40p EVERY WEEK · No 82 · Oct 13 1984

PERSONAL Computer NEWS

NOW 40P

64 SYMPHONY
Play music with a real keyboard - p39

SPECTRUM LISTER
Make sense of your programs - p26

AMSTRAD SPRITES
Part 2 of PCN's powerful utility - p 22

ATARI GRAPHICS
Super-smooth scrolling - p 18

BBC ELITE
The best computer game ever ?

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- Two independent RS232 ports
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- Main Block with typewriter-style layout
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- Eight programmable function keys (16 with shift)

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TEXT MODE

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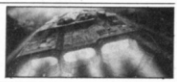
MENU

COVER STORY

BBC Elite 47

PCN's writers have been fighting to play it. Find out what makes Acornsoft's space odyssey such a brilliant game.



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Make sense of your listings with this program for Spectrum and Microdrives.

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Music at your fingertips with a full piano keyboard that plugs into your Commodore.

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REGULARS

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Dragons, trolls, hobbits, deserted cities, vampire castles. All this and more in our weekly excursion into the adventure maze.

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MONITOR

Wherever it happens, if it affects you, we report it in the Monitor pages. Home news, events and analyses, with regular columns from where technology makes waves — the USA and Japan. Plus a regular look at the British micro scene in Home Front.

Rift threatens MSX impact

The impact of MSX micros in the UK may be fatally weakened following a rift between Microsoft UK and the Japanese micro manufacturers.

'Basically, Microsoft has thrown a spanner in the works,' said a spokesman for Toshiba, one of the MSX companies.

Microsoft had not always turned up to meetings at the MSX working group, sending its apologies instead, he added.

And when the working group needed advice or information from Microsoft, it has had to go to Ascii Microsoft in Japan, causing further delays.

Several of the MSX companies have expressed concern at the lack of support from Microsoft in promoting the MSX standard in the crucial run up to the all important Christmas sales season.

For its part, Microsoft is denying any suggestions of a rift.

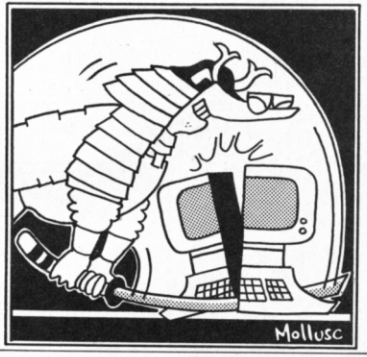
'Microsoft in the UK was never intended to play a major part in the promotion of MSX,' said a Microsoft spokesman.

However, it is widely believed that Microsoft's lack of enthusiasm in working with the Japanese companies stems from the fact that all the royalties and licence fees go directly to Ascii Microsoft.

A contributory factor is that Microsoft spent a lot of money trying to sign up two UK companies to produce MSX machines.

One of these was Dragon Data, whose MSX project on behalf of GEC bit the dust when the company crashed earlier this year. It may yet re-appear under GEC's banner.

First out is Toshiba with its HX-10 — featured last week in Currys' adverts which said that the micro was available in selected stores but could be ordered from any branch. It is priced at £279.99.



QL VIEW — QL users who've been waiting to hook up to a Sinclair-recommended monitor can now do so for £299. The Sinclair Vision QL from Data Efficiency (0442-60155), is a 12in RGB colour monitor with an 85-column text display. The monitor comes with a cable that plugs into the RGB outlet at the back of the machine and has a 12 month warranty. Sinclair also intends to produce a 'QL printer' early next year — this ties in with its plans to supply a range of add-ons for the QL.

MONITOR

Danger lurks in Compunet Jungle

There are more dangers than the legal traps we reported last week lurking in the Compunet Jungle. There are also sharks, out of place maybe, not no less vicious for that.

With the free form of the Jungle and Compunet's decision to leave users largely in charge of what appears, there is nothing to stop a subscriber making a few quid by simply uploading a few pages of garbage and charging a king's ransom for access.

Unfortunately, it is not possible to examine the contents of a page before you purchase it, though it is possible for information providers to produce a free page that will tell you what you are about to buy.

Even though the system is in its early days and charges aren't being made yet to users a few rip-off pages have already appeared. For example, it is possible to pay £20 to examine two pages that say: 'There isn't a lot here for the amount it costs' and: 'I don't think much of the colour scheme either'.

A spokesman for Compunet said that it was recommending that users of the system should never buy a page until they actually knew what they were purchasing, either through an information page or recommendation by another user. He added that if anyone was ripped off by another user they should get in touch with Compunet and action would be taken against the offender, who would have his number erased and be left with an unusable modem.

Compunet — sharks in the Jungle.

CTA weeds out cowboy retailers

By this time next year you should be able to walk into a computer shop certain in the knowledge that it is staffed by people who know what they are talking about.

And if you decide to buy something, you should be able to pay for it with a special credit card accepted in hundreds of similar shops around the country.

This vision, almost too good to be true, belongs to the Computer Trade Association, which launched two new schemes for computer dealers last week.

The first is a certification scheme to sort out the cowboys from professional retailers.

Under this a dealer — whether a CTA member or not — would have to satisfy the CTA that its staff have adequate knowledge and are able to give correct advice on the type of equipment it sells.

If it passes the CTA's tests it will be able to describe itself as a 'certified computer dealer'.

The credit card, which will probably be called simply 'The Card' is aimed at shops that want to rival the multiples.

Hitachi machine comes down in price

Dixons has halved the price of the Hitachi MBE 16002.

Selling at £1,489 the IBM compatible machine comes with 128K RAM, two disk drives with 320K each, keyboard and eight colour monitor.

In addition, you get £900-worth of free software which includes packages like Wordstar, Nucleus Generator and Calcmaster. With MSDOS as its operating system and Microsoft Basic it will also run some IBM packages.

● As *PCN* went to press last week, Dixons had made a £182m bid for the Currys chain.

Gavilan micro bites the dust

The Great Computer Shakeout has claimed another victim. Gavilan Computers is the latest US company to seek protection from creditors at the door by hiding behind Chapter 11 of the US's bankruptcy laws.

Gavilan burst on to the market last year when it announced what was then an innovative lap-held micro. Design and manufacturing problems held up its release until March this year.

By then several other manufacturers had managed to get similar products on to the market. According to one of Gavilan's investors, the company owes about $10 million.

