more of a plot, in fact it has so much plot it's nearly impossible to describe.

Basically there are these birds which you control and you must preside over the development of some eggs into chicks. This involves three stages, egg collecting, egg brooding and chick rearing.

The first of these involves shooting evil egg snatchers whilst in flight. This is because you are unable to pick up the

eggs yourself; when the egg is dropped by the egg snatcher you must catch it in mid air and drop it into the nest.

Other stages involve avoiding snowflakes and frogs, and pouncing on flying worms. You'll forgive me if I don't try to explain them. It's pretty wonderful, provided you have the patience to read through the instructions and figure out what you're supposed to do.

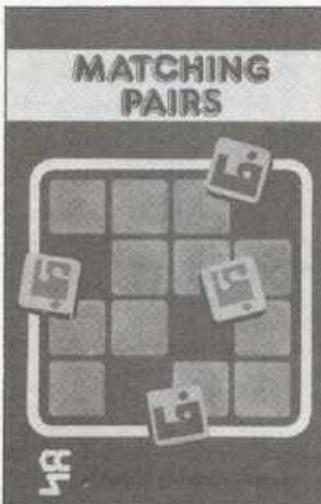
**Program** *Beaky and the Egg Snatchers*  
**Price** £6.50  
**Micro** *Spectrum*  
**Supplier** *Fantasy Software*  
*Fauconberg Lodge*  
*27A St. Georges*  
*Road*  
*Cheltenham*  
*Gloucestershire*  
*GL50 3DT*

## Pared Price

Whether in the end they are the iconoclastic mould breakers they believe, Mastertronic have certainly stirred up something. Whilst as yet there's been no massive move towards reduced prices for mainstream games, companies have certainly seen that there is a market for less spectacular but cheaper games.

To this end, I would guess, Cases Computer Simulations are releasing a new range called *Charlie Charlie Sugar*, which consists of various games, all of which might loosely be described as puzzles at a mere £2.99.

*Matching Pairs* is a souped up version of that old favourite Pelmanism (that was cribbed



Pick of the week

## LOGO LOWDOWN

Sinclair has released *Logo* — the graphics (amongst other things) language. Those in the know (people who mumble on and on about the relative merits of one language over another) tell me it's one of the best versions of the language available on a home micro.

The package consists of the program and two manuals, *Logo 1* and *Logo 2*. Roughly speaking, *Logo 1* does what you always knew *Logo* could do; ie draw patterns using principles of maths and geometry. *Logo 2* proves that you can do a great many things besides, including the manipulation of words and numbers.

As computer languages go, *Logo* is more fun for the 'dabbler' than most because of the construction of patterns and

other wonderful things. The two manuals look excellent and would seem to cover virtually any question you could have about the use of *Logo*. Basic driver routines for a robot are also included as is a reference card listing the commands.

You can guess that a 48K program plus two manuals is not going to come cheap — in fact (I think) it's the most expensive Sinclair software ever at £39.95. On the other hand, it's cheap compared to its rivals and beautifully packaged. Start saving your pennies.

**Program** *Logo*  
**Price** £39.95  
**Micro** *Spectrum*  
**Supplier** *Sinclair Research*  
*Stanhope Road*  
*Camberley*  
*Surrey GU15 3BR*

from the liner notes — it's not an old favourite of mine) where the player has to remember the position of various letters of designs on the reversed faces of a table of cards — the idea is to find all the pairs in as few guesses as possible or alternatively, before another player.

This computer version of the game lets you play either alone or in competition and boasts five, ever more complex patterns. It is a nice interpretation of a simple game and at the price, some people at least may find it more satisfying than the latest space shoot em up at six or seven pounds (but then what isn't). Despite the dire warnings of imminent industry collapse if games are sold for these sort of prices, for the moment, anyway, I think they are a good thing.

**Program** *Matching Pairs*  
**Price** £2.99  
**Micro** *Spectrum*  
**Supplier** *Cases Computer Simulations*  
*14 Langton Way*  
*London SE3 TTL*

## Gulag

You may have seen some advertisements recently for a number of programs by a new

company which modestly calls itself Talent and has a range of programs primarily for the Commodore and BBC.

