40p EVERY WEEK No 107 APRIL 20

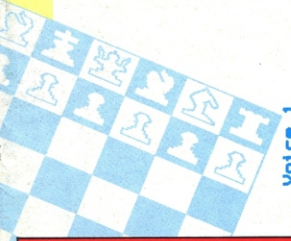
PERSONAL Computer NEWS

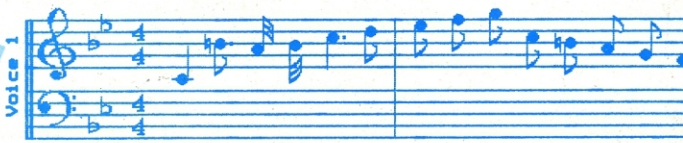
FREE COMPETITION Win a Spectrum

PRINT POWER

Buyer's guide to printers

PLUS Build a 64 interface





AMSTRAD ARCADE ACTION

A MOUSE FOR YOUR 64

BBC WORD PROCESSING

SPRITES ON SPECTRUM

BLAGGER GOES TO HOLLYWOOD

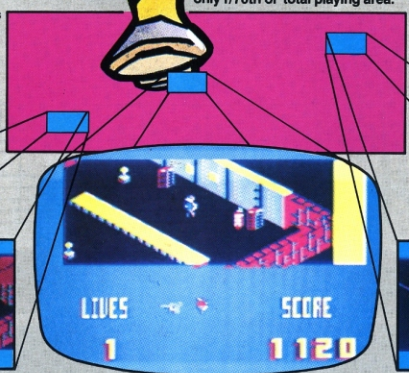
CBM 64

TAPE ONLY £9.95 DISK £11.95
INCLUDING FREE 'T' SHIRT & BADGE OFFER!

Has our dapper little thief overstepped the mark this time or can he truly outcon the best conmerchants in the business. Dazzled by the bright lights, stunned by the stars,. Blagger has decided his way to fame and fortune is in the movies – he's off to nick the next megadrama to hit the big screen. Guide him through 12 loony film sets as he gathers the objects that will open room 13.

Arcade fanatics and Adventure buffs alike, BGTH has something for all – only skill at the joystick and determined brainpower in the unique use of the movie props, will solve this intricate puzzle for you.

Each screen image represents only 1/70th of total playing area.



Alligata Software Ltd.

Alligata Software Ltd.,
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Sheffield S1 4DW
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Send for full colour product brochure (enclose a stamp)

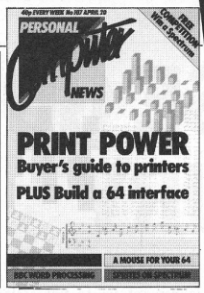
In classic movie tradition, simulated 3D and big sound soundtrack with 4 way scrolling action

MENU

COVER STORY

Print Power 26

What to look for when buying a printer; the pros and cons of dot matrix, daisywheel and thermal; value for money — all this and more in our buyer's guide to hard copy output.



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A golden oldie from the days of arcadia — Centipede in colour with sound.

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Moving programs from disk to tape can be a chore. This utility will take some of the pain away. (It also works on PETs!)

HARDWARE

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It started with big business systems then the BBC Micro grew one; now you can get one for your 64. It's a mouse, the trendy way to control your computer. We examine the latest.

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BBC words 46

Wordwise quickly established itself as one of the Beeb's best word processors. How does its successor, Wordwise Plus, shape up?

COMPETITION

Win a Spectrum 44

Another great bundle of freebies, courtesy of Sinclair and *PCN*. This week we're offering two Sinclair Plusses with expansion packs with runners-up prizes of software. And winning it couldn't be easier. Check it out . . .

REGULARS

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Your opportunity to sound off — let it all rip here and you could pick up £15 for your trouble.

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An advance look at new software titles.

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The first choice for bargain hunters — and the most economical place to sell because it's free.

Quit 52

Mysterious happenings in Portugal lead our off-beat view of the computing industry.

MONITOR

Micronet sweetens price rise pill

Micronet users face a price rise this summer — but Micronet has softened the blow somewhat with a couple of new features.

The sweetners on offer should widen the appeal of the system and may bring in some new subscribers. The first is a new service called Gallery which will allow any subscriber to become an Information Provider.

Gallery will allow a member to 'buy' a page of up to 26 frames at a charge of 25p for six months. Editing charges will be 4p per frame. Technical manager Mike Brown says: 'Gallery is all about taking part — it's an opportunity for members to have their own area of Micronet.'

Last, but by no means least, Micronet has commissioned a new communications protocol which will make the service far more attractive to Commodore 64 owners. 64 users who had bought Commodore's own Compunet modem could not download Micronet software. The new protocol will allow those owners more use of the system and new downloader software is available on Micronet free of charge.

● Viewdata services continue to proliferate — the latest news comes from Acorn which is setting up its own system.

Acorn's Viewdata service will hold 1,000 pages of product information and will be on-line 24 hours a day, seven days a week. Anyone with a micro and Prestel-compatible (1200/75 baud) modem can use the system to get information on new products, software, upgrades and the name of your local dealer.

The service is based on three BBC Micros linked by Econet to a hard disk unit. The number to call is Cambridge 0223-243642.

New dot and daisy printers — more sisters for Brother

Brother has further extended its already considerable range of printers with two new products. The first is a new daisywheel at a bargain price of £285 including VAT.

The HR10 prints at around 12cps, comes with a 2K buffer and your choice of interface from Centronics, RS232 or Commodore.

The second seems more like a choice for the computer user who has everything. The Twinriter 5 features both dot matrix and daisywheel operation in the same unit. Even better is the fact that you can use both in the same document raising the attractive possibility of letter quality print side by side with matrix graphics.

The catch is price — a hefty £1,295 excluding VAT. Start saving now . . .

Both models are available from Thame Systems on 084421-5471.

Tatung denies spring launch for new machine

Stories suggesting that Tatung will launch a new machine this May are wildly off-beam, according to Tatung's Tony Adams. Recent press coverage has described a £300 machine with a 40 column display (expandable to 80 column), built-in disk drive, Logo and a choice of Basics, but Mr Adams won't comment on this, and categorically denies that the company will launch a machine.

The specification described, incidentally, is remarkably close to that of Tatung's current home/business machine, the Einstein. This has recently had its price cut to £350, and it seems highly unlikely that the company would launch a machine that competes so closely with the Einstein which, according to Mr Adams, is selling 'quite happily'.

The Einstein is highly respected as a micro, but hasn't taken off to any great extent in this country. Sales have been around 14,000; while this isn't totally disastrous it's a world away from the company's original expectations. Last September Tatung was predicting it would make 200,000 machines this year.

Tatung has also recently declared 70 redundancies, following the merger of its computer and television divisions. Despite this the company still employs around 800 people in Telford.

And new machines? There are a number of unspecified projects in the pipeline, but these aren't liable to see the light of day before autumn.

ENTERPRISE GO FOR CENTURY

Enterprise owners — both actual and prospective — may be forgiven for thinking the machine had fallen on barren ground at the start of the year.

But according to the company the winter growth has been taking place beneath the surface and the machine is poised to blossom.

A little green shoot appeared this week with the announcement of 14 software titles ranging from adventure and arcade games to educational programs. Leading the names are Level 9's Colossal Adventure, Heathrow ATC from Hewson, and educational software from Bourne Educational.

In the longer term negotiations are under way with US Gold, Ocean and Firebird, among others, and Enterprise has vowed to produce new titles every month during 1985 culminating in a 100-strong range by Christmas.

Michael Shirley says the company is doing 'a tremendous amount of work' in gaining software support and the current jewel in the crown looks like a new title from Domark based on the latest James Bond movie View to a Kill. The game will be released to coincide with the British film premiere in June.

Sales of the machine are proceeding at a rate of 'several thousand a month' says Mr Shirley although the company is not yet up to full scale production. 'We've made substantial progress in a difficult time of year. Against the market background we've done extremely well.'

On the question of peripherals like memory expansion boards and disk drives the company is less forthcoming, declining to discuss the situation in any detail.

Mr Shirley would only say that exciting developments would be announced in 'the next few weeks'. We've heard that before but watch this space . . .

Lasky's deal for Torch

While Acorn might still be a little shaky after its brush with disaster earlier this year, Torch continues unabashed with a promotion for its Graduate — billed as 'the ultimate upgrade' for the BBC Micro.

The latest move means Graduate fanciers should be able to get hold of one with a great deal more ease since Lasky's has signed a retail deal.

Torch sales director Peter Harris dubs the move 'a major drive by Torch computers in the high street.' Lasky's computer buyer Phillip Halton reciprocated. 'We see the Torch Graduate as the ultimate upgrade system for the BBC Micro.

'Many BBC owners are looking to move into business computing and the Torch Graduate is a cost effective solution,' he said.

The Graduate gives your Beeb IBM compatibility, running many of the top titles like dBase III, Lotus 1-2-3, Multiplan and Doodle.

At £1,150 the Graduate represents good value in terms of IBM disk handling and processing but when the cost of the BBC and a monitor is added there are a number of equally attractive options. When *PCN* reviewed the system in February we found the speed of screen handling to be so slow as to handicap the entire system.

In our opinion the best business upgrade for the Beeb remains Torch's own ZEP disk pack which adds a second processor and CP/M compatibility, giving access to most of the business software a small-scale operation would need.

A visit to Lasky's, however, should give you a hands-on demo.

NEC DESKTOP SHUNS IBM

IBM compatibility has long been the in-thing with business system manufacturers. NEC, however, has moved away from the herd with its new APC III computer. The new high speed, 16-bit desktop computer depends on MSDOS and high resolution graphics instead.

NEC claims the decision not to have IBM compatibility was taken because it would have meant a reduction in the quality of the final product. Some degree of IBM compatibility has been maintained, however, as the APC III will read IBM format disks, so you can transfer files between the two.

The APC III is based on an NEC-manufactured 8086-2 compatible processor running at 8MHz and is far faster than other machines in the same price bracket. This speed, together with its eight-colour high resolution graphics, make the machine an ideal choice for the computer aided design market.

APC III — good foundation.

Most well known software packages are already available on the machine but NEC is giving away its own Foundation Package with the computer to make sure you can get started immediately. The package includes communications, text editor, typewriter emulator, calculator, calendar and toolbox software together with an icon-driven front end.

Unfortunately the front end requires an additional 128K to run. GW Basic and MSDOS 2.11 are also included in the price.

Prices for the machine start at £1,499 for a basic system with dual disk drives and 128K RAM, and £2,399 for a 128K model with a 10Mb hard disk. Monitors cost extra.

IN BRIEF

C128 highlights Commodore show

Advance notice — so you've no excuse — of the 6th Commodore Computer Show. The time is June 7, 8 and 9 and the place is the London Novotel hotel in Hammersmith.

Highlights of the show will be the launch of the 128, and International Tennis which promises to do for tennis what International Soccer did for football simulations.

QDoctor — take one utility and rest

Billed as the 'ultimate Microdrive utility' QDoctor from Adder Publishing vows to take the pain out of Microdrive use. Akin to many renowned disk doctors, QDoctor allows you to examine Microdrive cartridges either in hex or ASCII format, save corrupted sectors and even recover deleted files.

At £17.19 QDoctor is available from Adder at PO Box 148, Cambridge CB1 2EQ.

P&P plots speedy Macintosh add-ons

A couple of new Macintosh products, both available from P&P, have been announced. The first allows you to hook up the Mac to a plotter for the princely sum of £99 ex VAT. The second allows you to configure part of your 512K system as a RAM disk with claimed increases in speed of operation. It costs £34 ex VAT.

More details on Macplot and Mac Memory Disk from P&P on 0706-217744 or 01-677 7631.

Brewster booster on the Spectrum

Micromega's latest wheeze The Derek Brewster Collection will undoubtedly boost the ego of Mr Brewster — author of Codename MAT, Kentilla and Jasper — no end, and may be good news for Spectrum owner who want all his titles for £9.95. The rest of you will have to be content with having got in on Brewster when he was a nobody.

High-powered plus for 1-2-3 users

Fanatical loyalists of 1-2-3 (it *is* religion with some) will no doubt be over the moon to learn of Optionword+, a £100 package that replaces the word processing functions of 1-2-3 with a high-powered version.

It also adds graphics, a calendar and a telephone directory to the suite.

THORN AHEAD IN JOBS PLAN

A high tech scheme to help disabled youngsters which was launched last year is starting to bear fruit. Leading the way is Thorn EMI Computer Software which has announced a new employment project for the disabled.

The scheme will provide sponsorship for a trainee programmer within the company's Altergo Products Division. Entry will be open to disabled youngsters who should have A-level or equivalent qualifications and be able to demonstrate logical ability.

The project is launched in conjunction with COMET (Concerned Micros in Employment and Training) which was established at last year's British Microcomputing Awards sponsored by VNU — publishers of *PCN* and *Personal Computer World* — *The Sunday Times* and Thames Television.

A COMET awards panel will be established to select and interview applicants for the project. The successful applicant will be announced at this year's BMA ceremony on June 12.

Applicants should contact The National Bureau for Handicapped Students, 40 Brunswick Square, London WC1N 1AZ. Closing date for receiving all applications is April 24.

Grid launches new IBM compatible

Grid, whose portable Compass is beloved of space shuttle pilots and President Reagan, has launched a new range of computers. Grid claims that the range, called the GRiD-Case, is totally IBM PC compatible as well as being portable.

Twenty different models of the machine are available, the major differences being the type of screen and the amount of memory available. Three memory configurations offer 128K, 256K and 512K. Each will also allow you to have up to 512K of user ROM inside the machine which you can use to store either commercial programs or your own custom software.

The screens available are a standard LCD type on the lowest priced machine, an Enhanced LCD in blue on yellow, or a plasma screen which is red on black and gives excellent quality but at a premium price.

Grid claims its new portable is fully IBM PC compatible.

Numerous expansion facilities are available including 3.5in, 5.25in and hard disk drives, in addition to the 3.5in drive supplied inside the machine. Options are available so that a full size IBM keyboard can be plugged into the machine together with a colour monitor.

Prices for a 128K model of the 80C85-based machine are £2,975 for the LCD version, £3,250 for the Enhanced LCD version and £4,350 for the plasma display.

Further information can be obtained from Grid on 07372 41211.

ELITISTS' CHANCE TO BATTLE IT OUT

Hot news for Dangerous, Deadly and Elite members of society — in other words the cult followers of Acornsoft's Elite. Next month's Electron and BBC Micro User show will feature the national Elite championships — a showdown between Britain's best Elite players.

Five thousand players have already entered the contest and six finalists will fight it out to win £1,000 worth of equipment and software.

Even if you're still Mostly Harmless, it promises to be an exciting event. May 9-12 are the dates for your diary.

Meanwhile, good news for owners of non-Acorn machines still awaiting versions. Acornsoft and Firebird have agreed a licensing deal to put Elite on Commodore 64, Spectrum, Amstrad and MSX machines.

Firebird will release the 64 version first in mid-May. Current prices stand at £14.95 for cassette and £17.95 for disk. The Z80 version is still under development and won't be available for a while.

View From THE U.K.

Innovation takes a back seat now

April, as the saying goes, is the cruellest month. The bard who came up with this winning phrase had the weather and the state of the human psyche in mind.

As far as the micro industry is concerned April is the cruel month when the piper has to be paid. The grasshoppers among micro and software manufacturers will have ploughed their resources into massive advertising campaigns over Christmas and the fact that until good old Joe Public starts throwing his money around again in the autumn things can only get worse is scant comfort to the casualties.

Look back three years to the start of the micro boom and you'll see that the market was a lot more open. At that time it was possible for a whizz kid in a back room to come up with a design for a new micro and against all the odds sell it and make money. These days the whizz kid can still come up with the idea, but the money probably won't be there.

As far as the UK is concerned the micro success story of last year has to be the Amstrad, but that machine's success is based on astute packaging of the features every thinking micro user is going to want from a machine.

Meanwhile, the hottest micro news this month is the new Atari ST series. This will have DR's Graphics Environment Manager built in and will use the 68000 processor. But what's so new about it? The 68000 processor has been accepted as a wonder chip for a long time and GEM — apart from being pretty much an off-the-shelf product — is essentially a variation on a theme introduced by Apple with the Lisa two years ago.

The fact that this is the best the industry can do speaks volumes if you're looking for innovation. But it's not about innovation any more. It's about selling whether you like it or not.

DRAGON GETS ADDED COLOUR

On the floor of the Royal Horticultural Hall, London venue of the pre-Easter 6809 Colour Show a battle for hearts and minds was being fought. Will the Dragon fly again?

Its new UK distributor Compusense, backed by the affable French Dragonman said yes unreservedly. But first everybody has to accept that they got it wrong in the first place — the Dragon 64 was never a games machine but a small business system.

Cumana's success with Dragon disk drives may support that view. It was selling them at the show and has been selling enough over the past 12 months to justify continued production. Elsewhere among the 53 exhibitors the games party held the upper hand and the news was of developments that won't make much difference to word processors or spreadsheets.

For example, the D200 (a revamped 64) will eventually include a new video processor. This should help pep up the pallid version of Jet Set Willy, which looked as though it had been coloured from the Dulux Peach range of off-white tints. Along the same lines Motorola is said to be on the point of releasing a 6800-compatible board that will hold truck-loads of video memory and give more than 400 shades of colour. Fitting piggy-back into the Dragon, it might sell for as little as £20. If Dragons can fly why shouldn't pigs?

Discontinued lines of software at £1.99 didn't bode well for a bouyant new Dragon but some software suppliers reported a perceptible rise in interest over the past few weeks. The Dragon User Group, with a membership of just under 1,000, said that eight or nine new suppliers had set up shop in the Dragon market.

Opinion varied over the precise number of Dragon owners in the UK but nobody put it below 100,000. That sounds like a solid foundation for a relaunch, but many must be out-and-out games players running moribund Dragon 32s. This version of the ill-fated Welsh micro isn't included on the comeback list and much of the remaindered software looks likely to follow it into obscurity.

But the show demonstrated that there aren't many aspects of home micro ownership closed to Dragon users. Quick Shot joysticks, £18 Datapen light pens, £80 MCP-40 printers from Cumana and a version of Dark Star were all on view. Even the venue contributed to the optimistic atmosphere — the Royal Horticultural Hall is large and airy and the perpetrators of such black holes of Calcutta as other users have to suffer should take note.

View From AMERICA

Jr's demise sets the cat among the pigeons

The US computing community is in the grip of a micro frenzy unmatched since IBM launched the PC and the PC Jr. But this time it's not the launch of a machine but the death of one that's causing the jitters.

Those who despaired when the launch of the Jr was greeted with the usual cries of 'IBM has legitimised the market', might think that IBM's decision to kill the Jr merits a 'told you so' response. That, sadly, underestimates the hold Big Blue has on hearts and minds here.

You'll find little agreement on the view that the Jr failed because it was a dog.

You'll get a nodding of heads however, at the suggestion that the Jr failed because the home computer market is doomed.

The latter view overlooks a few inconvenient facts, such as the performance of Apple's IIc which consistently grabbed twice the Jr's market share despite the latter's head start.

The other side of the situation views the prospects for Atari's ST and Commodore's Amiga machines. Not unnaturally Apple's Macintosh has been perceived as the main target for the newcomers, but they also posed a serious threat to the Jr.

In the eyes of many observers the entry of Atari and Commodore is an unwelcome intrusion into the Apple-IBM conflict which continues to confuse. Latest reports show the Mac making small but steady inroads into IBM territory.