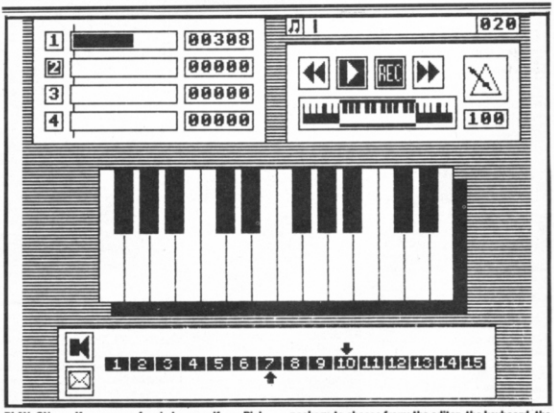
Juki wheels out a pair of printers

The Juki family of daisywheel printers (issue 10) has been extended with two additions.

The cheaper of the two is the Juki 2200 at £309. Running at 10 cps, this keyboard-printer-terminal comes with an internal receive-only RS232C interface and works with micros using the same connection.

At £918, IBM PCs and look-alikes can hook up to the Juki 6300. With a 3K buffer expandable to 15K, the printer has auto-underscore, proportional spacing, auto-justify, bold printing, shadow printing and auto-centring. For further information contact Micro Peripherals on 0256 47232.

Hitachi — star exhibit at Dixons.



PLAY ON — If you ever fancied yourself as Rick Wakeman The Music System (TMS) may realise your dream. At £24.95, it comes on two floppies which hold the system and a Song & Sound Library, and you get a 96-page manual. In all, there are five modules on the package to choose from; the editor, the keyboard, the linker, printout and the Synthesiser module, which creates sounds for the editor and the keyboard to use. TMS will also be available as two cassette packages each selling at £12.95 for the BBC.

MONITOR

QL Microdrive 2 faces stern test

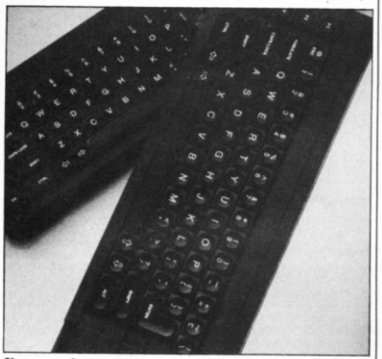
Just when Sinclair must have thought it was safe to show its face again, another question mark hangs over the QL — failure rates.

With the machine's first appearance in shops being so recent it is too early to talk about return rates, but with Christmas approaching it can hardly be too soon. One caller to *PCN* last week was on his fourth QL after a succession of Microdrive and overheating problems — checking around the retailers revealed that this is an extreme case, but also that problems with Microdrives aren't uncommon.

A Sinclair spokesman admitted: 'Problems are quite often related to the Microdrive in one way or another.' Microdrive 2 seems to be the weak link, and one dealer reported loading difficulties.

During the summer Sinclair's Nigel Searle promised that 'significant bugs' would be dealt with as they arose. He declined at the time to define a significant bug, but according to the spokesman some have been attended to. On the Microdrives he said: 'Everything can be overcome. The Microdrive, like a lot of other things, has had a lot of development attention.'

It's also had a bad press and is seen by many software suppliers as too unreliable to be a medium for their products. With a pair of them built in to the QL their reliability becomes crucial. Terse messages like 'Incomplete file transfer' and 'bad media' could spell a lot of frustration, especially if the QL does sell as well to small businesses as the Spectrum did to home micro users.



QL — many unhappy returns?

dBase II takes off with dB Compiler

dBase II is well on the way to full language status with the release last week of the dB Compiler.

International committees, compiler validation suites and all the rest of it are still some time off but the first compiler takes dBase II up a division. Anybody who wondered whether dBase II was fish or fowl can now rest assured — it's fowl.

P&P (0902 43913) is distributing the product in this country. It comes originally from Wordtech of California and supports all versions of dBase II up to 2.4. The advantages of compilation are mainly in speed and efficiency, but dB Compiler also offers some transportability — when the compiled programs are linked to produce executable code cross-environment linkers can adjust the object code for different operating systems.

P&P says that to get the most out of the compiler you'll need more than a 64K machine.

You can use it under CP/M-80, PCDOS or MSDOS, and versions for CP/M-86 and Unix are on the way. It costs £675 plus VAT.

IN BRIEF

Digital Research has given the world a look at the shape of disks to come, and not surprisingly, they're round.

But the company revealed more details last week of its interactive videodisc technology, Vidlink, which connects a Commodore 64 to a videodisc player (issue 72). DR's aim is to make the link available to IBM, Apple, ACT and Acorn users, with a cheap hardware interface and software for each.

Not a leader in the budget games market, Activision has demonstrated a streak of generosity by offering free membership to the Activision Software Club.

You'll get a full colour quarterly magazine, access to a worldwide pen-pal network, and prizes for high scores. To join ring Activision on Maidenhead (0628) 75171.

A company that makes its living from one of the micro business's thorniest problems — Commodore peripheral interfaces — has released a hard disk subsystem for the BBC Micro.

Intelligent Interfaces (0789 296879) has lined up the Motor Shark range of Winchester disk units for the BBC.

To wean you off Franglais, Silversoft is about to launch French on the Run. The £9.95 BBC program combines elements of an adventure game with its educational aspect — you're cast as a war-time British pilot shot down over occupied France. Using your knowledge of French, you make your way back to Blighty.

VIEW FROM AMERICA

US market leaders battle it out

Atari boss Jack Tramiel attended an electronics show in Holland recently and on seeing the Japanese MSX hordes declared: 'We kept them out of the US, we will keep them out of Europe. We will fight them off, and we will fight them on the beaches.'

Partly as a result, there is a strong rumour here that MSX chips will be enclosed in the new low-priced Atari promised for early 1985.

If Tramiel is concerned with international struggles, Americans are involved with their own. This is the most combative part of the year. While the sound of young football players hitting each other resounds through the suburbs and the leaves fall, US business grapples for position in the Christmas sales surge.

One report claims that 50 per cent of all home micros are sold between September 1 and November 30.

Apple and IBM are making aggressive moves and the nation is getting ready for MacNewsweek. The November 7 special election issue of Newsweek will have 40 of its 114 pages devoted to Apple ads for Mac and Lisa. Newsweek generally sells three million copies around the world, and Apple will be the sole advertiser in that issue. This exclusive deal is reputed to have cost between $2 million and $3 million.

Macintosh softwares are getting into the shops at last, with games, communications packages and graphics in the lead.

Few rivals to MacWrite have appeared, nor are there many spreadsheets to compete with Microsoft's Multiplan. Perhaps the knowledge that Lotus is preparing an integrated Mac spreadsheet/word processor for next year has dampened the software industry's competitive urge.