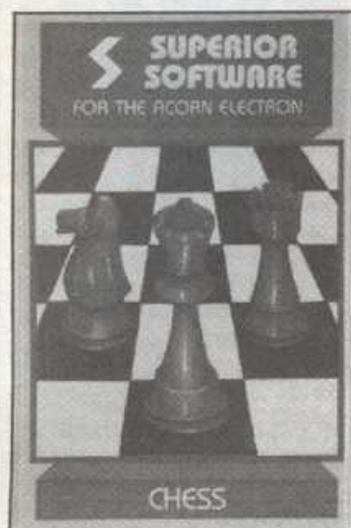
One of the programs is an adventure called *West* about which you can read a lot more (suffice to say that it's rather special) from the likes of Tony Bridge. I decided to have a look at one of the arcade games — *Archipelago*.

The title screen on this game is absolutely wonderful — as good as *Alice in Videoland* but the game was a bit of a disappointment. *Archipelago* proved to be a maze game with very simple graphics.

Using the joystick, you move a little man around a maze (which looks a bit like a crossword puzzle layout) collecting diamonds and avoiding spiders. In fact, it's not a bad game — very fast and addictive with the spiders acting very 'intelligently' as they try to entrap you.

So — marvellous title screen (a great sales job for the company's screen designer program), disappointing game graphics, but quite a fun game.

**Program** *Archipelago*  
**Price** £7.95  
**Micro** *Commodore 64*  
**Supplier** *Talent*  
*FreePost*  
*Glasgow*  
*04 0BR*



## MULTI OPTIONS

I wonder how the Electron is doing; it doesn't have a surfeit of programs for it — but then maybe it just hasn't been around long enough yet.

However, what programs there are come mainly from established BBC software houses, one such is Superior Software. It has released a version of that game of games, Chess.

It is unfair to judge something like a chess game on a quick review, you have to play a while to get the 'flavour'. What one is left with are peripheral aspects of the program.

This Chess has a lot of features — skill, speed, look ahead, etc, can all be changed — moves can be entered by cursor, coordinate or joystick. There are options for next worse move, next better move, worst move and best move play from the computer, as well as function key commands to alter display, etc.

It is, in short, a very well designed program with just about any feature you could possibly want in a chess program.

**Program** Chess  
**Price** £7.95  
**Micro** Electron  
**Supplier** Superior Software  
 Regent House  
 Skinner Lane  
 Leeds  
 LS7 1AX

## Page the Oracle

Spectrum owners may remember that a while ago — just

before the release of *Valhalla* — there was what could loosely be termed an animated graphics adventure called *The Oracles Cave* by Dorcas Software.

The game featured an animated man who walked left and right, climbed ropes and fought monsters (or ran away) as instructed by key presses.

The game is on a time limit of five computer 'days' — time is ticking away all the time and whilst sleeping can restore vital energy, it also wastes time.

There is treasure to collect and a variety of more and less useful objects to be discovered as you descend through a series of caves hoping to make your escape via the Oracles Cave at the bottom level.

The game is now faithfully reproduced in a Commodore 64 version complete with hi-res graphics and turbo load. If you fancy an adventure which combines dungeons and dragons, strategy and hi-res animated graphics, then it's well worth a look.

**Program** *The Oracles Cave*  
**Price** £7.95  
**Micro** Commodore 64  
**Supplier** Dorcas  
 3 The Oasis  
 Glenfield  
 Leicester



## Looking good

The first titles for the new Amstrad computer have been released. In the months before the release of the machine, Amstrad were busy arranging with a

variety of well-established software houses for programs to be available in time for the launch of the machine (other hardware manufacturers please note).

Obviously a 'standard' has not been built yet for the machine and these first programs are not going to push the machine to its limits, such as some of the more recent programs on the Spectrums.

Looking at a range of new packages I chose *Spannerman* by Gem Software. On loading what you get looks rather like a Commodore 64 game I think, perhaps because of the monitor, the graphics were a little better — the details of the man's overall and cap were clearly visible. The sound was marginally worse — certainly it ought to be worse using as it does the same boring old sound chip as 80% of all micros but I did like the 'nut tightening' noise. (Note to hardware designers, the new Yamaha sound chip available for some of the MSX machines is going to make even the Sid look pretty silly — be there or be square.)

The game is pretty good although infuriating. You control Spannerman whose job it is to repair a series of leaky pipes (a thought — if Spannerman is 'a man who uses a spanner in his job' then could a journalist be called Typewriterman?) before a building floods.