Adding to the confusion is an Infoworld interview with Jon Shirley president of Microsoft the company that led the dinosaur by the nose when IBM went micro.

Of Mac and PC users, Shirley says the two groups are remarkably similar. And just to set the cat among the pigeons Shirley adds that Mac buyers 'are power users who have a need to do very serious work. Because the machine is inherently easier to learn and easier to use does not mean that products need to be simplistic.'

Amen!

Ariolasoft giveaway

Spring is traditionally a time for looking forward, tidying up and attacking life with a renewed vigour. Software house Ariolasoft has taken the message to heart.

Five of the company's top Commodore 64 titles will soon be available for Spectrum, Atari and Amstrad owners.

The games in question are strategy games Archon and M.U.L.E., adventure title Murder on the Zinderneuf and arcade games One-on-One and Hard Hat Mack. Zinderneuf and M.U.L.E. will initially be on the Atari only.

Further extending its range Ariolasoft has signed a licensing deal with what it describes as 'up and coming software house' The RamJam Corporation. Its next product will be an adventure.

Last but not least Ariolasoft will spend the rest of the year giving away money. Between now and December it will be running a £10,000 promotion.

First, every month customers will have the chance to win a transportable Commodore SX64. Second every game will contain a discount voucher.

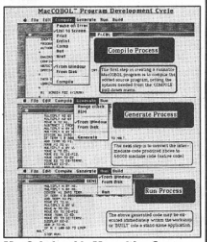
COBOL JOINS MAC'S RANGE

Sales of Apple's Macintosh could receive a boost from Micro Focus, a British software house. Micro Focus will release MacCobol later this month and commercial interest is certainly very high.

Apple has had trouble convincing potential Mac customers of the machine's business capabilities. Macintosh versions of applications written in Micro Focus's Level II Cobol could change that.

One of the attractions of MacCobol is that Level 2 source code can be moved onto the Mac and compiled to 68000 code. But MacCobol also offers access to the Macintosh graphics ROM routines.

MacCobol will be joined later this summer by Animator, Micro Focus's innovative debugging utility. MacCobol will cost £1,250; telephone 0635-32646 for more details.



MacCobol — big Mac with a C.

Cable lets your 64 talk

As anyone who has ever tried to connect something made by Commodore to something not made by Commodore will tell you — it's not easy.

Now SMC Supplies is offering an RS232 cable for £19.95. The cable will allow your 64 to talk to a range of printers and modems.

Telephone SMC on 01-441 1282 for details.

CHARTS

GAMES

TW	LW	TITLE	PUBLISHER	MACHINE	PRICE
1	1	Softaid	Softaid	SP, C64	£4.99
2	2	W'ld Ser Baseball	Imagine	SP, C64	£6.95
3	12	Brian Jacks S/star	Martech	SP, C64, AC	£7.95
4	13	Spyhunter	US Gold	SP, C64	£9.95
5	6	Moon Cresta	Incentive	SP	£6.95
6	3	Bruce Lee	US Gold	SP, C64, AT	£9.95
7	7	Impossible Mission	CBS/Epyx	C64	£9.95
8	4	Sorcery	Virgin	SP, C64, AM	£8.95
9	5	Airwolf	Elite	SP, C64, AC	£6.95
10	17	Ghostbusters	Activision	SP, C64, AT	£9.99
11	14	Dragontorc of Avalon	Hewson	SP	£7.95
12	—	Gremlins	Adventure Int.	SP, C64	£9.95
13	9	Raid Over Moscow	US Gold	SP, C64	£9.95
14	16	Combat Lynx	Durrell	SP, C64, AC	£9.95
15	8	Alien 8	Ultimate	SP	£9.95
16	15	Pole Position	Atarisoft	Various	£9.95
17	11	Emerald Isle	Level 9	Various	£.6.95
18	18	Football Manager	Addictive	Various	£5.95
19	19	Castle Quest	Micropower	AC	£12.95
20	10	Everyone's a Wally	Mikro-Gen	SP	£9.95

SPECTRUM

TW	MACHINE	PRICE
1	Softaid	£4.99
2	W'ld Ser Baseball	£6.95
4	Spyhunter	£9.95
4	Moon Cresta	£6.95
5	Brian Jacks S/star	£7.95
6	Bruce Lee	£9.95
7	Dragontorc	£7.95
8	Alien 8	£9.95
9	Gremlins	£9.95
10	Everyone's a Wally	£9.95

COMMODORE

TW	MACHINE	PRICE
1	Softaid	£4.99
2	W'ld Ser Baseball	£7.95
3	Impossible Mission	£9.95
4	Airwolf	£6.95
5	Brian Jacks S/star	£7.95
6	Pole Position	£9.95
7	Rocket Ball	£7.95
8	Super Huey	£9.95
9	Gremlins	£9.95
10	Tir Na Nog	£9.95

MICROS

BELOW £1,000

TW	MACHINE	PRICE
1	Spectrum	£129
2	CBM 64	£199
3	Electron	£129
4	Amstrad	£349
5	BBC B	£399
6	Atari 800XL	£125
7	CBM16	£140
8	MSX (series)	£250
9	Memotech	£250
10	Einstein	£500

ABOVE £1,000

TW	MACHINE	PRICE
1	IBM PC/XT	£2,349
2	ACT Apricot	£1,760
3	Compaq	£1,795
4	Olivetti M24	£1,595
5	DEC Rainbow	£2,359
6	Ericcson PC	£2,095
7	Macintosh	£1,795
8	Wang Professional	£3,076
9	Televideo TS 1603	£2,640
10	Columbia PC	£2,065

These charts are compiled from both independent and multiple sources across the nation. They reflect what's happening in high streets during the week up to **April 11**. The games chart is updated every week. The prices quoted are for the no-frills model and include VAT. Information for the top-selling micros is culled from retailers and dealers throughout the country and is updated every month. PCN Charts are compiled exclusively for us by RAM/C, who can be contacted on 01-892 6596.

MICROTIME INTERNATIONAL LIMITED

106A BEDFORD RD, WOOTTON, BEDS MK43 9JB
Telephone (0234) 767758/766351

NEC PC-8201A

From Tokai Create
PASOCALC — ROM based spreadsheet (NEC) £80

From A.M.P. Incorporated
Forth £90
The Journalist – Unique text formatter with graphic layout display £65

From Travelling Software Inc.
Travelling Writer – acclaimed word processor £50
Time Manager – time costing for professionals £55
Appointment Manager – calendars & appointments £50
Sales Manager – sales activity/customer notes £55
Expense Manager – full expense accounting £55
Project Manager – budgets/actuals/costs/activities £60
T-Base – the ultimate relational database system £90
T-Backup – advanced tape filing utility £25
IDEA! — the revolutionary outline processor £75

From Chattanooga Systems
Autopen – full featured word processor £30
Autopen N&A – as above with name/address options £40
Autopad — a small memory (5K) spreadsheet £40
Trip – expense account details and trip log £30
ChequeBook – personal cheque book record £25
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MICROWAVES

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Oric's characters get more definition

Defining characters on the Oric 1 and Atmos can be a tedious business. The following program makes the process a lot simpler.

Once it has been run, a character can be defined with: !n,b1,b2,b3,b4,b5,b6,b7,b8 where n is the character, and b1 to b8 are the data for the character. So: !£,30,45,45,45,30,12,18,33 will turn the £ character into a caterpillar's head

R Brooksby, Chandlers Ford, Hants.

```
20 AD=#9700:DOKE#2F5,AD
30 REPEAT:READ C$:C=VAL("#"+C$)
40 POKE AD,C:AD=AD+1:UNTIL C$="ENDC"
100 DATA A9,00,85,00,A9,B4,85,01
110 DATA A0,00,B1,E9,AA,18,A9,08
120 DATA 65,00,85,00,90,02,E6,01
130 DATA CA,D0,F2,E6,E9,90,02,E6
150 DATA EA,A0,00,84,02,20,1C,D9
160 DATA 8A,A4,02,91,00,C8,C0,08
170 DATA D0,F1,60,ENDC
```

Easy code to Amstrad printer hook-up

Routine Enquiries (issue 103) had a query from a Mr Mackintosh on how to get his Amstrad to print with a Seikosha GP80A printer. You suggested cutting the lead to pin 14 on the ribbon cable but, as people may have discovered by now, this does not work. However, this piece of code, given to me by a friend does.

David Phillips, Worthing, West Sussex.

```
10 CLS:MEMORY 42999
20 FOR A=48427 RO 48429 : READ B : POKE A,B : NEXT A
30 FOR A=43000 TO 43008 : READ B : POKE A,B : NEXT A
40 END
50 DATA 195,248,167,254,10,32,1,135,207,242,135,201
```

Locating those elusive BBC bits

When working with machine code, I often find that I need to know the make-up of a particular location in memory as a series of bits.

The following procedure (PROCbyte) will look up any location entered as byte%, and any subsequent bytes given by to%. It will then print them as a series of one and zeros.

It displays the hex memory location, the hex contents, and the binary contents. The example demonstrates the character set stored at &C000 in ROM.

David Penny, Llansantffraid, Powys.

```
  20look%=&C000:number%=127*8
  30PROCbyte(look%,number%)
  40END
 100DEFPROCbyte(byte%,to%)
 110from%=byte%
 120FOR offset%=0 TO to%-1
 130byte%=?(from%+offset%)
 140PRINTSTR$~(from%+offset%);"=";~?(fr
om%+offset%);" ";
 150count%=128
 160PRINTTAB(12)"";
 170FOR times%=0 TO 7
 180PRINTSTR$(byte% DIV count%);:IF byt
e% DIV count% THEN byte%=byte%-count%
 190count%=count%/2
 200NEXT
 210PRINT
 220NEXT
 230PRINT
 240ENDPROC
```

RANDOM ACCESS

Share your words of praise or send us a rocket about *PCN*. We want to hear your views and feelings on the articles we print — and those you feel we ought to. Write to *Random Access, Personal Computer News, Evelyn House, 62 Oxford Street, London W1A 2HG.* You could win £15 for the best letter of the week.

Raising the standard of home computing

I have been a regular reader of *PCN* for almost two years and find it very entertaining. The most interesting feature after Mike Gerrard's Dungeon column is trying to guess the price of the next issue. However, there are a few areas where *PCN* is not doing its best to improve the standard of home computing.

The new hardware column is a very good idea, although Project 1 was a bit weak. Much the same effect could be achieved with a table lamp switch. While it is no use trying to run before learning to walk, I am hoping to see better things.

The subject of alternative languages to Basic has been neglected for far too long. Several of these are widely available for micros, *eg* Pascal, C, Fortran, Forth and assembler. I suspect that many people are put off buying and using them because they neither understand them nor see their attractions. A series of articles introducing and examining other languages, discussing their keywords and structures together with a few simple examples would improve matters greatly. A concise list of available compilers/interpreters and a verdict on them, similar to your review report cards, should also be included.

The program listings which appear every week are in desperate need of revision. While they provide necessary support for raw beginners and occasional interest for the rest, they would be more useful with less listing and a greater theoretical content in the form of algorithms. This would have a two-fold advantage: first the algorithms are applicable to a wide range of micros, and second it might teach the reader something useful about programming in the process. James Lucy took a step in the right direction with Wheels within wheels in issue 103.

I realize that implementing some or all of the above ideas would require either more pages in *PCN* or retiring some of the current features, but I would be interested to read any comments on these points from the editorial staff and readers.
Mike Howard,
Edinburgh.

Workbench is already building up to more interesting projects and will continue to do so. We have a series of articles in alternative languages scheduled for next month which should answer some of your criticisms. On the question of listings, we're in the hands of our readers since all programs are contributed. We'd certainly like to see features on the lines you suggest — what do other readers think? — Ed.

Calling all WAGs — user group opens

A new user group for owners of (and anyone interested in) Atari computers is starting in the Watford area, provisionally called The Watford Atari User Group, or WAG.

All enquiries should be addressed to me, Chris Bone at my address, or in person, at 'Infomania' Carey Place, Watford, Herts.
Chris Bone,
10 Garston Drive, Garston, Watford, WD2 6LB.

Spectrum interface around the corner

With reference to the letter from Mark Dunham, of Hull (issue 103) about 16-bit I/O interfaces for the Spectrum computer.

EDA (Software) currently markets such an interface for the Apple IIe computer and is developing a version for the Sinclair Spectrum. It will feature 16 inputs, from contact closures, inductive sensors or TTL, and provide 16 latched outputs to drive ancillary equipment.

In addition, it will connect directly with the Lektro II Power Interface Unit allowing 16 channels of mains power to be switched on or off by the Spectrum. Inputs and outputs will be accessed directly using the Spectrum in and out Basic commands or the Z80 in and out instructions in machine code.
CC Hemstritch,
Chertsey, Surrey.

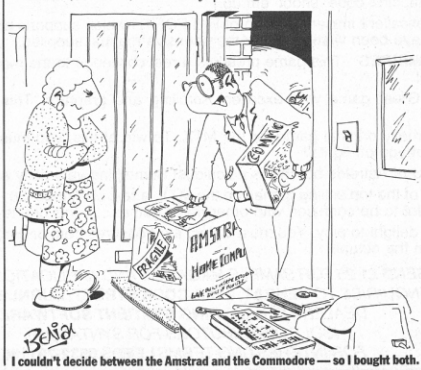
Amstrad needs a little more support

First, thank you for supporting the Amstrad since the very beginning. Your utilities have been invaluable and the games entertaining.

I must put my views on the Gameplay section. Apart from the occasional review, it is dominated by the Spectrum and the C64. The quality of Amstrad software is now much greater than you seem to think.

I hope you will be publishing some DIY projects for the Amstrad in Workbench. The potential is enormous.

Lastly, I must commend you for providing such a good magazine at such a ridiculously small price.
F MacIntyre,
Glasgow.



I couldn't decide between the Amstrad and the Commodore — so I bought both.

Quick connection to RGB monitor

Your answer to Colin Smith's letter on using Amstrad colour monitors with Spectrum or C64 (issue 105) is wrong, (or misleading would be fairer).

I do not know about the C64 but I bought Adapt Electronics' RGB output module which connects the Spectrum to the monitor perfectly with no messing about — just plug it in. The picture is superb — much brighter than with the Amstrad. Perhaps a little too bright, but I cannot fathom out why. Still, it works perfectly.

It cost £34.95 I think, but there is a DIY kit around a fiver.
R Dasent,
Guildford, Surrey.

Anyone interested can contact Adapt at 20 Starling Close, Buckhurst Hill, Essex — Ed.

Deciphering menu leads to frustration

Utilities for the Commodore 64 are always welcome so I was particularly pleased to see On the Menu (issue 106). Unfortunately, it will not work in its printed form. I know 'cos I've just struggled through a frustrating hour trying to sort it out.

To deal with the obvious errors first (and I hope that doesn't sound condescending, it isn't meant to). The £ sign has been used in several lines instead of the # which will prompt that well known conversation stopper 'Syntax error'.

Additionally, on the first run the program will come up with error 60 (write file open) or some such, as the file it is looking for 'Menu.dat' isn't on the disk at that point. The 'G' option must be pressed as quickly as possible, so that the file can actually be created.

After several puzzling minutes I found that it was better to change line 190 to read 'open 3, 8,3,"menu.dat,s,r,":gosub 420' — so that the directory can be read and listed to the screen and then press G to write the file. At that point line 190 can be changed to its original 'gosub570'.

I trust the above is reasonably clear and look forward to more such useful programs.
RC Medford,
Altrincham.

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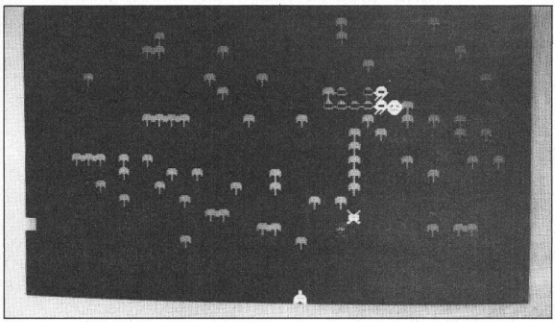
CENTIPEDE

Rescue your garden from killer mushrooms and hungry centipedes in Gordon Tomlinson's game for the Amstrad.



Centepid, for the Amstrad, casts you as a farmer defending your field from a ravening centipede and a gang of killer mushrooms. Your goal is to finish off the centipede before it reaches the bottom of the screen.

Note that the mushrooms divert the centipede downwards, so you have to keep control of them, too. The program is well-documented with REM statements, so you should have no problems typing it in.

Program notes

Lines 1270-1740 print the string Z$ in double height, but only single width characters. To use this routine you must first use SYMBOL AFTER 32 at the beginning of your program. This loads the character pattern table into RAM from ROM, where you can change it easily.

It simply takes each character of Z$ in turn and looks up the eight bytes of the character pattern table pertaining to that character. It then places the eight values into the array Q(B).

It then uses char(254) as the top half of the character and char(255) as the bottom half of the character. You could easily print a character with a height of three or four or more characters, but you would have to use chars 253, 254, 255 for three characters high etc.

Call &BC02 Used in several places, this simply sets INK to its original values, the same as when you switch on.

POKE 46312,255 This is the same as pressing caps lock.

The **WHILE-WEND** loop in line 1580 simply waits until the keyboard buffer is empty.

The routines at lines 150 and 170 are routines included in all my programs. They simply clear the screen, return to Mode 1 and set the ink, pen, paper colours to their original values. The error routine reports the offending line number and the type of error (see the manual), and in most cases, prints the offending line in the Edit Mode so you can correct it.

The REM statements indicate what each particular section is supposed to be doing.

All the REM statements may be left out to save your fingers while typing, as none are addressed by GOSUBS or GOTOS in this program.

Variables used

MU(25, 40) Mushroom field map (0=empty, 1=mushroom, 2=centipede, 3=bug, 4=bouncing spider)

RW(34), CW(34) Centipede's segment positions

CH,RL Centipede's head position

HT(34) Flag for segments set to 1 if segment destroyed

Q(7) Array to hold character pattern in double height

Y$ Name of the highest scorer

HS Hiscore

SC Score

Z$ String to be printed at double height

BODY Length of centipede

LIVES Number of lives left

MUSH Number of mushrooms destroyed

BUG Row at which the drop in bug starts

DR Direction of centipede

SG Centipede being moved

COL Position of spray

BNHIT Set to 1 if bouncing spider hits spray gun

BN Set to 1 or 2 if spider present

BNROW, BNCOL Position of bouncing spider

RL, CL Position of drop in bug

SL Set to 1 if bug present

COLOURS Set ink colours for particular screen

ST Set to 2 if spray gun fired

FIRE Set to 76 for fire button or 47 for space bar

LEFT Set to 74 for joystick or 45 for keyboard

RIGHT Set to 75 for Joystick or 37 for keyboard

ERR Print error type number

ERL Print line number in which the error occurs

LINE 190 Define A-T

The latter simply pre-defines all variables beginning with any letter between A and T as Integer variables. This saves typing the per cent sign after every variable. Once entered, try putting the per cent sign after a variable and you will get a 'Already dimensioned in line 190' warning. This does not stop you using variables with these letters as Real or String variables.