But products such as Dilithium Press's PC-to-Mac-and-Back for comms with an IBM PC, and Winterhalter's Data Talker/Mac, which lets a Mac emulate an IBM 3270 terminal, may be seized on eagerly by executives who want Mac but work where the law is Big Blue.

IBM was also in the news this summer when it announced Topview for $149. 'Topview is a strategic product,' says Bob Markell, IBM's vice-president of software development at Boca Raton. Existing software for the PC will run under Topview but won't take full advantage of the systems features.

Now IBM has brought out 31 of its own programs for the PC, grouped under two headings. There are the IBM Business Management Series, $695 apiece, basically offering accounts functions, and the IBM Personal Decision Series, aimed at spreadsheet and graphics users but with price tags of $150 to $200, considerably more expensive than the competition, moving analysts to note that firms such as Lotus have hundreds of thousands of happy customers who won't be budged too easily from what they already know and like.

Chris Rowley

MONITOR

Fourth bridge for Timex/Spectrum?

Strong evidence from Sinclair quarters indicates that a version four of the Spectrum may be in the pipeline.

Sinclair Research has denied any plans for a fourth, but on past experience of its handling of version three Spectrums there's room for doubt (issue 28).

When issue three Spectrums appeared some software written for earlier Spectrum models wouldn't run on the revised version. This was due to a redesigned uncommitted logic array (ULA).

One Sinclair software supplier admitted last week that there's a good chance of a version four surfacing. But its lips were sealed as the original information came from Sinclair sources.

The manager of Micromega, more forthcoming, threw some light on the subject. He said: 'Distributors of the Timex TS2000 in the US have included a plug-in module to reconfigure the Timex machine — so it looks like a Spectrum.

'Presently, this reconfigured machine exists in abundance in the US — and it's on this basis that we're marketing software over there.' The implication is that version four could owe a lot to the Timex machine.

The Spectrum has survived fierce competition over the past two-and-a-half years. Perhaps it's time for it to undergo some cosmetic surgery.

The TS2000 is a better looking machine and has a similar spec to its English counterpart — running a Z80A processor, 48K RAM, 24K ROM but with a space bar on the keyboard.

ITL cures hitches on Hybrid for Oric

The Oric 1/Atmos upgrade has caused some head-scratching at ITL Kathmill, maker of disk drives and cabling systems for Oric machines.

ITL has had to produce a new version of its Hybrid cable, originally designed for the Oric 1. The Hybrid (enthusiastically Pro-Tested in issue 52) comes complete with disk interface and Basic enhancements, and with a master disk holding the Oric DOS, utility programs and demonstration software.

When the Atmos appeared earlier this year, users of the Hybrid started to report problems booting the DOS.

The differences between the ROMs in the Oric 1 and the Atmos caused the problem, which ITL has cured by altering the circuity of the Hybrid 'to a small extent'. It is now selling an Atmos version at the same price (about £100) with the same DOS working at a different frequency.

ACT program offers multi-dialling

Act has become the first company to let you dial up viewdata services like Prestel as well as standard 'teletype' services like Telecom Gold from a single program.

The program, called Communiqué, has been packaged with ACT's on-board modem for the Apricot for an all inclusive price of £395.

Telephone numbers, passwords and user IDs can be saved to disk allowing you to dial-up automatically and log-on to the service of your choice at the press of a single button.

■ ACT has bought 50 per cent of Swire Systems, the Hong Kong based distributor in the Far East of Sirius and Apricot micros. ACT and Swire were unsuccessful joint bidders earlier this year for Victor Technologies.

Window on the world from ACTmaking a communique.

HOME FRONT

Bill and Ben weed out piracy cash from the industry

A chance encounter at the *PCW* show revealed one facet of piracy, the dark side of the computer industry.

On the ACT stand, we met two 11-year-olds from the Midlands who, for the purposes of this story, shall be known as Bill and Ben. Their purpose amid the Apricots was to borrow from the company one of ACT's infra-red mice-cum-tracker balls. Intrigued by this display of juvenile enterprise, we escorted the duo to a nearby hospitality suite and plied them with iced cokes. The ensuing conversation makes fascinating reading for anyone interested in the computer black market.

Bill and Ben reckon they have about 200 games programs at home. They were understandably hazy on the details but seemed to remember buying about seven of those titles. Bill is a Commodore 64 owner, Ben a BBC Micro enthusiast.

With a short combined time in the software field, they have deprived the software industry of a couple of thousand pounds. Even more interesting is the background to this nefarious operation.

Bill's mum is a teacher and through her Bill and Ben met a man known only as Tim (real name, for what it's worth). Tim proceeded to recruit our dynamic duo into the business of software copying. The system works like this:

Bill and Ben pass the word around their friends that they know a man who wants original tapes. In return for their contributions they get a few copies — one to keep and the rest to give, sell or swap. Bill and Ben act as the middlemen.

These two software wizards first try to copy the stuff the hard way, reading tape headers or wriggling around software protection devices. They reckon most tapes succumb to their schoolboy charms without too much effort on their part. If the going gets really tough, they resort to the tried and trusted method of tape-to-tape copying. Enter Bill's mum again. Courtesy of the local education authority, she borrows a tape recorder from her school and the copying business gets into full swing for an evening.

PCW Show — Watch out, there's a pirate about.

Bill and Ben reckon there are others like them working for Tim, and Tim in turn is just one of several working for the boss of the operation, a man they know as The Master.

So in return for a few blank tapes, The Master has a nicely organised distribution network, and a ready supply.

Charles Dickens wrote a book about this man. Among software dealers at the show, another interesting facet of copying became apparent. After first asking for Bill and Ben's real names and addresses (we didn't ask, they didn't tell us) the dealers launched into a tirade against that sort of activity. After some probing by *PCN's* newshounds, to a man they admitted to music piracy — copying records onto tapes.

But then, as they all agreed, 'that's different, isn't it?'

The show was also marked by another sort of underhand activity — this time straightforward theft. Quicksilva reported a couple of joysticks missing, Mirrorsoft had a higher class of customer who walked away with two Spectrum Microdrives, but the most audacious theft of the week happened at the Virgin Games stand. Although all the machines there were enclosed in arcade-type housings, some determined character had unscrewed a panel and nicked a Commodore 64. Left all the cables though — must have been a Vic owner on the upgrade.

Peter Worlock

CHARTS

As featured in Radio 1's Chip Shop Saturday morning.