Aside from the sheer logistical problem of moving from leak to leak, various unlikely objects are tumbling down threatening to buff you on the head. There is a variety of life-threatening rodent that scampers back and forth along the pipes that can only be thwarted by a swift kick (shades of *The Young Ones* here).

I liked the game, and it represents not a bad start for the machine at all — in terms of programs what we might have in the Amstrad is the Commodore 64 plus better (slightly) graphics plus better (even excellent) Basic plus (possibly much) faster run times, minus sound quality. Things look good.

**Program** *Spannerman*  
**Price** £7.95  
**Micro** Amstrad CPC 464

**Supplier** Gem Software  
 Brentwood House  
 169 Kings Road  
 Brentwood  
 Essex CM14 4EF

## Battling Bikers

What a lot of people said they didn't like about *Chequered Flag*, Psion's car race program, was the absence of competing cars. All you could do was try to better your own lap time on a variety of circuits.

*Full Throttle* is the latest release from Micromega whose excellent Star Trek style game *Codename Mat* is still high in the charts. It does for motorbike racing what *Chequered Flag* didn't do for cars; ie, it puts competitors on the track.

Many of the technical effects on the game would seem to have been derived from another Micromega game from the same author — *Death-*



*chase*. As you zoom around the track other bikes weave in front of you, try to pass you and generally make life difficult; hit one and you lose valuable position time. You have to manoeuvre your bike not only, therefore, around the bends and swerves of the track, but through the dense group of fellow bikers — no easy task.

Sensibly Micromega have kept the controls simple, bank left, bank right, accelerate and brake. There are a variety of different courses based on real tracks with differing properties and demanding differing skills. Fun to play and technically very clever.

**Program** *Full Throttle*  
**Price** £6.95  
**Micro** Spectrum  
**Supplier** Micromega  
 230-236 Lavender Hill  
 London SW11 1LE

- ZX81**
- 1 (-) Krazy Kong (Interceptor Micro)
  - 2 (5) Krypton Ordeal (Novus)
  - 3 (6) Planet Raider (Novus)
  - 4 (10) Alien Rain (CRL)
  - 5 (8) Walk the Plank (Novus)
  - 6 (4) Football Manager (Addictive Games)
  - 7 (1) Asteroids (Quicksilver)
  - 8 (9) Scramble (Quicksilver)
  - 9 (-) Mothership (Psion)
  - 10 (7) Space Raiders (Psion)
- (Figures compiled by Boots/Websters)
- BBC\***
- 1 (2) Overdrive (Superior)
  - 2 (3) Aviator (Acornsoft)
  - 3 (1) Fortress (Pace)
  - 4 (4) Micro Olympics (Database)
  - 5 (-) Eagle Empire (Alligata)
  - 6 (-) Lords of Time (Level 9)
  - 7 (5) Hunchback (Superior)
  - 8 (6) JCB Digger (Acornsoft)
  - 9 (-) Stock Car (Micropower)
  - 10 (10) Jet Power Jack (Micropower)
- \*All Model B.  
(Figures compiled by WH Smith and Son, London)

- Vic 20**
- 1 (-) Bewitched (Imagine)
  - 2 (9) 3D Maze (Mastertronic)
  - 3 (-) Chariot Race (Micro Asics)
  - 4 (-) Phantom Attack (Mastertronic)
  - 5 (-) Crazy Kong (Interceptor Micro)
  - 6 (-) Vegas Jackpot (Mastertronic)
  - 7 (8) Undermine (Mastertronic)
  - 8 (-) Sub Hunt (Mastertronic)
  - 9 (-) Scrambler (Mastertronic)
  - 10 (1) Computer War (Creative Sparks)
- (Figures compiled by Boots/Websters)

- Commodore 64**
- 1 (-) Hoktik (Mastertronic)
  - 2 (-) Gilligan's Gold (Ocean)
  - 3 (-) Squirm (Mastertronic)
  - 4 (-) The Election Game (Mastertronic)
  - 5 (-) Trashman (Quicksilver)
  - 6 (-) Sheep in Space (Llamasoft)
  - 7 (-) Encounter (Hi-Tech)
  - 8 (-) Incredible Hulk (Adventure International)
  - 9 (-) Space Walk (Mastertronic)
  - 10 (-) Son of Blagger (Alligata)
- (Figures compiled by Boots/Websters)