Listing 1

```
10 ' **********************
20 ' **      CENTEPID      **
30 '
40 ' **     WRITTEN BY     **
50 '
60 ' **GORDON  TOMLINSON**
70 '
80 ' **  COPYRIGHT 1985 **
90 ' **********************
100 '
110 '
120  Y$="* ARNOLD *" : HS=5000
130  ON BREAK GOSUB 150 : ON ERROR GOTO
170 : GOTO 190
140 REM BREAKKEY ROUTINE
150 CALL &BC02 :SPEED KEY 10,4 : MODE 1
: PEN 1 : PAPER 0 : CLS : END
160 REM ERROR ROUTINE
170 CALL &BC02 : PEN 1 : SPEED KEY 10,4
:PAPER 0 : MODE 1 :CLS : PRINT "ERROR T
YPE :";ERR : PRINT : PRINT "ERROR IN LIN
E :";ERL
180 REM DEFINE VARIABLES & ARRAY'S
190 DEFINT A-T: DIM MU(25,40),RW(34),CW(
34),HT(34),Q(7)
200  SYMBOL AFTER 32: RANDOMIZE TIME : C
OLOURS=1
210 REM SETUP TITLE SCREEN
220 MODE 1:INK 0,0 : INK 1,18 : INK 2,11
 : INK 3,24: BORDER 15
230 PAPER 0 : PEN 7: LOCATE 7,4: Z$="P E
 R S O N A L": GOSUB 1720
240 LOCATE 24,5: PEN 2 : PRINT "COMPUTER
 NEWS";
250 PEN 0: PAPER 3 : LOCATE 17,8 : PRINT
 "PRESENTS"; : PAPER 0
260 PEN 1: LOCATE 10,12: Z$="C  E  N  T
 E  P  I  D" : GOSUB 1720
270 PEN 3: PAPER 2: Z$=STRING$(24,"*") :
LOCATE 9,15: GOSUB 1720
280 LOCATE 11,19: PEN 0: PAPER 1: Z$="BY
  GORDON TOMLINSON": GOSUB 1720 : PAPER
0
290 LOCATE 6,24: PRINT STRING$(32," "):Z
$="P R E S S  ' S '  T O  S T A R T"; FO
R A=6 TO 37 : LOCATE A,24 :PEN 2: PRINT
">";
300 PEN 3:SOUND 1,1100-A*20,10,4: SOUND
1,0,3,0 : PRINT CHR$(8);CHR$(ASC(MID$(Z$
```

Listing (cont)

```
,A-5,1)));
310 IF INKEY(60)<>0 THEN NEXT A: GOTO 29
0
320 REM  PRINT INSTRUCTIONS
330 MODE 1 :  BORDER 0 : LOCATE 15,1 : P
EN 1 : PRINT "INSTRUCTIONS": LOCATE 14
,2 : PEN 2 : PRINT "-------------";
340 PEN 3 : PRINT "You own a small field
 which is always  bieng over run with m
ushrooms. To add toyour problems a centi
pede is winding itsway toward's you, if
 it gets level with you it's curtains. Al
so beare of bug's"
350 PRINT "that drop in now and again. A
lso watch  out for the bouncing spiders.
                Your only chance is to wipe t
hem all outwith your pesticide spray."
360 PEN 2: PRINT "-------------------
-------------" : PEN 1 :LOCATE 17,1
4 : PRINT "CONTROLS"; : LOCATE 2,16 : PE
N 2 : PRINT "Z"; : PEN 3 : PRINT " = LEF
T";
370 PEN 2 : PRINT "/ "; : PEN 3 : PRINT
"= RIGHT  FIRE = "; : PEN 2 : PRINT "SP
ACE BAR"; : PEN 3 : LOCATE 20,18 : PRINT
"OR"; : PEN 2 : LOCATE 17,20 : PRINT "JO
YSTICK";
380 PEN 3 : LOCATE 18,22 : PRINT "PRESS"
: LOCATE 1,25 : PEN 1: PRINT "'"; : PEN
 2 : PRINT "K"; : PEN 1 : PRINT "' FOR K
EYBOARD  OR  '"; : PEN 2 : PRINT "J"; 
: PEN 1: PRINT "' FOR JOYSTICK";
390 IF INKEY(45)=0 THEN FIRE=76 : LEFT=7
4 : RIGHT=75 : GOTO 430
400 IF INKEY(37)=0 THEN FIRE=47 : LEFT=7
1 : RIGHT=22 : GOTO 430
410 GOTO 390
420 REM DEFINE GRAPHICS
430 SYMBOL 97,60,126,66,195,126,36,72,14
4
440 SYMBOL 98,60,126,219,153,255,195,126
,60
450 SYMBOL 99,24,24,24,126,195,255,231,1
29
460 SYMBOL 100,12,48,12,48,12,48,12,48
470 SYMBOL 101,126,255,255,253,219,24,24
,24
480 SYMBOL 102,195,36,90,126,36,90,129,1
02
490 SYMBOL 103,129,66,36,126,66,126,36,1
95
500 REM SETUP SCORE & LIVES
510 SC=0 : MODE 1:INK 0,0 : GOSUB 1670
520 PEN 0:PAPER 1, : LOCATE 1,1: PRINT ST
RING$(12," ")"S C O R E :":LOCATE
3,1: GOSUB 1720 : GOSUB 1700
530 PAPER 1:PEN 2: LOCATE 30,1: Z$="LIVE
S: "; GOSUB 1720: PEN 3:Z$="3":GOSUB 172
0:PAPER 0:MOVE 0,365: DRAW 640,365,3
540 BUG=1 : BODY=11 : LIVES=3 : MUSH=0
550 REM SETUP CENTIPEDE LENGTH
560 DR=1: COL=20: BODY=BODY+2: IF BODY>3
4 THEN BODY=34
570 BUG=BUG+1 : IF BUG>18 THEN BUG=18
580 REM SETUP MUSHROOM FIELD
590 FOR A=1 TO 25: FOR B=1 TO 40: MU(A,B
)=0 :NEXT B,A: FOR A=1 TO 34: RW(X)=0:CW
(X)=0: HT(X)=0 : NEXT A
600 FOR A=1 TO (5+BODY) : SOUND 1,600-A*
3,1,7
610 B=INT(RND*17+5) :C=INT(RND*35+4): IF
 MU(B,C) THEN 610
620 PEN 3:LOCATE C,B:PRINT "e";:MU(B,C)=
1 :NEXT
630 REM DISPLAY CENTIPEDE AND SPRAY GUN
640 FOR A=1 TO BODY : RW(A)=4: CW(A)=A+2
 : HT(A)=0
650 PEN 2: LOCATE CW(A),RW(A) : PRINT "a
"; :MU(RW(A),CW(A))=2 : NEXT
660 LOCATE CW(1),RW(A-1): PRINT "b"; :
LOCATE COL,25:PEN 1: PRINT "c"; : CH=CW
(BODY):RH=RW(BODY): DR=1: SG=1: P=RW(BOD
Y)
670  SPEED KEY 1,1 :HH=0 : SL=0 : BNHIT=
0: BN=0
680 REM START OF MAIN ROUTINE
690 ST=1:GOTO 1040
700 IF NOT INKEY(FIRE)=0 THEN 760
710 REM FIRE SPRAY
720 ST=2:PEN 1:FOR A=24 TO 5 STEP -1: LO
CATE COL,A: PRINT "d";
730 LOCATE COL,A+1+(A=24): PRINT " "; :
IF MU(A,COL) THEN 890 ELSE ON A GOTO 190
,190,190,190,1040,740,740,740,1040,740,7
40,740,1040,740,740,740,1040,740,740,740
,1040,740,740,740,1040,740,740,740
740 PEN 1: NEXT A:ST=1: LOCATE COL,5 : P
RINT " ";
750 REM MOVE SPRAY
760 A=(INKEY(LEFT)=0)-(INKEY(RIGHT)=0):
IF A=0 THEN 810
770 COL=COL+A: IF COL<2 OR COL>39 THEN C
OL=COL-A
780 PEN 1: LOCATE COL-1,25:PRINT " c ";
790 IF BN THEN GOSUB 1190 : IF BNHIT THE
N 1370
800 IF BN=0 AND INT(RND*(40-BODY))+1<4 T
HEN GOSUB 1170
810 IF SL THEN GOSUB 850 :IF RL=25 AND C
L=COL THEN 1370 ELSE 690
820 IF INT(RND*(40-BODY))+1>2 THEN 690 E
LSE GOSUB 830: GOTO 1040
830 CL=COL : RL=BUG : SL=1
840 REM BUG ROUTINE
850 MU(RL,CL)=0 :PEN 1: LOCATE CL,RL : P
RINT " "; : RL=RL+1: LOCATE CL,RL:PRINT
 "g" : MU(RL,CL)=3
860 SOUND 1,10+25*RL,7 :IF RND>0.7 AND R
L<23 THEN PEN 3: LOCATE CL,RL-1: PRINT "
e"; : MU(RL-1,CL)=1
870 IF RL<25 THEN RETURN ELSE LOCATE CL,
RL : PRINT " "; :SL=0: RETURN
880 REM HIT SOMETHING
890 ST=1:LOCATE COL,A: PRINT " "; ON MU(
A,COL) GOTO 910,940,990,1010
900 REM HIT MUSHROOMS
910 SOUND 1,169,10,7 : SOUND 1,213,10,7
920 MUSH=MUSH+1: MU(A,COL)=0: GOTO 1040
930 REM HIT CENTIPEDE
940 FOR X=1 TO 5: SOUND 1,169,5,7 : SOUN
D 1,213,5,7 : NEXT X: SC=SC+100: GOSUB 1
700: IF A=BN AND COL=CH THEN 690
950 FOR X=1 TO BODY: IF HT(X)=0 THEN IF
A=RW(X) AND COL=CW(X) THEN 970
960 NEXT X:
970 HT(X)=1: MU(A,COL)=0: HH=HH+1: IF HH
+1=BODY THEN 1270 ELSE 690
980 REM HIT BUG
990 MU(A,COL)=0: SC=SC+100+7*RL: GOSUB 1
700 : FOR X=1 TO 5: SOUND 1,400-X*70,3,7
: NEXT X: SL=0: GOTO 1040
1000 REM HIT BOUNCING SPIDER
1010 MU(A,COL)=0 : SC=SC+200+BNROW*4 : F
OR X=1 TO 5 : SOUND 1,266,5,7 : SOUND 1,
399,5,7 : NEXT
1020 GOSUB 1700 : BN=0 : GOTO 1040
1030 REM MOVE CENTIPEDE
1040 IF HT(SG)=1 THEN SG=SG+1 :IF SG<=BODY
 THEN 1040 ELSE SG=1 :GOTO 1040
1050 MU(RW(SG),CW(SG))=0:LOCATE CW(SG),R
W(SG):PEN INT(RND*3+1):PRINT " "; : LOCA
TE CH,RH :PRINT "a"1
1060 CW(SG)=CW(SG)+(DR=2)-(DR=1): IF CW(
SG)<2 OR CW(SG)>40 THEN CW(SG)=CH+(DR=1)-(DR
=2):GOTO 1090
1070 IF RW(SG)<RH THEN RW(SG)=RW(SG)+1:
GOTO 1090
1080 IF NOT MU(RW(SG),CW(SG))=1 THEN 112
0
1090 IF DR=1 THEN DR=2 ELSE DR=1
1100 RW(SG)=RW(SG)+1 'INT(RND*2)+1
1110 IF RW(SG)<RH THEN RW(SG)=RW(SG)+1:
GOTO 1110
1120 LOCATE CW(SG),RW(SG) :PRINT "b"; :
CH=CW(SG):RH=RW(SG): MU(RW(SG),CW(SG))=2
:SG=SG+1 : IF SG>BODY THEN SG=1
1130 IF SL THEN GOSUB 850: IF RL=25 AND
CL=COL THEN 1370
1140 IF BN THEN GOSUB 1190 : IF BNHIT TH
EN 1370
1150 IF RH>24 THEN  1370 ELSE ON ST GOTO
 700,740
1160 REM MOVE BOUNCING SPIDER
1170 BNHIT=0 : BNCOL=INT(RND*30+5): BNRO
W=25 : IF BNCOL=COL THEN 1170
1180 BNMAX=22-INT(RND*6)+1: BN=1: IF BNC
OL<COL THEN BNDIR=1 ELSE IF BNCOL>COL TH
EN BNDIR=-1 ELSE BNDIR=0
1190 SOUND 2,INT(RND*400)+100,5,7 : PEN
2 : IF BN=2 THEN 1230
1200 MU(BNROW,BNCOL)=0 : LOCATE BNCOL,BN
ROW : IF BNROW>20 THEN PRINT " "; ELSE
IF RND<0.7 THEN PRINT " "; ELSE PEN 3 :P
RINT "e"; : MU(BNROW,BNCOL)=1
1210 BNROW=BNROW-1 : BNCOL=BNCOL+BNDIR :
 IF BNCOL<1 THEN BNCOL=40 ELSE IF BNCOL>
40 THEN BNCOL=1
1220 MU(BNROW,BNCOL)=4 : LOCATE BNCOL,BN
ROW : PRINT "f"; : IF BNROW<=BNMAX THEN
BN=2 : RETURN ELSE RETURN
1230 MU(BNRDW,BNCOL)=0 : LOCATE BNCOL,BN
ROW : IF BNROW>20 THEN PRINT " "; ELSE
 IF RND<0.7 THEN PRINT " "; ELSE PEN 3 :
 PRINT "g"; : MU(BNROW,BNCOL)=1
1240 BNROW=BNROW+1 : MU(BNROW,BNCOL)=4 :
 LOCATE BNCOL,BNROW : PRINT "f" ;
1250 IF BNROW=25 AND BNCOL=COL THEN BNHI
T=1:RETURN ELSE IF BNROW=25 THEN 1180 EL
SE RETURN
1260 REM SCREEN COMPLETED
1270 FOR A=4 TO 25: LOCATE 1,A: PRINT ST
RING$(40," "); : NEXT A : PEN 3 : LOCATE
 4,12 : Z$="* W * E * L * L  D * O * N *
 E *" : GOSUB 1720
1280 RESTORE 1310: FOR A=1 TO 23 : READ
DURATION,NOTE : SOUND 1,NOTE,DURATION*14
,7
1290 SOUND 2,NOTE-5,DURATION*14,7 : SOUN
D 4,NOTE-10,DURATION*14,7 : SOUND 7,0,DU
RATION*4,0 : NEXT A
1300 REM MUSIC DATA
1310 DATA 1,318,1,318,1,318,1,378,1,318,
1,284,1,318,2,378,2,425,1,378,2,425,1,31
6,1,318,1,318,1,378,1,284,1,318,2,
378,2,425,1,378,1,425,2,478
1320 REM ADD MUSHROOMS TO SCORE
1330 FOR A=1 TO MUSH+100: SC=SC+10 : SOU
ND 1,2000-A*10,5,7:SOUND 1,0,1,0: GOSUB
 1700 : NEXT A
1340 COLOURS=COLOURS+1: IF COLOURS>8 THE
N COLOURS=1
1350 LOCATE 1,12 : PRINT STRING$(80," ")
 : GOSUB 1670: GOTO 560
1360 REM LOOSE A LIFE
1370 BORDER 0,26: INK 0,26 : IF ST=2 THE
N LOCATE COL,A : PRINT " ";
1380 IF BN THEN LOCATE BNCOL,BNROW : PRI
NT " ";
1390 IF SL THEN LOCATE CL,RL : PRINT " "
;
1400 REM DEATH MARCH MUSIC
1410 DATA 50,1016,37,1016,12,1016,50,101
6,25,850,25,899,25,899,25,1016,25,1016,2
5,1136,100,1016
1420 FOR b=1 TO 2:RESTORE 1410:FOR c=1 T
O 11: READ duration,note: SOUND 1,note,d
uration,7 :SOUND 2,note+5,duration,7:SOU
ND 5,0,3,0: NEXT c,b
1430 INK 0,0: GOSUB 1670 : LIVES=LIVES-1
: IF LIVES<0 THEN 1510 ELSE Z$=STR$(LIVE
S): PEN 3:PAPER 1: LOCATE 37,1: GOSUB 17
20
1440 PAPER 0:FOR B=1 TO BODY: IF HT(B)=0
 THEN LOCATE CW(B),RW(B) : PRINT " ": MU
(RW(B),CW(B))=0
1450 NEXT B:IF SP THEN  LOCATE COL,A : P
RINT " ": MU(A,COL)=0: SP=0
1460 FOR B=1 TO MUSH: SOUND 1,2000-B*20,
3,7: SC=SC+10 : GOSUB 1700
1470 C=INT(RND*17+5) : D=INT(RND*35+4) :
 IF MU(C,D) THEN 1470
1480 LOCATE D,C :PEN 3: PRINT "e";:MU(C
,D)=1: NEXT : MUSH=0
1490 HH=0 : GOTO 640
1500 REM GAME OVER
1510 SPEED KEY 10,4 : LOCATE 1,10: PRINT
 STRING$(240," "): LOCATE 7,12: Z$="* G
 A  M  E  *  O  V  E  R  *": PEN 2,24,15:
 PEN 2: GOSUB 1720
1520 FOR A=1 TO MUSH: SC=SC+10 : GOSUB 1
700: SOUND 1,100+20*A,5,7 : NEXT A
1530 FOR A=1 TO 25: FOR B=1 TO 40: MU(A,
B)=0: NEXT B,A: FOR A=1 TO 34: RW(A)=0 :
 CW(A)=0 : HT(A)=0 : NEXT
1540 CALL &BC02 : BORDER 24:MODE 0: PAPE
R 5: CLS
1550 PEN 12 : LOCATE 2,4: Z$="SCORE :" :
 GOSUB 1720
1560  PEN 4 :  LOCATE 10,4 :Z$=STR$(SC)
: GOSUB 1720
1570 REM CAPS LOCK & CLEAR KEY BUFFER
1580 POKE &6312,255 : WHILE INKEY$<>"" :
 WEND
1590 IF SC<=HS THEN 1610 ELSE LOCATE 2,1
0 : PEN 10 : PRINT "ENTER YOUR NAME": LO
CATE 5,12 : PEN 13 : INPUT Y$
1600 LOCATE 1,10: PRINT STRING$(160," ")
;: Y$=MID$(Y$,1,10) :  HS=SC
1610 LOCATE 2,10: PEN 11 : Z$="HISCORE :
": GOSUB 1720: Z$=STR$(HS): PEN 3: GOSUB
 1720
1620 LOCATE 2,16 : Z$="BY : " : PEN 13 :
 GOSUB 1720 : Z$=Y$: PEN 8: GOSUB 1720
1630 X$="PRESS SPACE BAR" : FOR D=1 TO 1
7: LOCATE D+2,24 : E=INT(RND*15) :E=E+(E
=5)*2: PEN E: Z$=MID$(X$,D,1): GOSUB 172
0
1640 SOUND 1,600-D*20,4,7 : IF INKEY(47)
=0 THEN 200
1650 NEXT D:LOCATE 1,24: PRINT STRING$(4
0," "); :GOTO 1630
1660 REM SET INK COLOURS
1670 RESTORE 1680: FOR F=1 TO COLOURS :
READ A,B,C,D : NEXT F : INK 1,A : INK 2,
B : INK 3,C : BORDER D : RETURN
1680 DATA 26,18,16,11,24,2,15,22,20,1,21
,6,6,24,26,12,21,11,16,13,17,18,12,25,16
,25,14,15,6,23,25,8
1690 REM DISPLAY SCORE
1700 PEN 2:PAPER 1: Z$=STR$(SC): LOCATE
23-LEN(Z$),2: PRINT SC;: LOCATE 15,2:PRI
NT STRING$(9-LEN(Z$),"0"): PEN 1:PAPER 0
: RETURN
1710 REM DISPLAY DOUBLE HEIGHT CHARS
1720 FOR A=1 TO LEN(Z$): FOR B=0 TO 7 :
C=PEEK(-23296+(ASC(MID$(Z$,A,1))-32)*8+B
) :Q(B)=C: NEXT B
1730 SYMBOL 254,Q(0),Q(0),Q(1),Q(1),Q(2)
,Q(2),Q(3),Q(3) : SYMBOL 255,Q(4),Q(4),Q(
5),Q(5),Q(6),Q(6),Q(7),Q(7)
1740 PRINT CHR$(254);CHR$(10);CHR$(8);CH
R$(255);CHR$(11); : NEXT A: RETURN
```

Instead of computers catc technology now has to ca

The way we see it, technology has suddenly got quite a race on its hands.