GAMES

TW	LW	TITLE	PUBLISHER	MACHINE	PRICE
1	1	Daley's Decathlon	Ocean	SP, C64	£7.90
2	9	Sherlock Holmes	Melbourne	SP, C64	£14.95
3	3	Beach Head	US Gold	SP, C64	£9.95
4	14	Kokotoni Wilf	Elite	SP, C64	£6.95
5	2	Monty Mole	Gremlin	SP, C64	£7.95
6	4	Full Throttle	Micromega	SP	£6.95
7	17	Elite	Acornsoft	AC	£15.00
8	—	Avalon	Hewson	SP	£7.95
9	9	Sabre Wulf	Ultimate	SP	£9.95
10	5	Lords of Midnight	Beyond	SP	£9.95
11	10	Decathlon	Activision	C64	£9.99
12	8	Jet Set Willy	Soft Projects	SP	£5.95
13	12	Int Soccer	Commodore	C64	£9.99
14	6	Match Point	Psion	SP	£7.95
15	—	Football Manager	Addictive	SP, C64, AC	£6.95
16	18	Scrabble	Leisure Games	SP, C64, AC	£14.95
17	20	Death Star Intr.	System 3	C64	£7.95
18	19	Frank N Stein	PSS	SP	£6.95
19	—	Chiller	Mastertronic	C64,	£1.95
20	—	Zim Sala Bim	Melbourne	C64	£9.95

SPECTRUM

TW	TITLE	PRICE
1	Beach-Head	£9.95
2	Sherlock Holmes	£14.95
3	Daley's Decathlon	£7.90
4	Kokotoni Wilf	£6.95
5	Full Throttle	£7.95
6	Avalon	£7.95
7	Monty Mole	£7.95
8	Sabre Wulf	£7.95
9	Lords of Midnight	£9.95
10	Jet Set Willy	£5.95

COMMODORE

TW	TITLE	PRICE
1	Daley's Decathlon	£7.90
2	Kokotoni Wilf	£6.95
3	Monty Mole	£7.95
4	Decathlon	£9.99
5	Int Soccer	£9.99
6	Death Star Interceptor	£7.95
7	Chiller	£1.95
8	Zim Sala Bim	£9.95
9	Astro Chase	£8.95
10	Pitfall II	£6.95

MICROS

OVER £1,000

TW	MACHINE	PRICE
1	IBM PC	£2,390
2	Apricot	£1,760
3	Televideo TS1603	£2,640
4	Compaq	£1,795
5	Apple III	£2,755
6	Sirius	£2,525
7	Wang Professional	£3,076
8	HP 85	£1,917
9	NCR Dec. Mate V	£1,984
10	Kaypro	£1,604

UP TO £1,000

TW	MACHINE	PRICE
1	Spectrum	£99
2	Commodore 64	£199
3	Electron	£199
4	Amstrad	£349
5	BBC B	£399
6	Vic 20	£140
7	Amstrad	£299
8	Atari 800XL	£199
9	Memotech	£199
10	Oric	£99

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 **October 4**. 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.

BUYING A DISC?

FIRST CONSIDER THE

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* Available for BBC, Dragon & Nascom computers.

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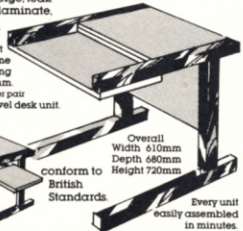
Unit Desk/Table for Home Computer
£49.50 (plus P. & P.)

Money refunded if not completely satisfied and goods returned undamaged within 14 days.

Also available optional side extensions that fit easily and quickly to left and right hand side frame giving additional working surfaces. Size 285 x 250mm. Price £6.00 (inc. P. & P.) per pair
Also available single level desk unit. £47.50 (plus P. & P.)



side extensions and single level desk unit.

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BT is taking the wrong line on modems

News of British Telecom's promise that it is stepping up the checks on the use of illegal modems has prompted me to write again to Random Access.

It strikes me that BT is wasting its time hunting down the culprits. BT is not losing money by people connecting 'unapproved' modems to the telephone network through lost sales. And it is certainly not having trouble with the modems damaging the system electronically. So why is BT wasting money, and our money at that, monitoring the lines?

My second thought is that the best way to stop people connecting 'bad' modems up is surely to remove the temptation. To do that means incorporating modems into the standard telephone connection box that everyone has in their house.

There must be hundreds of companies out there making modems capable of user selectable baud rates, auto-dialling and auto-answering. BT could then install these in place of the old master telephone socket quite easily for a service charge of £20, which is BT's rate for putting in extension phone points. The householder could then simply wire up the computer by means of an RS232 cable. The rental charge for the modem should be in the region of £8 per quarter.

C Haine,
Rugby, Warwicks.

That seems to put the ball in BT's court — Ed.

Nice ideas — pity about the binders

The 'new look' *PCN* is a step in the right direction. More and more computer magazines seem to either put their prices up or cut down the amount of pages, but *PCN* manages to cut the price as well as increase both the quality and quantity — amazing!

Now the bad news . . . Buying a *PCN* binder by mail order is, in a word, diabolical. Earlier this year I decided to purchase a binder. So, after sending off £3.50 of hard earned cash, I sat back and waited . . . and waited.

It took no less than ten weeks to arrive — six weeks after my cheque was cashed. And people say Sinclair are slow.

S Parnell,
Benfleet, Essex.

Shamefaced, we must admit to difficulties in the binders department. Hopefully, we have solved the problems and binders should be going out within days of receiving the orders — Ed.

Last word on 600XL data processing

In Routine Enquiries (issue 79) you make several misleading statements about word processing for the 600XL.

First, it is possible to link *four* disk drives to the machine — surely enough for most serious applications.

Second, it is possible to obtain an upgrade to 64K for the 600XL — they are readily available in the local store here.

In summary I think your conclusion, 'You have to think in terms of a new machine' is totally unjustified. A Anderson will be well served by upgrading the existing machine.

By the way I have no connection with Atari except as a satisfied customer.

Gregory Kuopp,
Gillingham, Kent.

Four 100K disk drives are not a real alternative to two 320K drives — even if you can find software that will easily allow you to use four drives. Besides, how much would four drives cost? — Ed.

MSX could be a white elephant

I see that with MSX comes a whole barrage of manufacturers new to the home computer market — Sanyo, Sony, JVC, Mitsubishi, Toshiba, Hitachi etc. All are probably more used to making televisions and other electrical goods.

So why computers? And why all bunch together under one big MSX roof?

I don't know about any other *PCN* readers but it seems as if someone is trying to make a clean sweep or a quick profit. Weren't some of these companies involved in the great FM CB purge of 1981 when FM was launched to wipe out AM and succeeded in wiping out itself as well?

Obviously we're not all going to go MSX — at least, I think not. Yet many will probably convert to it — but why? It is no better than any other computer on the market, most of them reliable. MSX looks like a white elephant. Compatibility might be a big attraction for business machines but not for the majority of home computers.