- Dragon 32**
- 1 (-) Hunchback (Ocean)
  - 2 (-) Ugh! (Softtek)
  - 3 (-) Hungry Horace (Melbourne House)
  - 4 (-) Mystery of the Java Star (Shards)
  - 5 (8) Kriegspiel (Beyond)
  - 6 Cuthbert in Space (Microdeal)
  - 7 (10) Dungeon Raid (Microdeal)
  - 8 (-) Scramble (Microdeal)
  - 9 (-) Cuthbert in the Jungle (Microdeal)
  - 10 (-) Devil Assault (Microdeal)
- (Figures compiled by Boots/Websters)

- Books**
- 1 (2) 60 Programs for Commodore 64, *Erskine et al* (Pan)
  - 2 (7) Guide to Playing Hobbit, *Elkan* (Melbourne House)
  - 3 (-) Commodore Graphics & Sound (Granada)
  - 4 (-) Adventure Games for Commodore 64 (Granada)
  - 5 (-) Business Systems on Commodore 64 (Granada)
  - 6 (4) Step by Step Spectrum Book 1, *Graham* (Dorling Kindersley)
  - 7 (3) Very Basic, Basic — CBM 64, *Ellorshaw and Schofield* (Century)
  - 8 (8) 60 Programs for Sinclair Spectrum, *Erskine et al* (Pan)
  - 9 (-) Inside the Dragon, *Smead and Somerville* (Addison-Wesley)
  - 10 (-) Spectrum Book of Games, *James and Gee* (Granada)
- (Figures compiled by Bookwise)

- Atari**
- 1 (2) The Hulk (Adventure International)
  - 2 (3) Encounter (Novagen)
  - 3 (1) Bruce Lee (Datasoft)
  - 4 (4) Captain Sticky's Gold (English)
  - 5 (-) Airstrike II (English)
  - 6 (-) Helicat Ace (Microprose)
  - 7 (6) Slinky (Cosmi)
  - 8 (5) O'Riley's Mine (English)
  - 9 (9) Sea Dragon (Adventure International)
  - 10 (-) Rally Speedway (Adventure International)
- \* cartridge + cassette † 48K disc.  
(Figures compiled by Calisto Computers, Birmingham 081-632 6458)

- Spectrum**
- 1 (3) Match Point (Psion)
  - 2 (1) Jet Set Willy (Software Projects)
  - 3 (10) Blue Thunder (Richard Wilcox)
  - 4 (2) Lords of Midnight (Beyond)
  - 5 (2) Jack and the Beanstalk (Thor)
  - 6 (-) Chequered Flag (Psion)
  - 7 (-) Mugsy (Melbourne House)
  - 8 (9) Psytron (Beyond)
  - 9 (4) Zaxxon (Starzone)
  - 10 (5) Sabre Wulf (Ultimate)
- \*All 48K.  
(Figures compiled by WH Smith and Son, London)

## Wishful thinking

Talk about wishful thinking, a book on the Vic20 for £11.65 *Mastering the Vic20* is a general 'introduction to' type of book with the usual mish-mash of Basic commands explained and simple programs. If it were even £6.95 it would only be averagely OK, at £11.95 they have to be joking.

The back cover blurb also describes the Vic as 'one of the most powerful and versatile personal computers around' — are they kidding? What year was this book written in?

**Book** *Mastering the Vic20*

**Price** £11.95

**Micro** Vic20

**Supplier** Prentice/Hall

66 Wood Lane End

Hemel Hempstead

Herts

HP2 4RG

## The mind boggles

All things considered I'm surprised at how few books there are on the mind boggling subject of artificial intelligence

there are. Fewer still that actually give you programs to type in. *Exploring Artificial Intelligence on your Microcomputer* is one such book.

A.I. which is what we buffs term it, is one of those topics that cover a multitude of significantly different areas. These range from Eliza-type pseudo compassion and understanding, to database crunching expert systems, to Tictac as a computer that learns what not to do from mistakes.

All of these programs appear in this book and apart from doing some things that some people consider has something to do be artificial intelligence, they have little in common.

That said, there is quite a lot of background text about the history of A.I. and commentary on how each program works and some analysis of in what way each one could be said to be intelligent. The programs too, are pretty good, particularly the Eliza which is absolutely the smartiest version of this old chestnut yet.