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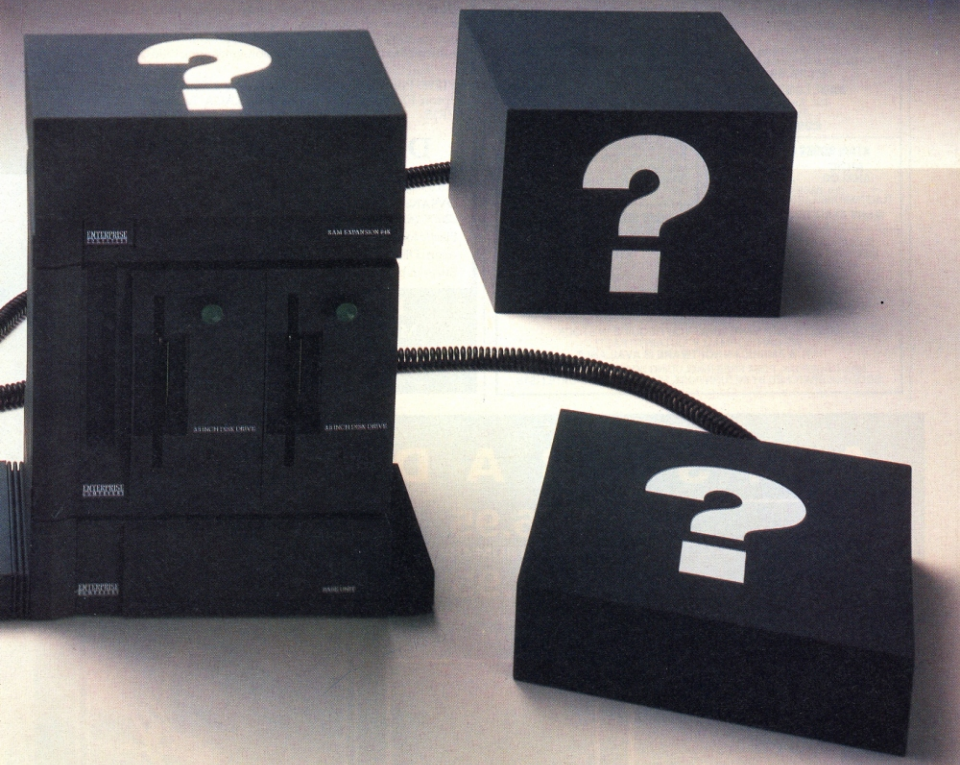

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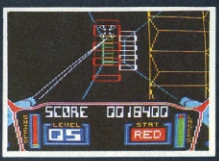

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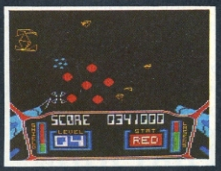

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SPRITE SUPPLEMENT

Finding that sprite handling a little sluggish? Brian Smith springs to the rescue with a machine code routine that will help to pack your games with a bit more punch.

Stuart Nicholl's excellent sprite program (*PCN*, issue 99) has one drawback. The designing and entry of the sprite figure data is very tedious. This can be easily solved by the following piece of machine code.

It produces the necessary four frames of data/mask information needed for each sprite, and places it in the figure space required. You only need to supply the data/mask information for the top left frame (the initial frame).

Although the code takes up about 300 bytes, it also uses a further 406 bytes as storage/workspace, where the user puts the initial frame and the number of the figure where the generated frames are to be placed.

Figure 1 shows a typical sprite with the data (black and white) and the mask (grey). To convert it into the necessary data/mask blocks, you need to make up two 2×2 CHR$ blocks; one for data, the other for the mask as in Figure 2. The CHR$ blocks from Figure 2 can be entered into your favourite UDG designer program. Each quarter of the two frames must be placed in the CHR$ shown in Figure 3.

Once this has been done, the CHR$ a-h are saved as a single continuous block using SAVE "data" CODE USR "a", 64 or SAVE* "m";1;"data"CODE USR "a", 64. It's this data that the routine uses to create the full sprite frames.

To enter the machine code use a hex loader (see *PCN*, issue 95) and then type in the code as in Listing 1. Remember to clear RAMTOP to 52999 before entering the code. Once entered save it using SAVE "expander" CODE 53000,319 or SAVE*"m";1;"expander" CODE 53000,319. Table 1 shows the layout.

Now load the sprite controller into the memory and right its time to test the expander. Using the initial data frame already saved, load it in to the initial data space using LOAD"data"CODE 53319 or LOAD*"m";1;"data"CODE 53319, then POKE 53317,F where F is the figure number (0 to 15) into which the full sprite frames are to be placed. The full frames are created using RANDOMISE USR 53000.

The sprite system can be activated now, as long as the attributes have been set up. You'll see a full sprite moving at half CHR$ square movement, produced from a simple initial frame, without the need for a great deal of effort. Anyone who has a knowledge of machine code can easily work out how to make it deal with simple animation in the top and bottom frames using a rearranged expander.

Using this routine, a full 16 sprites can be stored in a compressed form in 1K instead of the normal 4K — a great asset for games writing.

Sprite figure data

Figure 1

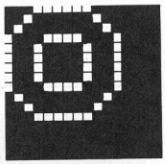


Figure 2

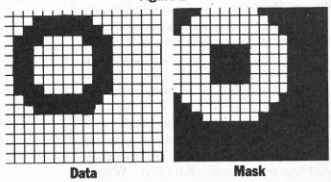


Figure 3

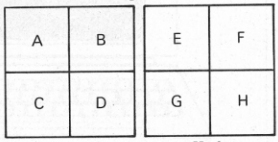


Table 1

Memory map

Description	Start address	
	Hex	Decimal
Workspace	D086	53382
Initial frame	D047	53319
Sprite figure	D045	53317
Machine code	CF08	53000

Listing

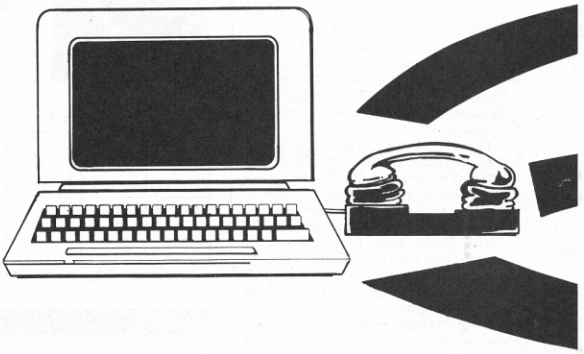
```
ZX Spectrum hex dump
Expander M/code 53000,319
CF08 CD 33 CF 21 DB D0 CD 56  =BE
CF10 CF CD 6B CF 21 1B D1 CD  =B0
CF18 56 CF CD 33 CF CD C4 CF  =54
CF20 21 5B D1 CD 56 CF CD 6B  =77
CF28 CF 21 9B D1 CD 56 CF CD  =1B
CF30 3F CF C9 21 47 D0 11 87  =A7
CF38 D0 01 40 00 ED B0 C9 2A  =A1
CF40 45 D0 11 00 01 CD A9 30  =CD
CF48 11 00 EA 19 EB 21 DB D0  =CB
CF50 01 00 01 ED B0 C9 DD 21  =66
CF58 87 D0 06 20 DD 7E 20 77  =6F
CF60 23 DD 7E 00 77 23 DD 23  =18
CF68 10 F2 C9 DD 21 87 D0 CD  =ED
CF70 88 CF DD 21 97 D0 CD 88  =11
CF78 CF DD 21 A7 D0 CD A6 CF  =86
CF80 DD 21 B7 D0 CD A6 CF C9  =90
CF88 06 08 C5 DD 66 00 DD 6E  =61
CF90 08 A7 06 04 CB 1C CB 1D  =88
CF98 10 FA DD 74 00 DD 75 08  =85
CFA0 DD 23 C1 10 E5 C9 06 08  =8D
CFA8 C5 DD 66 00 DD 6E 08 37  =22
CFB0 06 04 CB 1C CB 1D 10 FA  =E3
CFB8 DD 74 00 DD 75 08 DD 23  =AE
CFC0 C1 10 E5 C9 21 87 D0 CD  =C4
CFC8 01 D0 CD 2E D0 11 87 D0  =04
CFD0 CD 17 D0 21 8F D0 CD 01  =02
CFD8 D0 CD 2E D0 11 8F D0 CD  =D8
CFE0 17 D0 21 A7 D0 CD 01 D0  =1D
CFE8 CD 2E D0 11 A7 D0 CD 17  =37
CFF0 D0 21 AF D0 CD 01 D0 CD  =DB
CFF8 2E D0 11 AF D0 CD 17 D0  =42
D000 C9 11 CB D0 E5 01 08 00  =63
D008 ED B0 E1 D5 11 10 00 19  =8D
D010 D1 01 08 00 ED B0 C9 21  =61
D018 CB D0 D5 01 08 00 ED B0  =16
D020 D1 E5 21 10 00 19 EB E1  =CC
D028 01 08 00 ED B0 C9 21 DA  =6A
D030 D0 11 CA D0 01 04 00 ED  =6D
D038 B8 21 D6 D0 11 DA D0 01  =3B
D040 10 00 ED B8 C9 01 00 =7F ZZ
```

GETTING ON-LINE

Communications is one of the fastest growing areas in home computing. From bulletin boards through Prestel to commercial electronic mail services, everyone is getting on-line. In the introduction to *PCN's* new weekly column on communications, Surya explains how to choose a suitable modem and what you do with it once you've bought it.

Once the idea of ordinary hobbyists logging on to mainframe systems, leaving messages for each other and swapping software — all through a simple phone call — was almost unheard of. Now the modem is becoming an essential peripheral.

But there's a bewildering variety of protocols in use, and comms (the usual abbreviation for computer communications) has a jargon all of its own. Where does an interested hobbyist begin?



First things first

A computer used to access another over the phone lines is a terminal. You sometimes hear the term 'intelligent terminal', which simply means that the terminal has its own computing power. In contrast, custom-designed terminals, like those used with mainframe computers, are known as 'dedicated' or 'dumb'. An intelligent terminal comprises a micro, a modem and some communications, or terminal emulation, software.

First make sure your micro is capable of acting as a terminal. The only requirement is some form of serial port — preferably, but not necessarily , an RS232 compatible one. Almost any home computer has one, but Spectrum owners need some kind of add-on RS232 interface; the Sinclair Interface 1 is not totally suitable, though all the third-party manufactured ones I know of are.

In general, any micro with either a serial port (usually marked Serial, RS232, RS432 or Modem) or a user port (normally marked User, Expansion bus, I/O or Peripherals) is okay. So the BBC Micro, Commodore 64, Atari and Tandy, for example, are all suitable. Business micros may offer an RS232 port as an optional extra. If in doubt, check with your dealer.

Uses for comms

Now you can choose between three main applications:

1 Direct user-to-user transfer of text and/or software

2 Messaging, electronic mail and telex

3 Information-gathering from databases

User-to-user comms

Have you ever struggled with a program all evening, got completely stuck and had no-one around to advise? With a modem, you can just ring up a friend and transfer the program to their micro over the phone. If they find the bug, they can simply correct it and transfer the revised program back.

And when you finish the program, you can send copies to all your mates instantly, whether they're in the next street or 200 miles away. You can transfer text files in the same way.

Messaging

This is possibly the most exciting area. Using electronic messaging, you can write a letter or document on your micro and upload it to a dial-up computer system addressed to another user. When that user logs onto the system, they receive your message.

There are two main types of electronic messaging, private and public. Private messages can be read only by the person they're addressed to. Public messages can be read by anyone using the system. Private message systems are known as electronic mail, while public message systems are bulletin boards.

Electronic mail is primarily used by business at present, but I think more and more private users will join one or more electronic mail services during the next five years. It combines the permanence and exactitude of the written word with the speed and convenience of a phone call.

Bulletin boards are generally used more as a form of entertainment. Their beauty is that anyone can leave a message on any topic (as long as it's not libellous or offensive) and anyone can reply to it. The most unlikely subjects can lead to long chains of replies to the replies. Very often, the original subject is forgotten as more and more people join in.

Some electronic mail systems, such as Telecom Gold, offer a bulletin board, and most bulletin boards offer electronic mail. Commercial electronic mail services tend to cost too much for hobbyists (Telecom Gold has a minimum charge of £120 per year, for example, and other systems have similar standing charges). Bulletin boards are normally free, thanks to the generosity of the hobbyists who run them, although you may be asked to pay a once-only registration fee of £1 or so towards costs.

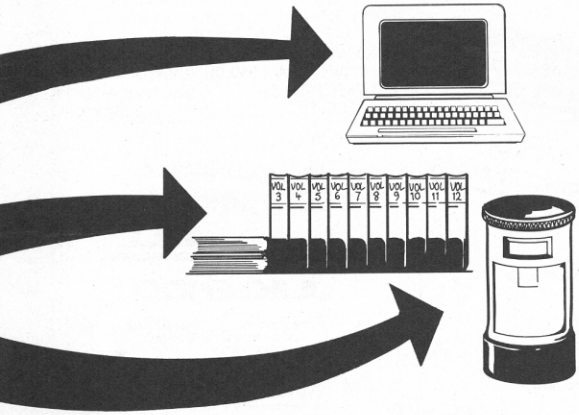
Databases

The third use of comms is information retrieval. Comms allow you to access information on a huge range of topics, instantly. Not only can you retrieve more information than you could possibly keep in paper form, but you can do so instantly and, in many cases, more

economically than traditional methods. Many databases are updated daily, some hourly and one or two by the minute.

Although many database systems are aimed at business users — and often priced way out of reach of hobbyists, £25-200 per hour is pretty typical — others, such as Prestel, are aimed more at the home market and are priced accordingly. The Micronet 800 area of Prestel is the main hobbyist system. You can use Prestel to check: the latest news; football, cricket or racing results; the local weather; train timetables, updated daily to take account of cancellations and alterations; technical information on your micro; details of many computer mags (including *PCN*, of course) and more. In the Micronet 800 area you can download both public domain (free) and commercial software.

Prestel costs residential users £5 per quarter, plus 5p per minute during peak and standard telephone times. There's no time charge in off-peak times. Access to Micronet 800 costs extra.



Choosing your system

We've looked briefly at the three main categories of comms system, so let's see what type of modem and software each requires. Since I strongly recommend buying your modem and comms software as a package from the same dealer, they will be treated together.

The first factor to consider is the baud rate. This is simply a measure of the speed of data transmission. There are three main baud rates: 300, 1200 and 1200/75.

The most common speed is 300-baud. Most messaging systems use this rate in default, although some may offer 1200 and/or 1200/75 as well. 300-baud is roughly equivalent to 30 characters per second (baud rate is often incorrectly defined as bits-per-second; this is *not* normally an accurate definition but it's adequate for our purposes).

1200-baud is, obviously, four times as fast as 300-baud. Until fairly recently, 1200-baud communication over the phone network hadn't been used much because of reliability problems. With today's modems, however, 1200-baud is becoming increasingly popular for messaging systems and is ideal for user-to-user work.

1200/75-baud means that the terminal receives data at 1200-baud but transmits at 75-baud. This is used for 'viewdata' services — systems where most of the data is travelling in one direction, from the mainframe to the terminal. Prestel is a viewdata system. Some messaging systems, including a few bulletin boards, support this standard.

There's one complication that we'll deal with at this point, and that's Compunet. Compunet is an alternative to Prestel which, at the time of writing, can only be accessed by Commodore 64s. Unfortunately, because of the way in which Compunet's security system works, you cannot access the system with an ordinary 1200/75 modem: you have to buy the official Commodore Communications Modem. This modem can be used to access Prestel, but you won't be able to download software from Micronet 800 — you need the official Micronet modem for that.

So, decide what you want to access, and check what baud rate(s) you require. If you need more than one speed (you may wish to access both 300-baud bulletin boards and Prestel, for example), your best bet is to consider a multi-standard modem. Two examples are the Minor Miracles WS2000 and the Pace Nightingale.

If you require only a single baud-rate, you choose between a hard-wired (or direct-connect) modem, and an acoustic modem (or acoustic coupler). Hard-wired modems plug directly into the telephone socket, while acoustic modems have 'cups' to hold the telephone handset.

Hard-wired modems are generally more reliable, and work with any type of phone, but require a BT standard socket. If you don't already have this type of socket, British Telecom will install one for £18. Acoustic modems are prone to interference in noisy environments, and won't work with non-standard handsets (Trimphones, for example), but you don't need a BT socket. Some acoustic modems are battery-powered, enabling them to be used from public callboxes with portable computers.

As a general rule, if your modem is going to stay in one place, it's better to get a hard-wired one. If you want to use if from several locations, buy an acoustic one. If you have a lapheld micro (such as the Tandy 100, NEC PC8201A, Olivetti M10, Epson PX8 and so on), a battery-powered acoustic modem will retain the portability of the system. The Sendata acoustic modem and Epson CX-21 are two examples of suitable modems.

Bear in mind that some systems require a specific modem. I've already mentioned the two main ones — Compunet, and the software download area of Micronet 800.

Your software won't care whether you have a hard-wired or acoustic modem, but it does need to support the appropriate baud rates. Once you know which baud rates you require, make sure the software can use them all. It may be necessary to buy more than one software package if you require several different baud rates, but try to avoid this as you'll have to get used to two ways of working.

Unless you only want access to a single system, make sure your software can adapt to different standards. The most important things to be able to alter are the number of start, stop and data bits; and the parity. You don't need to know what any of this means, but some systems require seven data bits, two stop bits and even parity while another may want one start bit, eight data bits, one stop bit and no parity. The instructions that come with your software tell you how to change these settings.

Other features to consider are auto-dial, where the computer automatically keeps dialling an engaged number until it gets through, and auto-answer, which lets your computer automatically answer the phone to another computer for user-to-user work. That's really all there is to it. Happy hacking.

Surya can be contacted on Telecom Gold 84:TCC007 and Prestel 019 99 6732.