Andy Clarke,
Atherstone, Warks.

What tune do the pirates dance to?

Nick Alexander claims (issue 80) that piracy costs the industry about £100 million a year. Really? So how much are these companies making in profit? Whatever the reasons for Imagine's collapse, we all know it wasn't piracy.

The second point concerns changes in the law. It appears to me that adequate protection already exists if one of these companies were prepared to act on it. Copyright laws are well established in this country — surely all that's needed is a test case to set the precedent for software.

People selling copied software as originals must be in hot water under the Fraud Act.

Finally, the music business has suffered the problem of home copying for years and seems to have survived, despite the fact that it is now suffering at the hands of commercial software companies.

How many games now feature music soundtracks ripped off from music artists?

How many software companies are paying royalties to those artists?

John Holt,
Basildon, Essex.

For another slant on the issue, see Home Front in this week's Monitor section — Ed.

Newbrain owner's plea for help

I am the owner of a Newbrain. Last month the micro broke down — it is as if the computer has decided to ignore the keyboard.

As I am severely physically handicapped I am totally dependent on my computer for any writing I may need to do.

When I turn it on, everything happens as it should but it won't respond to the keyboard so I can't load programs etc.

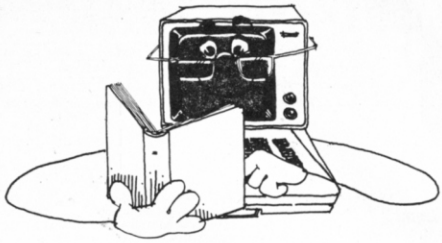
As I'm unemployed a new system is out of the question.

All I am asking for is some help in the way of addresses where I may be able to get it repaired cheaply.

G Bland,
Preston, Lancs.

We have two phone numbers you might try: Angela Enterprises on Stevenage 812439, and Elstree Computer Centre on 01-953 6921. If any PCN readers in the Preston area can offer any help, please write to us and we'll forward your letters — Ed.

Well, there was no bounce on that keyboard, Sir!



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Should I link my Pet to my 64?

Q I own a Commodore Pet 2001 and a Commodore 64 and I would like to be able to choose, if I wanted, Pet or CMB Basic, to connect the Pet monitor to the 64, and use the 64's 64K RAM without disturbing the Pet's 8K RAM. What would I have to do?
Anon,
Hendon, London NW4.

A What you describe is possible — just — but it's hardly worth the effort except as an interesting excercise.

The answer to all of the questions is to connect the two machines either via an RS232 or IEEE interface. The problem here is that although you could use the Pet's screen, the time lapse would make the system unworkable. The same problem goes for using the 64's RAM.

You could use the 64 to hold programs or data but you'd then have to download it to the Pet before the Pet could use it. Even then you'd be limited to 8K at a time because the Pet won't hold any more

The simplest solution to the Basic issue is to buy one of the numerous Basic extension packages for the 64.

Adding colour to my Melbourne Draw

Q Could you please help me with a few problems? Despite a letter to Melbourne House, I still can't find out how to add a new colour to my Melbourne Draw screens — I always have to change everything.

I also can't write a successful loader that enables me to write a SCREEN$ and a main program together. No matter what I try, the same thing always happens. The SCREEN$ loads OK, but as the main program starts to load the SCREEN$ will scroll up two lines, even if I don't use the bottom two lines.
K Norton,
Stavely, Chesterfield

A The Melbourne Draw problem is relatively easy to solve. The program is designed to change colours in accordance with the way the Spectrum's screen is designed, so it changes INK and PAPER colours one character position at a time.

All you have to do is switch to the mode for setting attributes and change the INK and PAPER colours to the ones of your choice. Passing the cursor over a character position will then set the colours you've specified. Obviously, if you don't want to change the attributes of a character position then you switch to skip mode, and if you want a different set of INK and PAPER colours you just change them.

Your SCREEN$ problem stems from the fact that the Spectrum will refer to the last print position used when it's going to print something new. So all you have to do is arrange for the last print position to be somewhere convenient:

```
10 LOAD"" SCREEN$
13 INK A
15 PRINT AT X,Y;
20 LOAD"" CODE
```

In this example you have to select a blank area of your screen, set INK A in 13 to the PAPER colour of this area, then assign X and Y so it prints here. Your program name will appear, but you won't see it because of the colour the INK is set to. If you're using Melbourne Draw it would be useful to use the screen grid to work out the coordinates of X and Y before you save it.

Printing pictures on the Commodore

Q I purchased a Commodore SX 64 computer and a Shinwa CP80 printer. I would like to draw pictures on the screen of my Commodore and then reproduce them on the printer.

Unfortunately, I have no idea of how to produce pictures, or how to dump them out.

Is there an easy way that I can do it without having to resort to poking the diagrams onto the screen?
W H Lovelock,
Bangor

A You are in luck, having purchased a printer that is compatible with an Epson. There are a number of utilities that will allow you to dump out the contents of a screen on to a printer of this type. One such listing was published in *PCN* (issue 79). All that is required is for you to get the diagrams onto the screen. The simplest way to do this is by means of a drawing package. You may find that using a light pen will make it even easier.

Quite a number of such products have been reviewed by *PCN* in the past and we are currently looking at a light pen and software from Stack (051-933 5511) which includes the software to drive an Epson printer.

Unfortunately this is supplied on cassette and the SX64 has no cassette port, but Stack may be able to help you.

Attaching disk drives to the Electron

Q I wish to know if an Electron Plus 1 interface can handle disk drives and if not, are there any interfaces that can?
James McCallum,
Balomoak, Glasgow

A No . . . the Plus 1 interface cannot, unfortunately, handle disk drives. To attach disk drives to your Electron, you will need to get in touch with Pace or Acorn.

Both companies are expecting their efforts to be available in the next couple of months. The Acorn version will, most probably, be Sony 3.5in drives with a similar operating system to the BBC. The Pace alternative will be a little more standard with 5.25in disks, it is expected.

Both plug into the system port at the back and both should be capable of allowing other gadgets to be stuck onto the back.

Accessing Prestel with modems

Q Could you please give details of modems and adaptors for accessing Prestel from a BBC B? I know about the Acorn adaptor, but how do others compare?

Also, how can I use the telesoftware service? At home we have a teletext TV, but when I look at page 700 on Ceefax, the software looks very strange, although certain words are recognisable.
Daniel Margolin,
Salisbury, Wilts.

A There are a number of modems that can connect directly with the BBC micro. Indeed, any modem with an RS232c interface can, with an appropriate connecting lead, plug straight in to the RS432 port on the Beeb.