**Book** *Exploring Artificial Intelligence on your Computer*

**Price** £4.95

**Micro** General (programs are in Microsoft)

**Supplier** Interface

9-11 Kensington

High Street

London W8 5NP

# This Week

Program	Type	Micro	Price	Supplier
Flight Path 737	Arc	Amstrad	£6.95	Anirog
House of Usher	Arc	Amstrad	£6.95	Anirog
Space Pilot	Arc	Amstrad	£6.95	Anirog
Machine Code Tutor	Ed	Atari	£14.95	New Generation
Hareraiser	Ad	BBC	£8.95	Haresoft
Gisburne's Castle	Arc	BBC	£6.95	Martech
Hi Bouncer	Arc	BBC	£7.95	Mirrorsoft
Biology	Ed	BBC	£12.65	Acornsoft
English Language	Ed	BBC	£12.95	Acornsoft
Mathematics 1	Ed	BBC	£12.65	Acornsoft
Mathematics 2	Ed	BBC	£12.65	Acornsoft
Star Seeker	Ed	BBC	£9.95	Mirrorsoft
Blue Thunder	Arc	Commodore	£6.95	Foundry
Paintpic	Ut	Commodore	£19.95	Kiwisoft
Loco	Arc	Commodore 64	£7.95	Alligata
Machine Code Tutor	Ed	Commodore 64	£14.95	New Generation
Fame Quest	S	Commodore 64	£7.95	Braingame
Electron Trail	S	Commodore 74	£7.95	Braingame
Wimbledon 64	S	Commodore 64	£8.95	Merlin
Mazerace/Spellbox	Ed	Dragon	£6.95	Paul

Zen	Ut	MSX	£19.95	Kuma
Crusoe	Arc	Spectrum	£6.00	Automata
Intravoid	Ad	Spectrum	£4.95	Delta 4
Action Pack	Arc	Spectrum	£3.75	Turtle
Automania	Arc	Spectrum	£5.95	Micro-Gen
Hubert	Arc	Spectrum	£4.95	Turtle
Simple Business				
Accounts	Ut	Spectrum	£11.95	Flowchart
Atlantis	Ad	TI 99/4A	£6.95	Intrigue
Lionel & the Castle	Arc	TI 99/4A	£7.95	Intrigue
Decimals	Ed	Vic 20	£9.25	Chalksoft

**Key:** Ad — adventure/Arc — arcade/Ed — education/  
S — strategy-simulation/Ut — utility

This Week is a new section that covers all the new software coming on to the home micro market each week. All suppliers should send details of their new programs to: This Week, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2R 3LD.

## A fast buck

The campaign against piracy of computer programs has begun to increase pace, with a ten-minute rule Bill being introduced in Parliament on July 24.

It seems as if the Bill will have the support of the Government because it is felt that the computer industry should be in a position to protect itself against unlawful copying. It is true, unfortunately, that the one good reason to distribute software with an essential manual is that the law of copyright applies to the manual.

In the case of some microcomputer products, the sales of books and manuals to accompany software far exceed the sales of the software itself. It could be that there are many people using the same software on one machine, and each wants a personal copy of the documentation. But it is far more likely that each manual will accompany a separate pirated copy of the software.

The Bill is expected to include provisions for unlimited fines, and up to two years in jail, for those who copy, with lesser penalties for those who sell.

So, who are the copiers against whom the Federation Against Software Theft (FAST) wishes the Bill enacted?

There are those who use systems on mainframes, which are illegally copied from

systems at other installations. By the very nature of large installations such copying is difficult to conceal and, as software is usually sold on licence, the origin of the copy is not that difficult to ascertain, and prosecute. If the Bill aims to curb industrial espionage, there are legal remedies already in existence.

In contrast, there is the microcomputer games player who is part of a "copying collective". Originals of games are bought, and then multiple copies are made, to be exchanged for other copied games. There may be micro games players who have no copied games in their possession, but they are rare creatures.

Micro games players tend to be young, and the Draconian measures envisaged in the Bill seem somewhat mediaeval in nature for this category of offenders. The number of such juvenile offenders is into the millions, and so a Bill, if stringently enforced, will bring the legal system to a halt.