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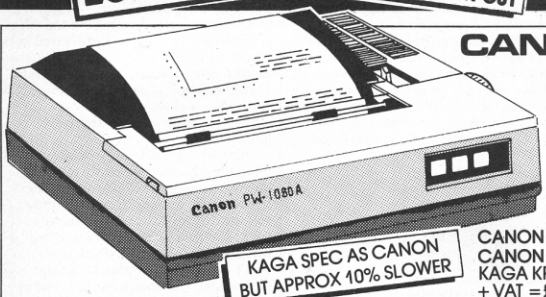

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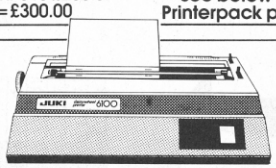

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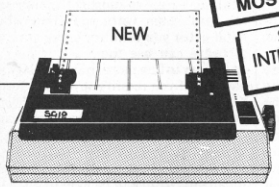

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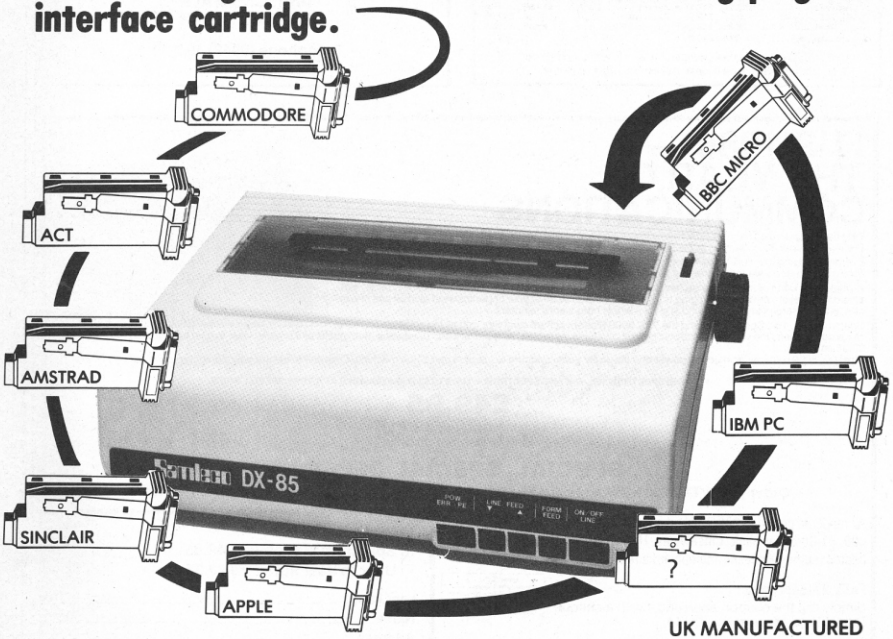

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MOVEABLE FEAST

Does the thought of transferring programs from disk to tape send you into a deep slumber? Help is at hand with Jonathan Whitchley's useful utilities.

Moving programs from disk to tape can be a monotonous job. Copying one Basic program isn't too bad, but making up a tape containing several programs is time-consuming.

With machine code programs, there's the added difficulty of finding what memory location they load into, and saving from there. This is awkward if you don't have a 64 monitor/utility.

The two programs here (one for the Commodore 64, the other for 4 Pets) are short hybrid utility programs (a dog's dinner of Basic and code), designed to download any number of programs, Basic code or hybrid, from disk to tape.

Once you've entered the program names the utility gets on with the job without any further supervision. The program also gives you the option to make several tapes.

At first glance, the two programs look similar, but there are significant differences, particularly as the 64 and Pet tape operating systems aren't as similar as you might expect. This isn't surprising when you remember that the 64 has auto relocation for any program that is entered without a secondary address.

The programs use the same technique. Obviously, Basic programs can't be loaded directly, as they would overwrite the utility, so it opens up each program file to find the loading address, and after storing this, the program is loaded into $1000. This isn't done in the normal way, since both machines have the endearing trait of restarting Basic after loading.

Saving to tape is done in two stages. First the header is written with the correct start and end addresses, then the remaining program is saved, but this time the pointers are set to $1000 upwards to the end of the program. As a result, the largest program this utility can cope with is 28K.

Program notes

30 Stores machine code routine, above Basic for Pet, at $C000 for 64 (this won't affect the transferring programs which were saved from $C000)

90 Reads in the program names, one at a time

110 Gets the start address for the program being transferred

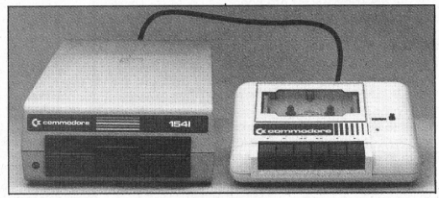
130 Forces program into $1000 and picks up the end of program address

140 Calculates true end of program address

160 Writes header with true addresses, then redirects pointers

170 Saves the rest of the program to tape

Note that these are hybrid programs in that they make direct calls to ROM as well as to short routines in RAM.



Listing 1

C64 auto-transfer program.

```
10 rem c64 auto-transfer files from disk to tape
20 poke56,16:clr
30 fort=49152to49221:readx:poket,x:nextt
35 data162,0,160,16,134,174,132,175,169,0,133,147,133,144,166,185
40 data32,175,245,169,96,133,185,32,213,243,165,186,32,9,237,165
45 data185,32,199,237,32,19,238,165,144,74,74,176,6,32,19,238
50 data76,240,244,76,4,247,162,60,134,178,160,3,132,179,32,56
55 data248,169,3,76,106,247
70 print" What titles are to be copied":print" from disk to tape"
80 print" (type * when all titles are entered)Q"
90 a=a+1:print" title"a;:inputname$(a):ifname$(a)<>"*"then90
100 lt=a:a=1
110 open1,8,2,name$(a):fort=0to1:get#1,x$:ifx$=""thenx$=chr$(0)
120 lo(t)=asc(x$):nextt:print#1:close1:sys57812 name$(a),8
130 sys49152:h1=peek(175):h0=peek(174)
140 h=256*(lo(1)+h1)+lo(0)+h0-4096:sys57812 name$(a),1,1
150 poke193,lo(0):poke194,lo(1):poke175,int(h/256):poke174,h-256*int(h/256)
160 sys49206:poke193,0:poke194,16:poke174,h0:poke175,h1
170 print"saving R"name$(a):fort=1to2500:next:sys63591:a=a+1:iflt>athen110
180 print" Resave on another tape? (y/n)"
190 getz$:ifz$=""then190
200 ifz$="y"thenprint"ok":goto100
```

Listing 2

Auto-transfer program for Commodore 80 column and 40 column basic 4.

```
10 rem auto-transfer files from disk to tape
20 poke53,16:poke42,172:poke43,7:clr
30 fort=1920to1963:readx:poket,x:nextt
40 data169,96,133,211,32,165,244,32,210,240,165,211,32,147,241,32
50 data192,241,165,150,74,74,144,3,76,193,243,32,192,241,76,145
60 data243,32,149,246,32,140,248,169,1,76,25,246
70 print" What titles are to be copied":print" from disk to tape"
80 print" (type * when all titles are entered)Q"
90 a=a+1:print" title"a;:inputname$(a):ifname$(a)<>"*"then90
100 lt=a:a=1
110 open1,8,2,name$(a):fort=0to1:get#1,x$:ifx$=""thenx$=chr$(0)
120 lo(t)=asc(x$):nextt:print#1:close1:sys62589 name$(a),8:poke157,0
130 poke251,0:poke252,16:sys1920:h1=peek(252):h0=peek(251)
140 h=256*(lo(1)+h1)+lo(0)+h0-4096:sys62589 name$(a),1
150 poke251,lo(0):poke252,lo(1):poke202,int(h/256):poke201,h-256*int(h/256)
160 sys1953:poke251,0:poke252,16:poke202,h1:poke201,h0
170 print"saving R"name$(a):sys63322:a=a+1:iflt>athen110
180 print" Resave on another tape? (y/n)"
190 getz$:ifz$=""then190
200 ifz$="y"thenprint"ok":goto100
```

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SCIENCE FRICTION

Mike Gerrard's trips down adventure lane this week threaten to turn him into a babbling idiot (or is that a babel fish idiot?).

Two adventures this week which bear a few similarities (they're both disk-only adaptations of best-selling science fiction books) but the results are as different as the books they're based on: Douglas Adams' *The Hitchhiker's Guide to the Galaxy* and Arthur C Clarke's *Rendezvous with Rama*. The former's a delight, but the latter's a disaster.

First the good news, if you can call being reincarnated as Arthur Dent good news. Still, I suppose it beats coming back to earth as Marvin, or anyone else when your house is about to be demolished by a bulldozer to make way for a by-pass. That's one of Arthur's early problems, as if the hum-drum of daily existence wasn't bad enough — like how to stop the room spinning round when you get out of bed? And what *is* that thing your aunt gave you?

A load of bulldozer

Ho-hum, and it's out of the house to try and deal with that bulldozer. But, too late. You spent too long reading through the junk mail and a fleet of Vogon Constructor ships has arrived to demolish the earth. Better put on your peril-sensitive sunglasses while you look at your score.

You will, of course, already be wearing your DON'T PANIC badge, and will have examined your free piece of pocket fluff and the free microscopic space fleet, and done your best to ignore the equally free demolition order on your house.

Infocom adventures start when you open the packaging, and this one is better than most. The lucky people who can play it are those with an Apple Macintosh, Apple II, DEC Rainbow, IBM PC or CP/M86 (in 8in format), who can fork out £34.50 for the privilege. Common old Commodore 64 and Atari owners can have one at the bargain price of £30.20. All versions are being distributed by Softsel (01-844 2040).

Meanwhile, back at the bulldozers, Arthur has consulted the paperback in which he features and discovered that a good way of stopping the bulldozer is to lie in its path. This he fearlessly does, despite the warnings shouted by Mr Prosser from the local council. In the nick of time Ford Prefect arrives, and generously offers his towel, then disappears in the direction of the pub.

You risk getting up and following him to the pub, as you're dying for drink . . . oops, now you're just dying, hit by a flying brick, and you expire in silence. WAKE UP, you type, ever the optimist. "You keep out of this, you're dead," is the response.

The adventure remains fairly faithful to the book, though relying on it too much will only lead you up the garden path. When you get to the pub, for example, assuming you figure out how to get that far, you discover some peanuts. According to the book you need these, but can you attract the attention of the barman? Well I couldn't, just like in real life. The jukebox contains a generous supply of Beatles' records, and Ford buys a generous supply of beer, though you have to avoid getting a hangover.

Stay sober, rush outside to investigate the noise, and you may just devise some means of getting yourself on the right side of the Vogon Constructor ships. Twelve hours later you might have figured out how to stop yourself roaming round in the dark. Twelve days later and you might have figured out how to get a babel fish out of the babel fish dispenser — I doubt if there's ever been anything funnier on a computer than this.

That goes for the adventure itself, which veers from the storyline of the book, but I was so overcome with excitement at getting a babel fish out of the dispenser that I couldn't go any further. Buy it.

No rendezvous

As for *Rendezvous with Rama*, all I can say is don't buy it. It comes from an American company, Trillium, and is one of a series being distributed here by WH Smith for £19.95. It is beautifully packaged, with a glossy colour fold-out sleeve containing notes, maps and two double-sided disks.

The book is a marvellous read about the arrival in our solar system of the Rama, an enormous alien object that goes into orbit around the sun and is seemingly devoid of life. A ship is sent up to investigate the object. You're the captain of that ship, the Endeavour.

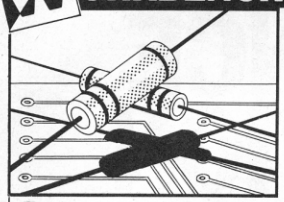
Graphics occupy about the top quarter of the screen, with a fairly detailed text beneath, showing you to be in the crew area. Spying a locker I opened it to see that it contained, among other things, some utility suits. GET UTILITY SUIT seemed obvious, but "Bad Obj" came the response and the program crashed.

Annoying, but not a major disaster if you keep away from utility suits and provided it doesn't happen again. It does.

There are two arcade games incorporated in the adventure, and apart from their poor quality they both cause the program to crash. You have five lives in each, and when those lives are exhausted . . . Crash!

You can have a practice session on either game by typing ACTION, or go straight into the first game. There's no warning that you need a joystick, let alone which port to plug it in, and still it crashes when you've lost your lives. It also crashed when I succeeded at the first part of the game, then attempted to dock the Endeavor with the Rama (for which there are also no instructions).

Trillium, however, seems to have recognised that there are problems with the program, and says it will be supplying a corrected version. I'll keep you posted.



PROJECT 3

Our Workbench series turns the spotlight on the Commodore 64 as Richard Keeble explains how to install a reset switch and make a parallel printer interface.

If you have ever spent hours writing a program only to have it disappear into never never land when you run it you probably wish the Commodore 64 had a reset switch so you could regain control of your runaway program.

In fact, installation of a reset is extremely simple, and a small piece of suitable software should banish disappearing programs.

The switch is placed on the user port. Since we are going to add a connector onto this connector, it's certainly worth using some of the other pins available to perform another useful task at the same time, *ie* providing the computer with a parallel printer interface. Many programs, such as *Easyscript*, offer the facility to use a standard Centronics printer from within the program rather than a standard Commodore one. It is possible to make your own lead for far less than the £30 you'd pay in a shop.

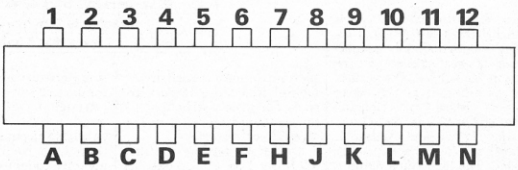
Start with the printer cable. The Commodore 64 doesn't have a true Centronics interface, but the user port can provide all the necessary signals to drive a printer.

Although the standard Centronics plug has 36 pins, only 11 are needed to get a working interface.

Pin 1 is the Strobe line: data is read from the port when this line falls from 5V to 0V. Pins 2 to 9 are the pins which carry the eight data bits to be sent to the printer. Pin 2 is the least significant bit, pin 9 is the most significant.

Pin 10, the Acknowledgement line, resembles the Strobe line in that it carries a pulse of electricity from the printer when data has been received. No further communication is possible without this pulse passing to the computer. Ground is present on pin 16 of the connector.

The reset switch connects to the reset and ground lines of the user port. When the switch is pressed, it forces the reset line to 0 volts and this resets the machine and all memory pointers. The program, however, is still held in memory, so all you have to do is set the pointers to their original values and your program will be retrieved. A small machine code program does this.



Commodore edge connector, seen from the rear of the computer.

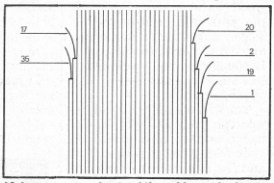
Construction

Building the interface couldn't be simpler. The Centronics socket simply needs the wire positioned inside it and then squashed together in a vice. The cable is a couple of wires shorter than the plug, so make sure you position the cable correctly in the plug. Examine the illustrations carefully – the empty pins should be 18 and 36 and the red stripe should be pin 1.

Now for the fun part. Solder the other end of the cable to the pins of the edge connector. Follow the wiring and the edge connector diagrams, making sure you know which pin is which. Before soldering the wires to this connector make sure that you are using the right ones. The cable is numbered very strangely, alternating between the top and bottom pins of the connector (see the diagram).

Before the wires are soldered to the connector it is a good idea to tin the pins of the socket you are going to be soldering onto and the ends of the wires. Don't leave too much bare wire when you strip the cable; half a centimetre should be plenty – any more and you run the danger of the wires shorting out to other pins of the connector. Figure 1 shows which pins should be connected together. Your Centronics printer interface is now finished.

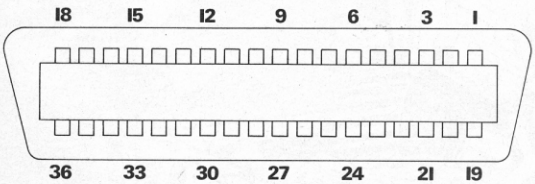
Installing the reset switch is simplicity itself as you simply solder a couple of short strands of wire to the connectors on a push-to-make switch, and solder the other ends of the two cables to the edge connector – one wire to pin 1 and the other to pin 3. Which way round the two wires are isn't important.



Make sure you understand the cable numbering.

When installing the interface into the box mount the edge connector on the outside edge of the case or it won't plug into the 64 properly. A little very strong glue helps fix it firmly.

So there you have it; a combined reset switch and printer interface for your Commodore 64. All you need is a little understanding of the user port and a little software. *Continued next week.*



Centronics pin numbers, shown looking at printer.

Parts	Cost	Maplin No.
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1 2*12 way PC edgecon	£2.20	BK74R
1 Centronics type con R	£6.25	FJ62S
1 ABS box 2002	£1.35	WY03D
4 Flat IDC cable 34-way	£2.32	XR76H
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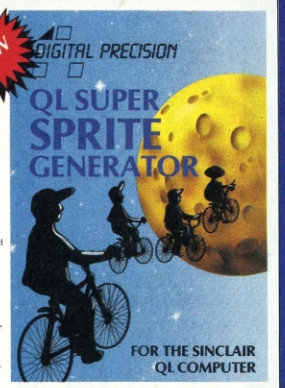

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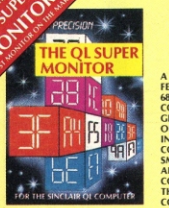

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PRINTS OF THE REALM

Finding the right printer for your computer can be as difficult as winding your way through a maze. But, there's hope on the horizon — simply consult Kenn Garroch's guide to what's what and for how much.

Printers range from cheap thermal narrow-paper machines to large expensive daisy wheels. The in-between ground is held by the dot matrix, Epson lookalike printers. There are also colour printers which range from the cheapest pen plotters to the ribbon and ink jet machines that produce high quality prints.

The bottom end of the printer market is generally held by the thermal printers, and the pen plotters. Thermal printers need either special paper, available from many stationers, or carbon transfer ribbons such as those in the Brother range (EP22/44/HR5).

The pen plotters use one of four coloured pens which move horizontally across the paper. The paper moves vertically allowing characters and graphics to be drawn on the paper. They tend to be slow and are generally limited to narrow (4.5in) paper.

Dot matrix is the most common type of printer these days. A vertical line of needles presses an inked or carbon ribbon onto the paper. At the bottom of the range the capabilities are limited but usually include bit image graphics and a choice of character sets.

At the top end, features such as proportional spacing, near letter quality (NLQ), buffers, and downloadable character sets are available. But you pay for the extra facilities.

For the more serious users, the daisy wheel type of printer may be necessary. These use a spoked wheel with a letter on each spoke. The letters are stamped against a ribbon just like a typewriter. The main problems are inflexibility, as you are limited to the characters available on the wheel. They also tend to be slow, roughly 10-20cps, and very noisy, which irritates some people.

Interfaces

A snag you may run across is the type of interface that connects the printer to your computer. The most common is the Centronics parallel connection.

The other main type is the serial or RS232 interface. This is usually available either as an alternative to Centronics, or as a separate adaptor for more cash (denoted by the £ sign in the list below).

When buying a printer, you will probably be spoilt for choice. The first thing is to decide what you need a printer for — letter quality, listings, graphics, colour, etc. Next, decide what you can pay, and see which printers are in your price range.

Once you have a selection, think of what you may need the printer for in the future. This should narrow the choice down to one or two. At this point, you should scour the advertisements in the computer press for the company that offers the best deal for the printer you want. Now you have a printer that should last for years without any problems. In case of hitches, make sure the dealer you buy the printer from has some kind of backup and guarantee policy.