As usual, you pays yer money and takes yer choice. Let's examine the options.

The Acorn Prestel Adaptor is a little overpriced at £113.85 (see Issue 71), but viewdata software, connecting lead and an auto-dial capability is included in the price.

On the minus side, there is no 1200/1200 half duplex capability — or the requisite software — for user-to-user communication. Nor is there a 300/300 full duplex rate for communication with many of the hobbyist bulletin boards. Finally, there is no auto-answer facility (useful if you want to leave your micro on line so that friends can ring up while you are out of the house.)

A modem that can offer all these facilities is the Miracle Technology (0473-50304) WS2000 World Modem. The basic modem costs £129.95 and offers all the baud rates mentioned above, together with 75/1200 (reverse viewdata).

The catch is that the connecting lead will cost you £10.35 and ROM-based viewdata software from £22.94 upwards.

In addition, auto-dial and auto-answer facilities each cost £34.50 extra and have yet to obtain official BABT approval (but this won't be long coming).

At the cheaper end of the scale is the Protek (0506-415353) modem. It costs £59.95 plus £14.95 for the viewdata and user-to-user software. Its disadvantage is that it's acoustically coupled (you plug your telephone handset into the rubber cups provided rather than plug it directly into the telephone line) and is therefore more likely to pick up faulty transmission from background noise. There is no ability to add auto-dial/auto-answer capabilities.

In the middle range is the BBC comms pack from Prism (01-253 2277). Costing £89.95, you get a 1200/75 modem, connecting lead and software on ROM. It can also be used at 1200/1200 for user-to-user communication.

Regarding telesoftware on Ceefax, you will need to buy a completely different interface which is known as the Acorn Teletext Adaptor and costs an arm and a leg. For all the free software on Ceefax it's not really worth wasting your money on it.

MICROWAVES

Tips from readers to make programming easier or open up new avenues of possibility. A new look to *PCN*'s pages means a new look to the payments too. Now £10 for every hint in print, and a hefty £50 for the *Microwave of the Month*. Send your hot tips to *Microwaves, PCN, Evelyn House, 62 Oxford Street, London W1A 2HG.*

Centre your text on the 64

Here's a machine code routine to produce a command for the Commodore 64 which locates itself at the top of memory, $C000 in hex or 49152 in decimal. The program replaces the LET command with the new command CEN (This is done by using a system wedge).

CEN "The text to be centred" places the text in the centre of the screen. It centres text up to 38 characters long. The command can also be used with strings as can be seen with the following example:

```
10 A$="COMMODORE 64"
20 CEN A$
30 END
```

The following is a short version of the listing in Basic.

```
10 A$="COMMODORE 64"
20 S=INT (40-LEN(A$))/2
30 FOR I=1 TO S
40 PRINT CHR$(32);
50 NEXT I
60 PRINT A$
70 END
```

The routine should prove useful in tidying up many of your programs.

Steven Jonas, Thorpe Bay, Essex.

```
10 REM        CENTRE COMMAND
15 REM      FOR THE COMMODORE 64
20 REM    COPYRIGHT 1984 BY S.JONAS
25 REM   TO USE TYPE  CEN "TEXT HERE"
30 REM
35 T=0:FORI=0TO169
40 READA:POKE 49152+I,A
45 T=T+A:NEXT
50 IFT<>24554THENPRINT"CHECK SUM ERROR":END
55 PRINT"   CENTRE COMMAND     (C)1984 BY S.JONAS"
60 PRINT"TO USE TYPE CEN "CHR$(34)"TEXT HERE"CHR$(34)
70 SYS49152:PRINT"CENTRE OK.":END
100 DATA 169,0,133,251,169,160,133,252
110 DATA 160,0,177,251,145,251,200,208
120 DATA 249,230,252,165,252,201,192
130 DATA 208,239,169,38,141,2,3,169
140 DATA 192,141,3,3,76,116,164,169
150 DATA 67,141,190,160,169,69,141,191
160 DATA 160,169,206,141,192,160,169,69
170 DATA 141,28,160,169,192,141,29,160
180 DATA 169,54,133,1,76,131,164,72,162
190 DATA 0,169,0,157,176,192,232,208
200 DATA 248,32,158,173,32,163,182,165
210 DATA 13,208,3,76,8,175,164,25,192
220 DATA 39,176,247,160,0,162,0,177,26
230 DATA 157,176,192,232,200,196,25,144
240 DATA 245,132,251,132,252,169,40,56
250 DATA 229,251,133,251,74,133,251,168
260 DATA 169,32,153,0,193,136,16,248
270 DATA 164,251,162,0,189,176,192,153
280 DATA 0,193,200,232,228,252,208,244
290 DATA 162,0,189,0,193,32,210,255
300 DATA 232,201,0,208,245,104,96,0
```

MTX assembler code and the VDP

The machine code program below helps to demonstrate how to write to the VDP (Video Display Processor) from the resident assembler in the Memotech MTX series.

This program fills the screen with the character display, and the code is relocatable using the OUT (2) instruction to access the 14-bit auto-incrementing address register.

D England Swindon, Wilts.

```
LD B,90          Load first counter
LD H,90          Load second counter
LD A,0           LSB of screen address
OUT (2),A        Send it to VDP
LD A,28          MSB of screen address
OUT (2),A        Send it to VDP
LOOP1:LD A,32    ASCII code for space
LOOP2:OUT (1),A  Send it to VRAM
INC A            Increment ASCII code by 1
DEC H            Decrement second counter
JR NZ LOOP2      If H =0 then run loop2
LD H,90          Load second counter again
DJNZ LOOP1       If B 0 then run loop1
LOOP3:JR LOOP3   Preserve screen display
```

Clocking on to the Sinclair QL

The QL procedure below is useful as it adds a line 1 containing the date and time to the current program in memory. Of course, the clock in the QL should first have been set with the SDATE command.

When developing programs I tend to use three different cartridges in rotation and save the program with a procedure such as:

```
32100 DEFine PROCedure sprog
32110 DELETE mdv1_progname
      _bas
32120 SAVE mdv1_progname
      _bas
32120 END DEFine sprog
```

The save sequence is then:

```
datestamp (ENTER)
    sprog (ENTER)
```

It is easy, at a later date, to find the latest version by examining the first line of each program.

Peter Edwards, Headington Quarry, Oxford.

```
1 REMark 1984 Sep 13 19:22:46
32000 DEFine PROCedure datestamp
32010   OPEN_NEW#15,mdv1_datestamp_temp
32020   PRINT#15,"1 REMark"!DATE$
32030   CLOSE#15:CLEAR
32040   MERGE mdv1_datestamp_temp
32050   DELETE mdv1_datestamp_temp
32060 END DEFine datestamp
```

Comparing files on your Beeb

The BBC's DFS contains a number of useful commands for examining the files on disk. Perhaps the most useful is *DUMP <fsp>.