The Bill, therefore, cannot be applied to minors, and — even if parents were held responsible — could not be applied to many. So at best, the Bill will help curb only the commercial scale games pirate and will do nothing to solve the main problem — home copying. The main impetus behind FAST and the promoters of the Bill comes from the games companies. Games are by their nature ephemeral. And games producers and retailers have consistently over-estimated the size of the market.

Their theory goes that if there was less copying many more games would be sold. This is a hypothesis the truth of which I strongly suspect. The total amount of money spent on games would not greatly increase, and players would swap originals rather than copies.

You cannot stop mass copying — or swapping — by individuals rather than organisations using legislation.

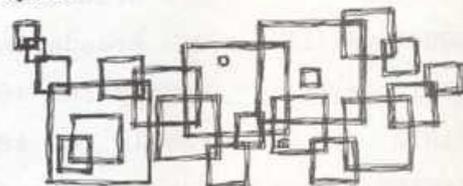
To create an industry based purely on entertainment is always dangerous, and for micro games the bucks are FAST running out.

Boris Allan

## All square

### Puzzle no 118

"Here is an interesting problem," remarked Professor Hex, at the monthly meeting of Mathemaholics Anonymous. "Can you find a perfect cube that is two million more than a perfect square?"



There was a moment's silence before a voice announced "Twenty-seven million!" Sure enough, twenty-seven million, the cube of three hundred, is just two million more than twenty-five million, the square of five thousand. "Er, yes," mumbled the Professor, reddening slightly at being caught so easily, "That wasn't the answer that I was thinking of."

Can you find an alternative answer?

### Solution to Puzzle no 113

We know that Alison must have earned an amount (in whole pence) somewhere in the range 1p to £3.40. If we knew this amount, all the other sums earned are determined by subtracting the known value from each pair, in turn, along the line.

However, each amount must be positive, and also the sum raised by Alison, Chris and Elizabeth must equal £5.18.

The program tests every value possible for Alison's total, works out the remaining sums, and prints any possible results found.

```
10 FOR A = 1 TO 340
20 LET B = 341 - A
30 LET C = 287 - B
40 LET D = 223 - C
50 LET E = 469 - D
60 IF C > 0 AND D > 0 AND E > 0 AND A + C + E = 518 THEN
PRINT A, B, C, D, E
70 NEXT A
```

This gives the following result: Alison, £1.27; Ben, £2.14; Chris, £0.73; Derek, £1.50; and Elizabeth, £3.18.

### Winner of Puzzle No 113

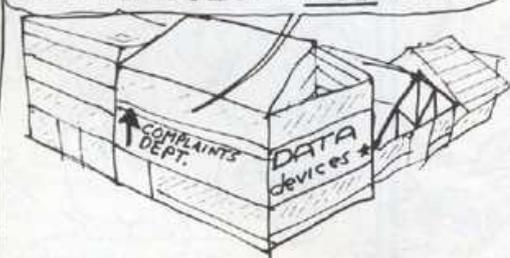
The winner is: Ms C S Gwilliam, Sheppard Way, Minchinhampton, Stroud, Glos, who receives £10.

### Rules

If the puzzle can be sensibly solved using a computer then the winner will have included a listing of the program used to find the correct answer. The closing date for entries to Puzzle No 118 is August 17.

## The Hackers

So, let A=1, then, A=A+1, ok? then, print 'A' = 'A', now let's run it..... SEE! WHAT ABOUT THAT THEN?



Rounding errors.

WHAT!?



One is apt to find that on the cheaper systems.



- PIMANIA-The Cult Adventure 48K Spec £10
- CRUSOE M/C Adventure 48K Spec £6
- OLYMPIMANIA M/C Arcade 48K Spec £6
- PIROMANIA M/C Arcade 48K Spec £6
- PI-IN'ERE M/C Arcade 48K Spec £6
- PI-BALLED M/C Arcade 48K Spec £6
- PI-EYED M/C Arcade 48K Spec £6
- MORRIS/BIKERS M/C Arcade Any Spec £6
- GO TO JAIL Family Fun 48K Spec £6
- DARTZ Family Fun 48K Spec £5

YAKZEE Family Fun 48K Spec/Dragon £5  
 THE PIMAN'S GREATEST HITS - amazing stereo L.P. cassette £3   
 'I'M A PIMANIAC' - T-Shirts (state size) £5

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