Thermal printers

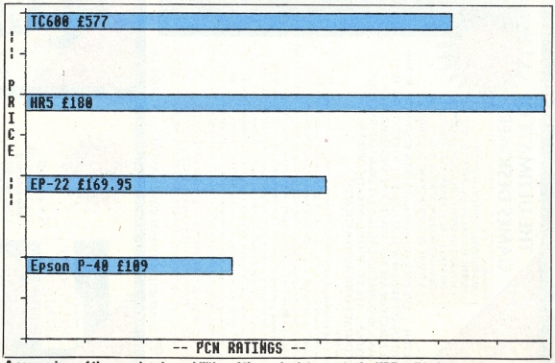
Name	TC600
Price	£577.25
Speed	16cps
Interfaces	RS232
Print method	Carbon ribbon/thermal
Paper size	8.5in
Comments	Plots graphs, built-in keyboard and RAM, disk drive available
Supplier	Jones Brother 061-330 6531

Name	HR5
Price	£180.85
Speed	16cps
Interfaces	Centronics/RS232(£)
Print method	Carbon ribbon/thermal
Paper size	8.5in
Comments	Battery powered 4xU2s, similar to EP-44 without keyboard
Supplier	Jones Brother 061-330 6531

Name	EP22
Price	£169.95
Speed	16cps
Interfaces	RS232
Print method	Carbon ribbon/thermal
Paper size	8.5in
Comments	Battery powered 4xU2
Supplier	Jones Brother 061-330 6531

The Brother HR5.

Name	Epson P-40
Price	£109
Speed	10cps
Interfaces	Optional Centronics or RS232
Print method	Thermal
Paper size	4.5in
Comments	Cheap but paper is narrow
Supplier	Peripheral Hardware 021-745 3033



A comparison of the speed and capabilities of thermal printers puts the HR5 well in front.

Dot matrix printers

Name Smith-Corona D200
Price £483
Speed 160cps
Interfaces RS232 and Centronics
Print method Dot matrix
Paper size 8.5in
Comments Includes NLQ, 2K internal buffer, IBM compatibility
Supplier Smith-Corona dealers

The Smith-Corona D200.

Name Riteman Plus
Price £260
Speed 120cps
Interfaces Centronics/RS232(£)
Print method Dot matrix
Paper size 8.5in
Comments Tractor feed mech available
Supplier KODE 0249-813 771

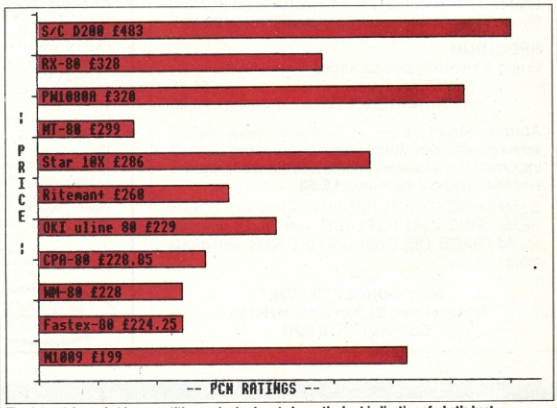
Name Walters WM-80
Price £228.28
Speed 80cps
Interfaces Centronics/RS232(£)
Print method Dot matrix
Paper size 8.5in
Comments Bog standard Epson lookalike
Supplier Walters Microsystems Int 0494-32751

Name Shinwa CPA-80
Price £228.85(Centronics) £251.85 (RS232)
Speed 100cps
Interfaces Centronics/RS232(£)
Print method Dot matrix
Paper size 8.5in
Comments Pretty well Epson compatible
Supplier Micro-Peripherals 0256-473232

Name Canon PW1080A
Price £320
Speed 160cps draft/75cps NLQ
Interfaces Centronics/RS232(£)
Print method Dot matrix
Paper size 8.5in
Comments Includes NLQ option
Supplier CJE Micros 0903-213900/Maplin 0702-552911

Name Brother M1009
Price £199
Speed 60cps
Interfaces Centronics/RS232(£)
Print method Dot matrix
Paper size 8.5in
Comments A compact printer, almost completely Epson control code compatible
Supplier Jones Brother 061-330 6531

The Brother M1009.



The dot matrix market is competitive, and price is not always the best indication of what's best.

Name Smith-Corona Fastex 80
Price £224.25
Speed 80cps
Interfaces Centronics RS232(£)
Print method Dot matrix
Paper size 8.5in
Comments Tractor feed available
Supplier Smith-Corona dealers

Name OKI Microline 80
Price £229
Speed 80cps
Interfaces Centronics RS232(£)
Print method Dot matrix
Paper size 9.5in
Supplier X-DATA 0753-72331

Name Epson RX80 F/T
Price £328
Speed 100cps
Interfaces Centronics/RS232(£)
Print method Dot matrix
Paper size 8.5in
Comments Taken as a standard
Supplier Epson dealers

Name Mannesman Tally 80
Price £299
Speed 80cps
Interfaces Centronics
Print method Dot matrix
Paper size 8.5in
Supplier Mannesman Tally 0734-791619

The Canon PW180A.

Name Star Gemini 10X
Price £286
Speed 120cps
Interfaces Centronics/RS232(£)
Print method Dot matrix
Paper size 8.5in
Supplier Keyaki 0932-242777

The Epson RX80 F/T.

29 ▶

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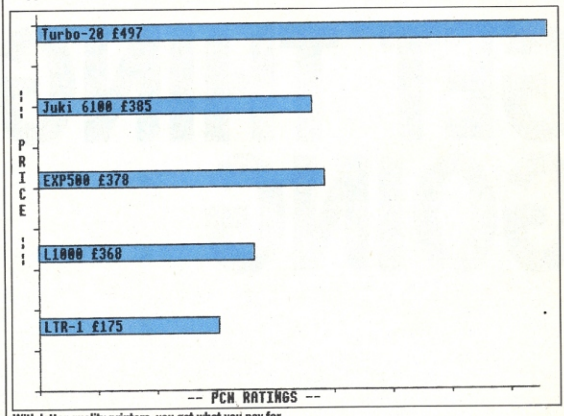
Name IBICO LTR-1
Price £175
Speed 12cps
Interfaces Centronics
Print method Letters on cylindrical roller — a bit like a rubber golf ball
Paper size 8.5in
Comments Interfaces available for Commodore 64, and Spectrum at £29.95, and £39.95 respectively
Supplier IBICO 01-568 2379

Name Silver Reed EXP500
Price £378
Speed 18cps
Interfaces Centronics/RS232(£)
Print method Daisy wheel
Paper size 10in
Supplier C/WP Computers 01-828 9000

Name Juki 6100
Price £385.25
Speed 17cps
Interfaces Centronics/RS232(£)
Print method Daisy wheel
Paper size 13in
Comments Takes Triumph Adler wheels
Supplier Most printer dealers

Name Smith Corona L1000
Price £368
Speed 12cps
Interfaces Centronics/RS232(£)
Print method Daisy wheel
Paper size 13in
Comments Replacement for the TP1
Supplier Smith-Corona dealers

Name Turbo-20
Price £497
Speed 18cps
Interfaces Centronics/RS232(£)
Print method Daisy wheel
Paper size 15in
Supplier Office Efficiency Machines 01-741 7383



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Colour printers

Name Seikosha GP700-A
Price £488
Speed 50cps
Interfaces Centronics
Print method 7-colour ribbon dot matrix
Paper size 8.5in
Supplier DRG Business Machines 0934-419914

Name Integrex Colour Jet
Price £654.35
Speed 40cps
Interfaces Centronics/RS232(£)
Print method Dot matrix ink jet
Paper size 8.5in
Comments No tractor feed available; interface for viewdata system
Supplier Integrex 0283-215 432

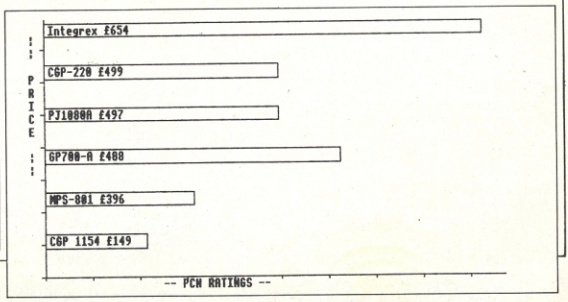
Name CGP 1154
Price £149
Speed 12cps
Interfaces Centronics
Print method Pen plotter
Paper size 4.5in
Comments One of many 4-colour pen plotters, all the same design and roughly the same price
Supplier Tandy shops

Name Tandy CGP-220
Price £499
Speed 37cps
Interfaces Centronics
Print method 7-colour ink jet
Paper size 8.5in
Supplier Tandy dealers

The GP700-A is good value, but the Integrex offers more features. Above, the Commodore MPS-801.

Name Canon PJ1080A
Price £497
Speed 37cps
Interfaces Centronics
Print method 7-colour ink jet
Paper size 8.5in
Supplier Canon dealers, Keyaki 0932-242777

Name Commodore MPS-801
Price £395.95
Speed 38cps
Interfaces CBMIEEE
Print method Dot matrix coloured ribbon
Paper size 8.5in
Supplier Commodore 0536-205252



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MICE MOVEMENT

A whole new window in computing has been opened with the arrival of the mouse. David Janda assesses the SMC version for the Commodore 64.

Mouse technology is gradually moving into the sphere of home computing and with the arrival of Magic Mouse, from SMC Supplies, Commodore 64 owners can now discover what all the fuss is about. The complete package includes a three-button mouse with four software packages: sprite design, icon design, drawing and mouse controller.

A mouse works in a similar fashion to a joystick or tracker ball, except that as the mouse is moved around the desk, the pointer moves around the screen. Programs which use a mouse usually follow the Macintosh system and have areas on the screen containing icons — little pictures that illustrate operations such as loading from disk. The pointer is moved to an icon, the button on the mouse is pressed and the required action is performed.

First impressions

In comparison to other mice on the market, the SMC version is extremely large – more like a rat than a mouse. Software can give different functions to each of the three buttons on the front. This means that a large number of functions can be controlled without ever having to touch the computer keyboard. The cable for connecting the mouse to the 64 is of a decent length and plugs into port two on the side of the machine.

Examining the underside of the mouse reveals that movement is detected with a large ball-bearing. When the mouse is moved, the ball moves a couple of rollers inside the mouse and the necessary data is sent to the computer. On the test mouse, the ball moved a little too loosely and rattled quite a lot. Another couple of rollers would hold it tightly without affecting movement.

In use

After loading the software, a menu with the names of the four programs is displayed. An icon in the shape of a hand is used as the pointer and the mouse moves it around the screen. Before you start, however, two screws have to be adjusted to allow the pointer to move over all the screen. Fortunately this should only need to be done once.

For some reason the pointer lags behind the mouse, catching up once you stop moving. This makes it extremely difficult to position the pointer with any degree of accuracy.

Moving it into the box containing the program you require, and pressing the left button, loads the program.

The most impressive program in the suite is the high-resolution graphics designer. This is a drawing package that allows you to create pictures in 16 colours by using the 64's multi-colour mode giving a resolution of 160 × 200.

Fifteen different drawing functions are provided. Features include fill, draw, line, frame, circle and so on. Your picture can then be dumped to a Commodore printer, or a Centronics printer, as long as you have the necessary cable.

Unfortunately there is no zoom facility built into the program. A fine-scroll command turns a section of the 64 keyboard into a sort of cursor controller. This will move the cursor one pixel for each keypress but a zoom facility would save on eye strain.

All the available commands are selected by moving the mouse. The only time that you need to type is when you enter a file name for either loading or saving a program. All available commands have icons to represent them. This makes the program extremely easy to use, as you can see the commands without having to look them up in a manual.

There is a second, and quite major gripe about this program. When you are drawing a line or plotting a point the actual point drawn is slightly above the pointer, which makes it very difficult to position a dot accurately.

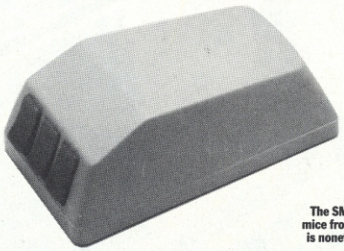
The sprite designer is used to create sprites in normal or multi-colour mode Features include sprite selection, colour change, sprite expansion and so on.

Again the mouse is used to control all operations. Simply move the pointer to the dot on the sprite grid that you wish to set or clear and press the button. Pointing the mouse to the right of the screen reveals a menu from which you can select commands. Unfortunately, this menu's layout is like a large calculator with a number or letter on each key. Each command is entered by selecting the appropriate key with the mouse, but you have to remember which letter stands for which command. Surely the idea behind icons is to have a picture that shows what the key command does, as in the drawing program?

The icon designer is very similar to the sprite designer except the area of the grid is much smaller.

The mouse controller allows you to use the mouse and its icons, together with their own program. SYS calls, PEEKS and POKES are used to access all relevant information, and are covered in the documentation. A few more examples would have made it easier to understand, however.

Use of the mouse should open up a whole new area of software design for the 64. It should now be easy to develop programs that use the mouse for entry of all commands rather than the keyboard. This can only make programs more friendly.



The SMC mouse is larger than the mice from other manufacturers but is nonetheless comfortable to use.

Verdict

The Magic Mouse is okay except that the movement of the pointer is a little sluggish. The size and shape I found to be very comfortable in use.

The software can only be described as adequate. It does the job, but could really do with a little more thought on its design. In fact, there are many superior packages which use a joystick or touchpad for control. In other words, buy it for the mouse, not the software.

REPORT CARD: 1 TO 5

Features	●●●●
Documentation	●●●
Performance	●●●
Overall value	●●●

Name Magic Mouse **Application** Mouse and graphics software **System** Commodore 64, others to follow **Price** £59.95 **Availability** Retail

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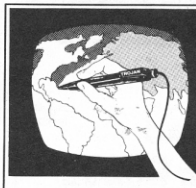

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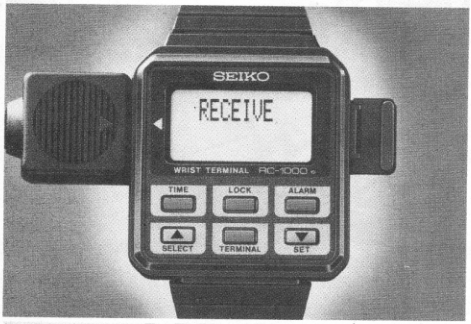

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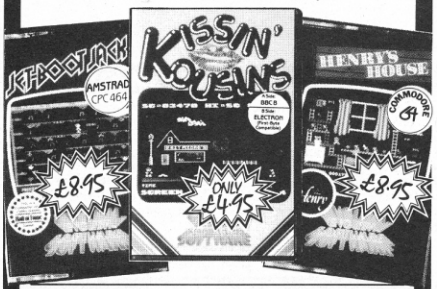

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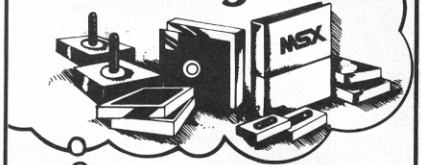

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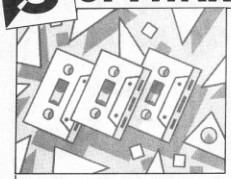
SOFTWARE PRE-VIEW



We check out the latest contenders on the software market. Don't forget, if you want your company's package to be included on this page, send your latest releases to Bryan Skinner, *PCN*, 62 Oxford Street, London W1A 2HG, along with prices and 'phone numbers.

AMSTRAD

Kuma's *Artwork* is a clever graphics package. It doesn't offer much in the way of fancy features, but its merit lies in its ease of use. The ESCape key is used to summon menus, and to return to where you left off.

Watch out for *Knight Lore*. If Ultimate can mimic the standard of graphics on the Spectrum version then you're in for a real treat. Latest whisper is that the release will come in the next fortnight.

English Software's *Jet-Boot Jack* performed well on the Atari, and the Amstrad version is another product that shows quite clearly what can be done with Amstrad graphics.

The Tomb of Kuslak	**£7.50**	**Intrigue Software 05806-4726**
Artwork	**£9.95**	**Kuma 07357-4335**
Jet-Boot Jack	**£8.95**	**Engish Software 061-835 1358**
Knight Lore	**£9.95**	**Ultimate 0530-411485**
Killer Gorilla Gauntlet	**£9.95**	**Micro Power 0532-45880**

BBC

Knight Lore for the Beeb should be around in a couple of weeks, so get your order in now. *Wizadore* is a platforms game with a medieval and magical theme, not up to the old standard of Imagine's games, but good for the Beeb. It's a bit like *Castle Quest*, but has adventure elements.

Knight Lore	**£9.95**	**Ultimate 0530-411485**
Wizardore	**£7.95**	**Imagine 061-980 3488**

COMMODORE 64

Gremlins is an illustrated adventure — I wasn't terribly impressed. The graphics are fair, with some animation. The plot is fairly simple — rub out the gremlins. I didn't like the phrase analyser which wouldn't accept 'Down' instead of 'Go Down', and 'And' was rejected, which betrays its standard.

Through deals with Cosmi, both Audiogenic and US Gold are selling *Super Huey*. It's a helicopter simulation and it's very good.

Grog's Revenge	**£9.95**	**US Gold 021-359 3020**
Gremlins	**£9.95**	**Adventure International 021-359 0801**
Super Huey	**£8.95**	**Audiogenic 0734-664646**

SPECTRUM

Starion is Melbourne House's response to *Elite*. It's a fast shoot-em-up, but lacks the game detail of *Elite*.

Spy Hunter is a classy car-chase game. It's the 'official' version of the Sega arcade machine.

Chuckie Egg 2 continues the exploits of Hen House Harry. With 120 screens, elements of arcade and adventure and £1,800 in prizes, A'n'F could have a minor winner.

Starion	**£7.95**	**Melbourne House 01-940 6064**
Battle for Midway	**£9.95**	**PSS 0203-667556**
Spy Hunter	**£9.95**	**US Gold 021-359 3020**
Grand National	**£6.95**	**Elite Systems 021-236 75329**
Chuckie Egg 2	**£6.90**	**A'n'F 0706-341111**

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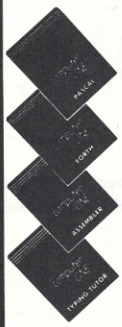

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PERSONAL Computer NEWS

BEST BUY

Any improvement on Britain's No.1 word processing ROM...

WORDWISE was the very first ROM based product to be made available for the BBC computer and over the last couple of years it has become the most popular word processing system for the BBC machine with almost 50,000 chips now sold.

It has consistently received excellent reviews for its ease of use and speed. It takes only minutes for the user to become familiar with a powerful professional word processing system.

WORDWISE PLUS is now available extending the original program in many unique directions. Not only is the program now twice the size but the package includes two completely new manuals—an introductory manual that gently introduces the newcomer to word processing with WORDWISE, and a reference manual listing all the commands.

THE WORDWISE PLUS PACKAGE CONTAINS

1. 16K ROM
2. SPIRAL BOUND REFERENCE MANUAL (180 pages)
3. INTRODUCTORY MANUAL (56 pages)
4. KEYSTRIP
5. TYPING TUTOR PROGRAM (On cassette)
6. EXAMPLE TEXT (On cassette)
7. EXAMPLE PROGRAMS enabling mail merging, index generation, etc.

WORDWISE PLUS is completely compatible with all older versions and is able to use existing WORDWISE files without modification.

WORDWISE PLUS FEATURES

Over the last couple of years we have received countless suggestions for ways of extending or adding new facilities to WORDWISE. It soon became obvious that we would not be able to implement every single suggestion. Indeed, each person uses a word processor in a different way—each individual has differing requirements—a feature that one person may think essential another may have no need for.