In Mode 0 and (3) this produces a 40-column dump of the file and uses only one half of the screen. Using the windowing facilities of the Beeb, it is possible to display portions of two files at the same time, thereby allowing them to be compared.

On running the program, you will be asked for two file names, one for the left and one for the right. After entering these, the first one will be displayed down the left-hand side of the screen.

To pause the listing, simply press the space bar. To obtain the second listing, press escape and again use the space bar to pause the listing.

The pause routine, assembled with PROCASSEM is a general purpose pause, switched on with *FX14,4 and off with *FX 13,4. It could be used in other circumstances such as listing programs.

Kenn Garroch, Peripherals Editor.

```
   10 ON ERROR GOTO 70
   20 MODE 0
   25 PROCASSEM
   30 INPUT "FILE LEFT
" L$
   40 INPUT "FILE RIGHT
" R$
   50 VDU 30
   55 *FX 14,4
   60 OSCLI ("DUMP "+L$)
   70 VDU 28,40,31,79,0
   75 ON ERROR OFF
   80 OSCLI ("DUMP "+R$)
   90 VDU 26
  100 END
 1000DEFPROCASSEM
 1010FOR T=0 TO 2 STEP 2
 1020P%=&A00
 1030[OPT T
 1040PHP:PHA:TXA:PHA:TYA
:PHA
 1050.STRT LDA &81
 1060LDX &256-99
 1065LDY &256-99
 1070JSR &FFF4
 1090CPX &255
 1100BEQ STRT
 1120.FIN
 1130PLA:TAY:PLA:TAX:PLP
:PLA
 1140RTS
 1150]
 1160NEXT
 1170?&220=0
 1180?&221=&0A
 1190ENDPROC
```

Commodore 64 double helpings

I have found a way of doubling the amount of storage space on almost all of my 5¼in floppies for use with my CBM 64.

All you need do is reproduce the write protect notch on the left-hand side of the disk, so there's a notch on both sides, then insert the disk upside down into your 1541 and format it. This may in some cases need to be done twice but I have been able to do this to all but a few of my disks. So now you have double-sided disks for half the cost.

Chris Moody, BFPO 43, W Germany.

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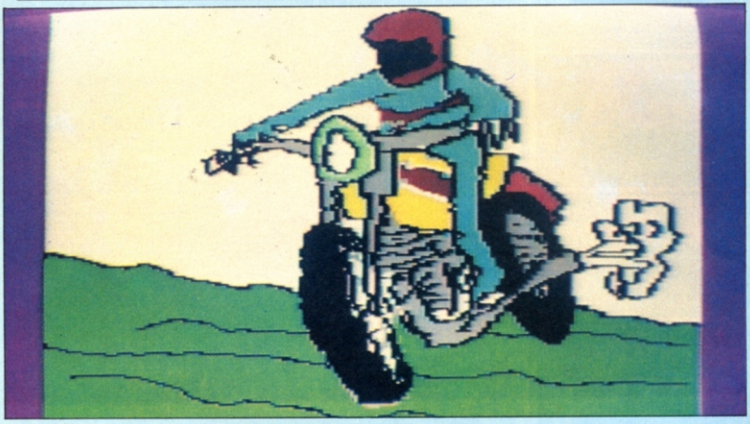
GRAPHIC ROUTINE

Plotting graphics on the BBC can be a time consuming process. In this excerpt from the PCN/Pan book *Invaluable Utilities for the BBC Micro*, Jeff Aughton explains how you can create graphics where they are most at home — on the screen.



It is generally agreed that the BBC computer offers excellent graphics facilities, although they can sometimes be difficult to use. Essentially, all of the graphics commands are (or can be) VDU commands and a sequence of VDU codes may be used to draw any shape, however complex. This looks great in listings, but it can be difficult to read and — more important, from our point of view — tedious to write.

Suppose you want to draw a red rectangle, of some size, halfway down the right-hand side of the screen – what should you do? What often happens, mostly due to a lack of planning, is a time-consuming process of trial and error. Rather than get out the squared paper and the eight times tables it seems easier to draw any old rectangle, check it, draw it again (bit closer that time), and again . . . by the third or fourth attempt, the result may be passable. Even if the figure is designed carefully beforehand, it is often necessary to see a shape on the screen to know if it is correct, however it looks on paper. Again, not everyone is expert on such things as 'relative plotting', 'colour masks', 'fill with logical inverse colour', and some means of experimenting with these new ideas should be welcome.

This routine is halfway between being a utility and a fun program (by definition, utilities are not fun). It is a greatly extended version of the 'etch-a-sketch' type of program that allows you to draw on the screen using simple controls. In this routine we include a number of useful (and some quite advanced) plotting techniques and a status line that tells you what you are doing at any time. In the example of the red rectangle quoted earlier, you would draw the shape using the routine's drawing facilities and then read off the GCOLs and coordinates that defined the shape. When you have finished the screen you would then be able to save it using the screen save utility given elsewhere in this section, print it out, or simply stand back and admire it.

Having chosen a mode, the top line of the screen is reserved as a status line containing useful information, while the rest is defined as graphics window where you can play around to your heart's content. The basic actions consist of moving the cursor (a small dot) and selecting various options by pressing the function keys. Some of the facilities provided on the function keys are essential, while others are really a matter of personal choice. Those we have provided vary from the necessary 'join two points' to the frivolous 'Moiré mode'. All ten function keys are used.

Unless you are using this to doodle (yes, it's great for messing about on too!) you may need to refer to the status line to see what is going on. This line consists of seven fields and looks like this:

808 66 F 1 3 3 M

Notice that this is only given as an example. The significance of each field (starting with the one on the left) is as follows:

- Cursor horizontal position. This is the horizontal displacement of the dot-cursor from the left hand edge of the screen. Its range is 0-1278.
- Cursor vertical position. This is the vertical displacement of the dot-cursor from the bottom edge of the screen. Its range is 0-982 (slightly less than the maximum 1023 as the top line of the screen is reserved). Each of these co-ordinates is measured in suitable units for subsequent PLOT and DRAW commands.
- Cursor speed. F stands for 'fast' and S stands for 'slow'. The S position is very useful for fine movement and high definition, while F is handy for zooming around the screen quickly.
- Number of fixed points. You are allowed to 'fix' up to two points and this displays the number fixed at any time.
- GCOL mode. The foreground colour (which is used for all your drawing) is indicated by the colour of this character, while the number indicates which GCOL effect is being used. For foreground plotting, the official range is 0 to 4 – see description in the user guide.