We have overcome this problem in two ways. Firstly we have included the most commonly requested additions and improvements. A number of new editing features and a few more embedded commands have been added.

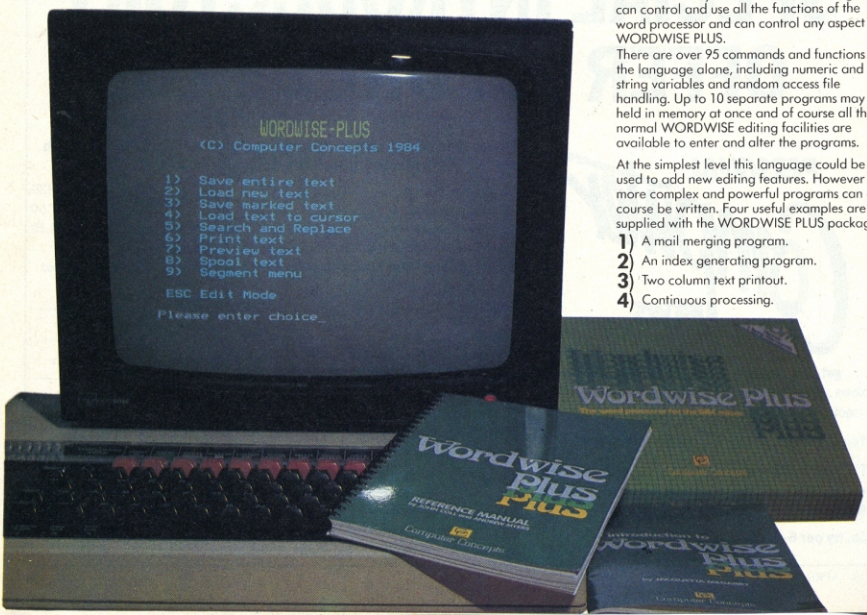
Secondly a unique BASIC-like programming language has been incorporated. This facility enables the capabilities of this word processor to be extended in an infinite number of ways.

The language itself has been designed, like WORDWISE, to be simple to use and understand. Many of the commands look and act like BASIC commands and so will be familiar to many users. However the language can control and use all the functions of the word processor and can control any aspect of WORDWISE PLUS.

There are over 95 commands and functions in the language alone, including numeric and string variables and random access file handling. Up to 10 separate programs may be held in memory at once and of course all the normal WORDWISE editing facilities are available to enter and alter the programs.

At the simplest level this language could be used to add new editing features. However more complex and powerful programs can of course be written. Four useful examples are supplied with the WORDWISE PLUS package.

1) A mail merging program.
2) An index generating program.
3) Two column text printout.
4) Continuous processing.



...Must Be A Plus

Word Processing With Wordwise

All the advantages of a ROM—instantly available. One command and your BBC machine becomes a powerful word processing system.

Fast and very simple to use.

The more complex commands are menu driven, enabling those totally unfamiliar with this software to use these more powerful features straightaway.

The function keys are used to full effect with a keystrip clearly showing each function.

Block copies and moves. It is possible to mark any part of your text, this marked section may be instantly moved or copied to any other part of your text. This cut and paste type of operation is a vital part of all word processing operations and with WORDWISE it is simplicity itself.

Automatic headings, footings and page numbering. When printing a document many pages long it is possible to have WORDWISE number the pages for you and put any heading or footing line on each page.

Unique word counting feature. Ideal for journalists, it constantly displays the current number of words typed. It also allows word counting for specific sections of a document.

Works with all filing systems, such as DISC., CASSETTE., and the new ADFS. Works with any printer that works with the BBC machine (most do) and is able to access the special features of any printer (italic, subscripts, etc.). There is no need to buy additional printer driver programs.

Here are a few of the things that have been said about WORDWISE.

"WORDWISE offers an extremely user friendly program . . . it would make an excellent choice for someone rather apprehensive about word processing."
. . . E & CM

"WORDWISE has won a devoted fan club because of its flexibility and ease of use."
. . . Practical Computing

"On the whole WORDWISE is an excellent wordprocessor . . .WORDWISE is thoroughly recommended."
. . . VIEWFAX 258

"WORDWISE is straightforward, friendly and excellent value."
. . . Practical Computing

". . . it is ideal for the home hobbiest and small businessman."
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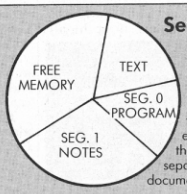
Word Processing with Wordwise Plus

WORDWISE PLUS still has WORDWISE as its core therefore it is still very user friendly and retains all the features that made WORDWISE the most popular word processor. It now has many new additions making this the most flexible word processor yet.

WORDWISE will continue to be sold alongside WORDWISE PLUS. For those more specialised users who require the added flexibility here are a few of the new features.

Segments



When using WORDWISE PLUS, the BBC's memory is divided between your text and up to 10 'segments'. Each segment may contain either a program or just normal text. It is therefore possible to store and edit up to 11 separate documents in memory, or 1 document and 10 programs, or any mixture.

Often when writing letter or articles it is useful to keep a notepad, outlining what you intend to write. In WORDWISE PLUS one of the segments could be reserved for an electronic notepad. It would be a simple matter to switch your 'notepad' and your main document with just a single key press.

Some of the New Editing, Embedded Commands and Wordwise Extensions

WORDWISE PLUS works with the 6502 2nd processor. This allows more text to be stored in memory and 80 column previewing no matter how full memory is.

New embedded command FI will fully indent text against the right margin.

New commands for underlining and bold printing. The bold and underline effects are shown on screen—and it is a simple matter to configure these features for any printer.

Saving and loading of text is now up to 10 times faster on disc, and now the computer gives the user a warning if a document is going to be overwritten on the disc or in memory.

There is now a working filename—i.e. WORDWISE remembers the name of the current document being worked on.

New command deletes markers automatically.

It is now possible to print or preview a file directly from disc without having to load it first.

New embedded command 'PS' allows strings to be inserted into the text when it is printed.

New embedded command 'PF' will read a document from file when printing and interpret any embedded command in that file.

Improved search and replace facilities now include wild-cards.

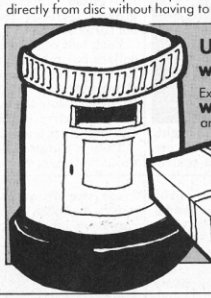
Example Programs Supplied With Wordwise Plus

1) A mail merging program that allows names and addresses to be added to a standard letter. This is a relatively easy job with this language.

2) An index generating program. This finds keywords and generates a separate index listing the word and the page numbers where the keywords occurred.

3) Two column printout. This program will print your text in two columns across the page.

4) Continuous processing. This enables the disc user to process and edit extremely large documents spread over several files as if it were one continuous document in memory.



Upgrades

WORDWISE PLUS for only **£21+VAT**

Existing users of WORDWISE can upgrade to **WORDWISE PLUS** for **£21+VAT (£24.15)**. We are only able to offer this service through ourselves at the address below. Please return the old WORDWISE package complete with chip (suitably protected for postage) and the manual with your cheque or P.O. or quote your Access or Barclaycard number. We will then send you the complete new package.

In The Near Future

HI-WORDWISE for 2nd processors that allows even more user memory, supplied on disc for less than £5 to WORDWISE PLUS owner.

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GAMEPLAY

C64/SPECTRUM

SOFTAID 10

STAR GAME

Moved by the tragedy in Ethiopia, Bob Geldof set up the now famous Band-Aid Appeal Fund. He set about obtaining the voluntary services of a host of famous names in the pop world, culminating in the release of *Do They Know It's Christmas?* The record was one of the biggest sellers ever and raised staggering sums.

The *Softaid* compendium costs £4.99 and contains not only ten eminently playable games but the original Band-Aid hit record too. At just under fifty pence a game and with the record thrown in free, *Softaid* is excellent value. But, more important, all proceeds go to the Bob Geldof Ethiopian Appeal Fund.

Kicking off the Commodore 64 compendium is *Gumshoe* (A & F). This platform game has Gumshoe searching a tower block for the kidnapped daughter of a millionaire. If a space shoot-'em-up is more your style, try *Beam Rider* (Activision), where your craft can only fire along the lines of a grid.

Still in space, interplanetary trading for up to eight players — with a dash of arcade action thrown in — is the theme of *Star Trader* (Bug-Byte).

Another space battle, *Gyropod* (Taskset) sports some superb graphics while *China Miner* (Interceptor) is a highly

challenging platforms and ladders game that should have you playing into the small hours.

Up in the air, but closer to home, *Kokotoni Wilf* (Elite) has you flying through dinosaur country in search of the legendary Dragon Amulet. If trundling a gold-laden wheelbarrow through caves while pursued by outlaws is your cup of tea, *Gilligan's Gold* (Ocean) should appeal.

Fred (Quicksilva) is a delightfully drawn explorer who tramps the catacombs while avoiding comical animated spooks. In *Falcon Patrol* (Virgin), you must prevent jets destroying your installations by taking to the skies in your own superbly animated fighter plane.

The last game brings no relaxing wind-down: *Flak* (US Gold) is an all-action game in which you fly a plane over various fortified strongholds in an attempt to reach and destroy the enemy's computer control centre.

The Spectrum compendium also contains *Kokotoni Wilf* and *Gilligan's Gold*.

In a sort of witch's *Q-Bert*, *Spellbound* (Beyond) has your toad hopping around a pile of cubes, dodging demons and the witch's blast. You can swap a witch's broom for a space-going super-bike and shoot anything that moves in *Starbike* (The Edge). *The Pyramid* (Fantasy) has you encased in a space bubble and blasting through 120 chambers on 15 levels.

On the piste again? *Horace Goes Ski-ing* (Melbourne House) takes you across motorways and down ski slopes.

Ant Attack (Quicksilva), famous for its instantaneous four camera angles, has you rescuing your partner from a giant-ant infested walled city. Great stuff.

What must be the best of the battle-zone type games is here with *3D Tank Duel* (Real-Time), a superbly animated tank battle. This game alone makes the compendium worth buying.

To complete the half-score, comes *Jack and the Beanstalk* (Thor) with colourful and imaginative graphics and *Sorcery* (Virgin), a multi-screen arcade adventure.

Excellent value and all in a most worthy cause. Buy one.

Bob Chappell

Price £4.99
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COMMODORE 64

BUCK ROGERS

This seemed a pretty good game when it first appeared in the arcades and then on a ROM cartridge, all those years ago. Today, Buck's grey hairs are showing.

The action is set in the 25th century, so why does the game play like it came out of the Ark? Buck's ship is pretty antiquated, being a minimally detailed, chunky piece of flightware. It may go left and right, up and down (a little), fire, and cast a shadow but it hardly looks or behaves like the latest thing in space technology.

Planet Zoom is not much better, being mostly a set of vertically scrolling, vividly hued, striped bands. Why anyone would want to fight over it beats me. On its surface pairs of posts appear at frequent inter-

vals — you fly between them as they jerk towards you.

Once you've done that, some graphically uninspiring alien craft arrive. Now you must not only fly through the posts but pot the aliens. As exciting as a plate of cold porridge.

Bob Chappell

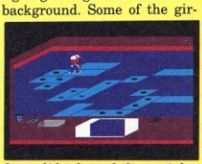
Rating 5/10
Price £9.95
Publisher US Gold 021-520 7591

COMMODORE 64

ROCK'N'BOLT

This game of logic has a thin veneer of arcade action. It's a shapes puzzle, so if you enjoy a cerebral workout and quick thinking you may enjoy it.

You control a hard-hatted, denim-overalled construction worker. The screen shows you arriving by lift next to the blueprint (if any) for that level. The main display is surrounded by the brown frame of the building, within which are light green girders on a blue background. Some of the gir-



ders slide from left to right, others up and down. Some are single squares with a central dot; longer ones may have a dot at each end. This dot is where you must stand to press fire, which spins you round as you fix the girder in place. If the girder's correctly placed, the dot turns black.

Each bolt secured earns you dollars, but unbolting costs you. Earnings and deductions are shown at the top of the screen, *ie* on the far side of the building — the perspective is from above and slightly to one side.

There's a practice level with unlimited men, no timer, and no money. Timed options two and three give you three lives, and timed option three pays better.

Rock 'n' Bolt is an unusual game and its driving background music adds tension to the action. But it won't appeal to everyone, especially not at the price.

Bryan Skinner

Rating 7/10
Price £10.99 **Publisher** Activision 0628-75171

SPECTRUM

SAM STOAT — SAFEBREAKER

Following in the footsteps of its *Monty Mole* series, Gremlin has introduced a new character — Sam Stoat.

Sam, who comes complete with swag bag, aims to enter one of four mansions, each with 20 rooms, and crack the closely guarded safe. Each mansion gets progressively tougher.

In order to blow open a safe, Sam has to find a bomb and a match. Once he has the bomb, and it's as big as he is, Sam has to drag it around with him wherever he goes.

The rooms are attractively and colourfully depicted. There's no scrolling — the screen clears at the edge of one room and refills the next.

An alternative method of leaving a room is by walking through a mousehole in the skirting board. This takes Sam to the edge of a water-filled pit which he must cross, if he's clever enough, by leaping from

one moving platform to another.

The game is similar in style to *Monty Is Innocent* but more interesting. The animation is not as strong or smooth as some games, but it is effective.

For a zany challenge with bright colourful graphics, Sam Stoat fits the bill nicely.

Bob Chappell

Rating 8/10
Price £6.95 **Publisher** Gremlin Graphics 0742-753423

An Epson in Commodore clothing

"Presents excellent value for money — a worthy purchase for any Commodore 64 or VIC 20" – PCN, January 12th, 1985

"This is one of the most versatile printer interfaces I have used ... a combination that will do almost anything you ask of it" – Commodore User, January 1985

"Undeniably an interface to look at" – Commodore Computing Int., May 1985

How many Commodore home computer owners, when faced with buying a printer, have longed to own an Epson but been put off by the problems involved? Firstly, it's not easy to connect the two together. Secondly, even when connected, it may be necessary to load driver software or the cartridge slot may be unusable. Finally Commodore-specific characteristics such as graphics and formatting commands will not be available.

Now Micro Control Systems have the solution. Just plug the Comprint circuit board inside the Epson, connect the cable supplied to the Serial I/O port on the Commodore computer and Hey Presto! The Comprint hoots the Commodore into thinking it is working with a Commodore printer. All the features are there — total emulation. And it even provides a 2K buffer as well.

What's more all the additional features that have made Epson so successful, such as condensed print and other type styles, are accessible directly by the Commodore computer. For the business user the ability to use 18 inch paper (in the MX/RX/FX-100 range) and print a £ sign (or other Epson special characters) will prove invaluable.

So go on — spoil yourself. If you are the owner of a Commodore personal computer treat yourself to an Epson — and a Comprint of course!

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GAMEPLAY

SPECTRUM

THE WRIGGLER

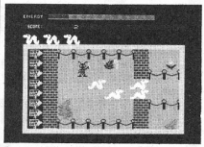
STAR GAME

The Wriggler is the first game from Romantic Robot — now there's a name to conjure with. Programmed by Devonshire House, it's one of the best games for any machine I've seen for a long time.

You control a maggot hoping to win the Annual Maggot Marathon. An unlikely scenario, but don't let that put you off. These programmers really know their code, and even better, they know the Spectrum inside out. The first hint is the loading screen — the picture loads from the bottom up.

You can't define the keys, but there's a fairly wide range of choices, and joysticks are supported. At kick-off there are four white wrigglers, so it's a bit hard to know which one you are. But, move up and down a bit and it becomes obvious. The wriggler's movement is a treat; like inchworms they contract and expand as they move along. Come up against a wall and you have to tack your way left and right as you wriggle up or down.

Initial strategy is follow-the-leader. You're in The Garden — basically a maze of brick walls, fences, hedges, etc. Patrolling the corridors are black ants,



lovingly portrayed with nodding heads and padding feet. Avoid these like the plague because they sap your energy. However, as they march back and forth on set paths, they don't pose too much of a problem.

The detail on the giant spiders is excellent. Their long white legs bend and stretch, but one touch is fatal.

There are more than a few types of garden pests: white ants and large-headed snakes (among others) appear in awkward places. Worse, some latch on to your trail and shaking them off is well nigh impossible.

Losing one of your three lives brings out yet another aspect of the program's excellence. Your wriggler loses flesh, leaving a skeleton which is mirrored in the display at the top of the screen. There's also a score there, but the system is a bit obscure and I haven't yet sussed it out.

Once out of the garden you find yourself in The Scrubland, where you can relax a little and restore your energy (shown at the top by a multicoloured bar meter) by passing over items and pressing what passes for 'fire' in this non-aggressive game.

You'll probably discover that some items don't replenish your strength — they're collected for future use.

Then it's out of The Scrubland into the The Underground, where you're surrounded by red earth in which white skulls are embedded. Fall down vertical shafts and you'll encounter stranger beasts.

Survive this and it's The Mansion, as yet beyond my powers. Apparently this is an intricate web of corridors around a bottomless shaft. You'll need to find the lift and the right keys to the doors, one of which leads to the surface of the planet.

The game is crazy; the graphics are a delight; and although the sound's limited, you won't notice because the game's so absorbing. The theme's original, unusual, and it's non-violent. But don't be fooled — *The Wriggler* is addictive.

Romantic Robot doesn't have the marketing clout of the big boys like Ultimate or Ocean, so you may not see *The Wriggler* in your local shop. But if you've any sense you'll order your copy now. **Bryan Skinner**

Price £5.95 **Publisher** Romantic Robot 01-625 9463

AMSTRAD

ANDROID ONE

Black Sabbath used to do a tune called Iron Man. Hum it to yourself while playing *Android One* — it's good for the concentration.

If you can't remember Iron Man, any other Black Sabbath song will do.

This is the old Spectrum game upgraded for the Amstrad. Your mission, should you choose to accept it, is to guide your android through 14 screens to a reactor which is on the point of exploding. Apart from the sands running through the hourglass there are brick walls to blast through, mazes to negotiate, and adversaries demanding your undivided attention.

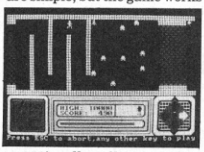
Let it be confessed without further ado — this reviewer got no further than the ninth screen. What happens in the remaining five and thereafter is a mystery.

At the foot of the screen you can watch the time ticking away, your score mounting up, and the number of android lives dwindling rapidly from five to none.

You can play with a joystick or from the keyboard. The joystick is better for scuppering your highly mobile foes, but the keyboard makes for more accurate positioning.

There are four kinds of nasties to deal with. Like the android, they are beautifully drawn — the programmer was apparently inspired by a seafood salad — and their movement is smooth and at times bewilderingly fast. They crop up in different combinations in the screens along the way; you lose a life by coming into contact with them, and you take them out with a weapon of limited range that spits death from the android's eyes.

The ingredients of the plot are simple, but the game works



exceptionally well. The android is drawn to look perpetually panic-stricken and makes a strange scuttling noise on the move, but the squelch of a dying sprite is satisfying and very addictive.

It's possible to clock up a good score just by demolishing the brickwork that separates the screens, but that slows you down.

Only the bravest will reach the reactor — but the most patient will get to the top of the high-score table

Android One is one of the best games of its type. There is the urgency of the stop-watch and the strategy needed to deal with the enemy; and it is all lovingly designed, with smooth movement and simple but appropriate sound effects. On top of that, it's fiendishly difficult in a way that is guaranteed to bring you back to it again and again. **David Guest**

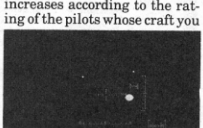
Rating 8/10
Price £7.95
Distributor Vortex Software 061-872 4747

COMMODORE 64

STARFIRE

The *Starfire* package actually contains two games; the other is *Fire One*, a submarine game. The two-game idea is a bit suspicious — perhaps the games aren't up to scratch? It's not always true, but the description of the game as 'arcade classics' and the credits to Exidy only reinforced my doubts.

Starfire's scenario is 'save the world' — in this game it's by blasting Exidy freighters carrying lethal weapons Earthwards. To add spice they're protected by enemy fighters. An unusual feature is that the enemy pilots have varying flying skills, and your score increases according to the rating of the pilots whose craft you



destroy.

The main display is star-scattered space, with your gun-sight central. Joystick control is arcade style, pull back to climb, but the perspective movement of the stars isn't that good. Below the main screen is your instrument panel. The limited display includes a radar panel, which tracks local fighters and freighters.

There's a laser meter which shows if your weaponry is in danger of overheating from indiscriminate firing. Also indicated are the current level of play, score, fuel and the bonus target.

Reach this and you get extra flying time and move up a level (there are ten).

The enemy are Star Wars veterans of different colours. They're fairly well done but the freighters are rather crude and dodging the random meteors is hardly taxing.

Your fighter is equipped with a computerised aiming system which gives enemy co-ordinates and helps line up your sights. It also beeps when you're targeted for a fill. Pressing fire produces four laser darts which proceed to converge on the cross-hair.

Starfire would have been great were it released a year or more ago, and given the price isn't too bad now. But there really isn't enough to make the game appeal beyond a couple of plays. CBS should have left *Starfire* in the US. **Barry Miles**

Rating 5/10
Price £8.95
Publisher CBS 01-734 8181

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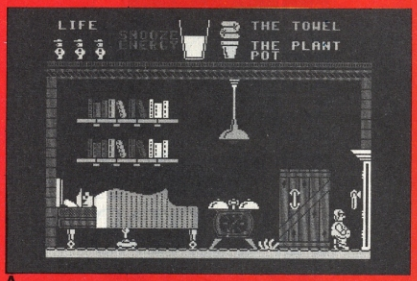
For the ten runners-up, we've got ten top software titles to give away.

All you have to do to enter is identify six well-known computer games from screen photographs. There are three printed here, and there'll be three more next week. To help you out we've listed eight titles — just spot the two red herrings, matching the correct pictures and captions, and you're off.

Complete the entry form in next week's issue and sent it to *PCN*. The first two entries out of the hat win the top prizes; the next ten get the runners-up software titles. Easy isn't it?

1 Monty Mole **2** Battle Cars **3** Tir Na Nog **4** Sorcery **5** Backpacker's Guide **6** Valhalla **7** Pyjamarama **8** Strangeloop



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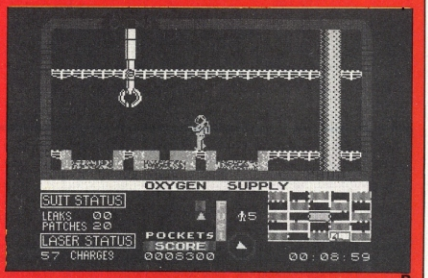

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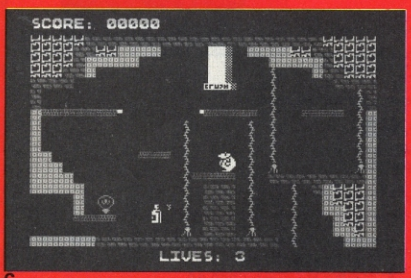

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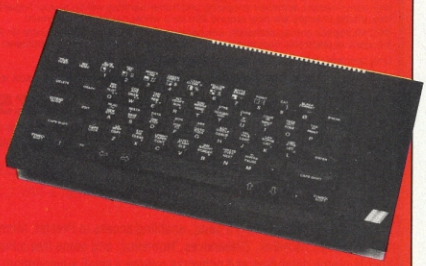
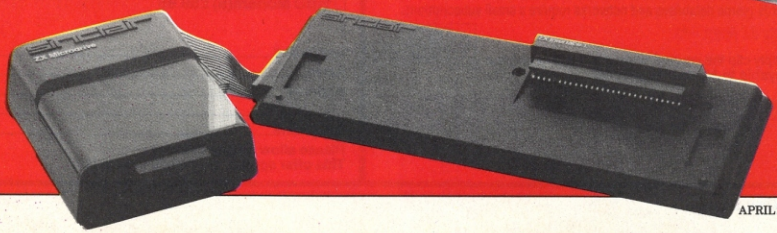
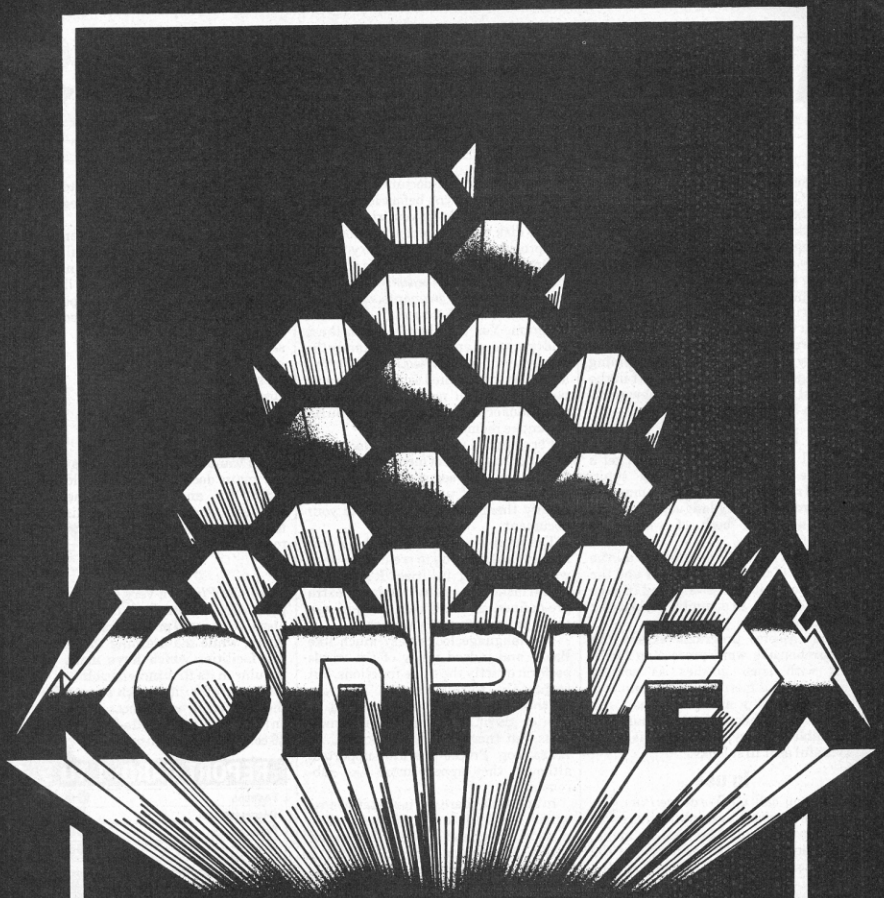






LEGEND

48K SPECTRUM

SOFTWARE PRO-TEST: BBC

AWAY WITH WORDS

Computer Concepts has gone one better than its word processing package Wordwise — it's revamped it and added a few extra facilities. Wordwise Plus packs a powerful punch, says Simon Williams.

Wordwise, the word processor from Computer Concepts, has come to be regarded as 'one of the best' by BBC users. There were always one or two niggles however, like the ease with which you could overwrite a text file by loading instead of saving.

Computer Concepts has taken heed of these criticisms and produced *Wordwise Plus*. At the same time it decided to add a few more facilities, including segmented memory and a macro programming language. The result wouldn't fit in the original, 8K EPROM, so the new package is a full 16K.

First impressions

As well as the EPROM chip, you get a cassette containing a typing tutor, several routines already programmed in the word processing language, and two hefty manuals, both of which are excellent.

The first is a tutorial guide to all the functions of the word processor and the language, while the second is a 176 page reference tome, in a similar style to the BBC user guide.

The cassette programs extend the comprehensive word processing facilities with such goodies as sorting routines, mail merge, dual column text and an indexing utility. You can also process documents larger than the available memory, although this is not as useful as it first looks.

In use

When you call up *Wordwise Plus*, you could be forgiven for thinking there was nothing different. The sign-on menu, and indeed the entire operation of the program looks very similar to the original. This is a conscious effort on Computer Concept's part, so users of *Wordwise* would still feel at home.

There are a number of new embedded commands, and alterations to others, which add to its versatility. The more interesting ones are:

CTRL R removes both markers from text
US/UE starts and stops underlining
DS/DE starts and stops double-strike
FI fully indents text (address blocks etc)
ES sends escape sequence to printer

In addition, * commands can be included in programs, and these will be sent to the operating system.

To save or load a document, select options 1, 2 or 3 from the main menu, as before. The safety check looks to see if you already have a document in memory, and reminds you before loading the new one. Similarly, if you try to save a file to disk using an existing filename, the program will point it out to you.

One new option on the main menu is 'Segment menu'. *Wordwise Plus* contains ten notional segments, or buffers, which can either hold sections of text or program. You can flick between these and operate on any of them in exactly the same way as the main section of text. The segments are handled completely transparently, so you needn't worry about partitions or memory usage until you fill the entire memory.

For example, you can have a document in the main section of memory and notes for it in one of the segments. You can call up the notes at any time, refer to or modify them and then return to your document.

The mini-language offered by *Wordwise Plus* allows you to create your own word processing utilities. It's a more useful facility than any number of extra pre-defined utilities because you can tailor any program to your needs.

The language looks very much like Basic, and indeed many of the words perform exactly the same functions, but within the word processor. Program controls, for example, are provided by REPEAT..UNTIL loops and IF..THEN conditions, but there is also the DOTHIS...N-TIMES loop. Procedures are supported, although they appear more like sub-routines.

In addition, there are new statements which manipulate text directly. The CURSOR command moves the cursor within a program. It's followed by a direction and number argument, *ie* CURSOR RIGHT 4 moves the cursor four characters to the right.

There are commands to get characters from the keyboard, to delete characters or words from the text, to find and replace characters within it, to swap their case, and to select other segments for display.

The language is very powerful. A short program can provide useful extensions to the built-in functions. For example, the following seven lines of code provide a function to transpose two characters which have been typed in the wrong order:

```
SEG 1
A$=GET$
DELETE LEFT
CURSOR LEFT
TYPE A$
DISPLAY
ENDSEG
```

If you wanted to call this program from the main document, you would press <SHIFT> and <f1> together. All segments are invoked in this way, leaving the unshifted function keys free to perform their old functions.

Verdict

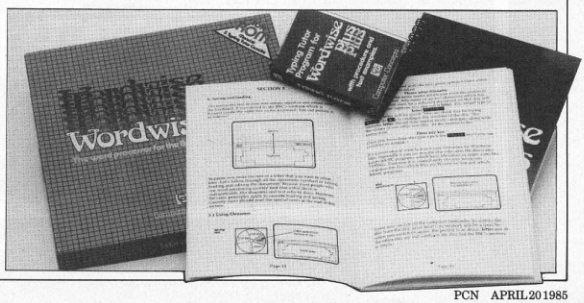
Wordwise Plus is a very powerful word processor. The macro language lifts it above other word processors for the BBC Micro, while maintaining the easy-to-use facilities which have made it so popular in its first incarnation.

The only facility which stops it being the most useful word processor available on the BBC is its dogged adherence to the 40 column, Mode 7 display.

REPORT CARD: 1 TO 5

Features	●●●●
Documentation	●●●●
Performance	●●●●
Overall value	●●●●

Name Wordwise Plus **Machine** BBC B **Price** £56.35 (Upgrade £19.55) **Publisher** Computer Concepts 0442-63933 **Format** EPROM **Language** machine code **Outlets** mail order and dealers.



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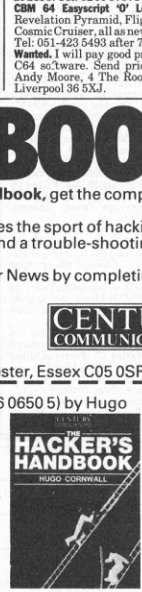

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QUIT

Don't believe what you read in the papers — the dismal Jimmies, moaning Minnies *et al* may sneer about Sinclair Research's chances on the stock market, but we at *PCN* can now exclusively reveal that the long-awaited flotation has already happened. In Lisbon.

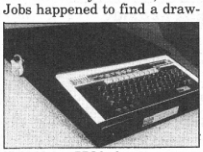
The flotation in question wasn't exactly a stock market flotation — it was one of the nautical variety, a seminar held last month aboard the Royal yacht Britannia in fact. The seminar, entitled 'Britain's new technology for Portugal tomorrow' (we assume 'tomorrow' is an attempt to make a virtue of late delivery) was timed to coincide with the Queen's visit to Portugal.

Apart from an early flirtation with a battery-assisted rowing boat (the Sea 5) this is the first time Sinclair Research has been associated with nautical matters, but Whitehall sources are hinting that this could mean further elevation for Sir Clive. He's going to be made a pier.

Back in Britain, Northern Computers has come up with a handy add-on to help BBC owners nail down their programming problems. The Micropulse Nightrider illustrated here is, as you can probably guess from the name, a 'locking security plinth'. It's made of matt black sheet steel and bolts your Beeb securely to the desk.

Even more intriguing is something Northern refers to only as a 'loop alarm'. We suspect that this is some kind of software security device that sounds a warning if you write something like: `10 PRINT "BUMS ":GOTO 10`.

Rude words also seem to be playing a part in the current relationship between Apple founders Steve Jobs and Steve Wozniak. The latter left Apple earlier this year after a disagreement over the company's direction, and began work on an $80 control device for linking audio and video equipment. Unfortunately for him, Steve Jobs happened to find a drawing of the product in the design studio Wozniak just happens to share with Apple. Wozniak is now looking for another designer.



Nightrider — BBC lock-up.

The last laugh.

You might think conflict is better confined to computer games, if you hadn't first seen Theatre Europe, PSS's tasteless contribution to the collapse of detente. The game is intended to simulate World War Three, and features music by Lennon and McCartney — Give Peace a Chance, would you believe.

Finally, we announce the winner of another closely fought Laughline contest. As you may recall, our picture shows the interior of Maxtor's European repair facility. The winning caption comes from G Dunster of Horley, Surrey, who served up 'I'm taking my lunch back to the canteen — it's only half cooked!' The usual whatever it is (£20-Ed) is winging its way to him.

SYNTAX ERRORS

Either we struck lucky or you were so busy looking towards Easter you failed to mention our normal quota of mistakes. But until we hear to the contrary we declare issue 106 flawless!

NEXT WEEK

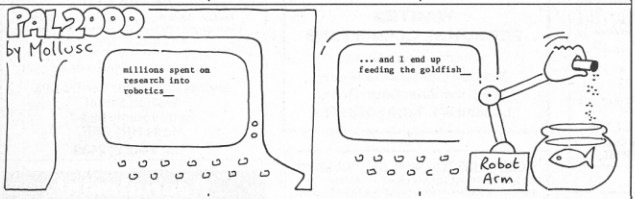
Tandy too
Full review of Tandy's latest lap-held machine, the big-screen 200.

QL Quest
Feast your eyes on Quest's QL system — the most comprehensive expansion package to date replete with disk drives, software and add-on boards.

Practical programs
Hands-on features offer BBC music, interrupt-driven code on the Amstrad, and how to write adventure games.

64 in print
Part two of our Commodore 64 printer interface project contains a software driver.

Plus . . .
The essential bit of our current Sinclair Spectrum competition — the last of the pictures and the entry form. Don't miss it.



PCN DATELINES

Event	Dates	Venue	Organisers
IQLUG	April 21	St George's Hotel, Lime Street, Liverpool	Bryan Pain 0908-564271
TI99/4a Exchange (UK TI User Group)	April 28	Royal Pavilion, Brighton	Clive Scally, 0273-503968 after 7.30pm
Computer Aided Production Management Exhibition	April 30-May 2	Wembley Conference Centre	David Houchin, 01-579 9411
COMDEX Spring	May 6-9	Atlanta, USA	Interface Group, 300 First Avenue, Needham MA 02194, USA
Apple 85	May 9-11	Novatel Complex, Hammersmith, London	Pamela Goodwin, 061-480 7863
Electron and BBC Micro User Show	May 9-12	New Horticultural Hall, London	Database Publications, 061-456 8383
Micro City 85	May 14-16	Bristol Exhibition Complex	Argus Specialist Exhbns 04427-73291
Hong Kong Comp Conf & Exhbn	May 21-24	Hong Kong	Trend Exhbn, 1203 Wah Kwong Building, 60 Hennessy Road, Hong Kong
DEXPO South	May 26-29	New Orleans, USA	Reed Exhbns 01-643 8040
Compec Europe	May 7-9	Brussels	CGP 01-528 9256
Nat Software & Comp Exhbn	May 29-31	Brisbane, Australia	Riddell Exhbn Promotions, Riddell House, 137/141 Burnley Street, Richmond, Victoria 3121, Australia
Business Computer Show	June 4-6	Earls Court, London	Reed Exhbns 01-643 8040

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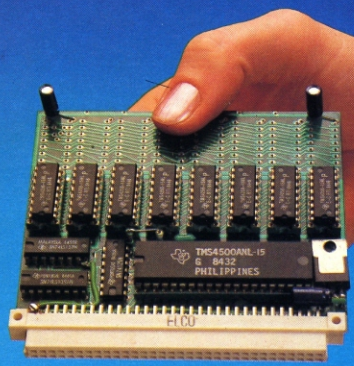

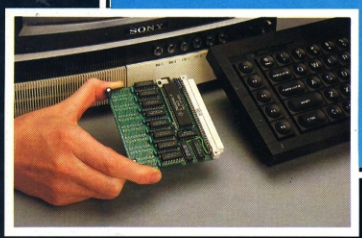

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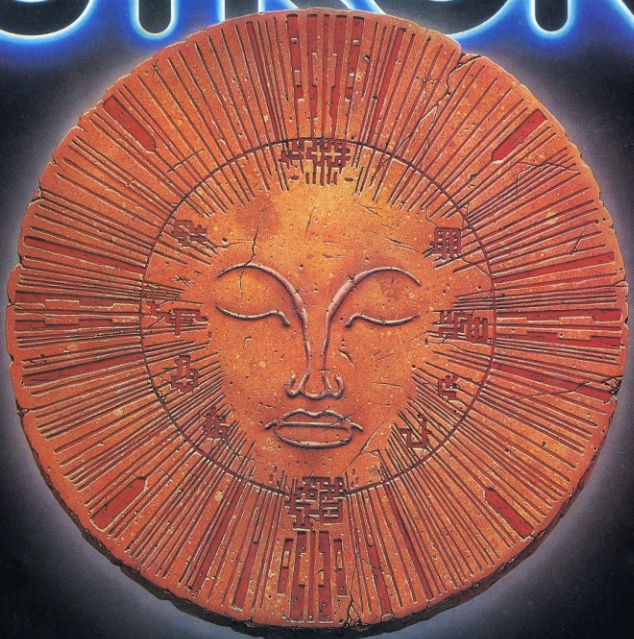

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