● Palette change. This field is used during a palette change to indicate the 'from' and 'to' colours. At any time it shows the result of the latest palette change.

● Moiré mode. An M in this field indicates that the plotting is being done in a special way, loosely related to moiré patterns. Otherwise the field will be blank.

Features available

The program is in Basic and can be run. It is short enough to be able to operate on a disc machine and in all modes, so it should run on any (32K) system.

Once you have selected the mode, the function keys come into effect and we shall look at those shortly. The only non-function keys that are relevant are the cursor keys, Q and DELETE. The cursor keys are used to move the cursor around – the movement features full wrap-around and auto-repeat. DELETE will delete the last fixed point if there was one, otherwise it will do nothing. This is necessary as certain functions set their own fixed points which you may not require. Finally, Q is used to quit the program, and to reset the cursor and function keys to their normal modes of operation.

You can press a function key at (almost) any time to select an effect as follows:

f0: Speed select. This key toggles the speed setting between F and S.

f1: Fix point. If you have not used both fixed points, this will fix one for you. The point is left behind when you move the cursor away and will appear in the current foreground colour.

f2: Join. Joins the previous fixed point to the current cursor position with a straight line. Notice that, if there are two fixed points when you do the join, the first will be lost and the current cursor position is inserted at the top of the list of fixed points.

This means that you can move around and 'join' to create a polygon without having to specifically save any of the vertices — that is done for you. If you do not want to remember the last point joined as a fixed point, use DELETE to get rid of it.

f3: Triangle. Draws a (filled) triangle using the last two fixed points and the current cursor position as vertices. This implies, of course, that you must have two points already fixed before you can draw the triangle. If not, the request is ignored. The current cursor position is saved as the latest fixed point and the one saved before that will also be remembered. Consequently, after a 'triangle' command, there will still be two fixed points (as there were before), but they will be the last two points visited. This scheme makes it easy to draw rectangles and other shapes composed of triangles because it has a chaining effect analogous to that of the 'join' command.

f4: Circle. Draws a (filled) circle centred at the latest fixed point so that the current position lies on the circumference. The centre is held as the last fixed point so that a series of concentric circles is easily drawn. If there are no fixed points the request is ignored.

f5: Moiré. Selects moiré mode – the key acts as a toggle between moiré on and off. As the cursor moves, straight lines are continually drawn to the last fixed point. Because of the relatively low resolution, even in MODE 0, the slight imperfections in the lines give the appearance of a moiré pattern. Strictly speaking, a moiré pattern consists of two almost identical patterns overlayed to give 'interference' effects, but the results in this mode are very similar.

An example of the display in this mode is reproduced below. In this diagram, the frame around the graphics area was drawn using 'join'; normally, no such boundary is used unless you draw one yourself.

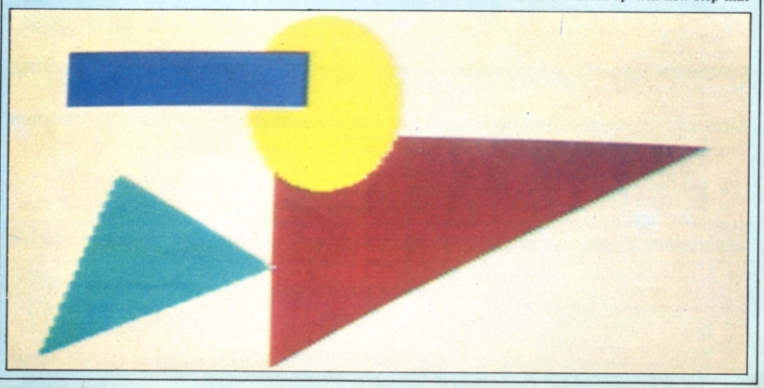
f6: Text. Allows you to type in text to label diagrams and plans. The cursor position will be the top left hand corner of the first text character and the colour of the print is the same as the current foreground colour. To exit from this mode, press <return>. Notice that DELETE does not work in this mode, neither can you erase letters by overwriting them, as the printing is done using VDU 5, which means that characters will overlay others rather than wipe them out. This is actually a rather useful feature as it enables you to produce different styles of lettering.

f7: Change colour. The current GCOL colour can be changed by holding down either the 'cursor up' or 'cursor down' key to step through the available colours. To indicate that you are in this mode, field 5 is replaced by a solid block whose colour indicates the colour you will select by pressing <return>. All subsequent plots will use this colour. When <return> is pressed, the colour is retained, but the field is replaced by the current GCOL mode number.

f8: Change GCOL. The cursor up/down keys will step the GCOL mode through the values 0-4. Leave this mode by pressing <return>. Initially this field is set to 0 which means that all plotting will be done in the colour specified, i.e. white.

f9: Palette. In modes other than 2, you might like a rest from the rather drab colour scheme, and use of this key enables you to change the palette, thereby introducing new colours. Field 6 will display a logical colour number in the range 0- (maximum number of colours for that mode less 1); step through the range using cursor up/down and press <return> when you reach the logical colour number you wish to amend. 'Cursor up' will now step that

15 ▶



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◀ 13

colour (the logical colour number will change colour) through the full range of colours. Press <return> when you find the one you want.

This sounds very complicated but in practice it is easy to use. For example, if we were in MODE 1, colour 2 would normally appear yellow. To change this to say, magenta, we would select the 'palette' facility and hold down a cursor key until field 6 showed the number '2'. Now press <return>. Holding down 'cursor up' will swap colour 2 for the full paint-box of colours – stop when it turns magenta and press <return>. Notice that anything that appears in yellow will change colour in sympathy with the swapping colours.

These facilities provide a good range of material both for the experimenter and the working programmer. Recently, I have used this routine to design a backgammon board and the task was greatly simplified by the ability to change palettes and to read off the X and Y co-ordinates of key points once the board began to take shape.

On the other hand, it can provide some interesting information about the effects of different GCOL setting and colour changes.

The routine can easily be amended to accommodate other graphic effects, depending on your own requirements.

How it works

Once the initialisation has been completed, the program enters a large loop (lines 210-380) which checks for any valid key being pressed. Action is taken depending on the key found and, with the exception of Q (quit program) this causes a PROCEDURE to be called to handle the processing of that request. On completing the PROCEDURE, control is returned to the loop.

Procedures

The bulk of this program is made up of PROCEDURES – for a start, each key option has an associated PROCEDURE. These are:

Key	PROCEDURE Name
f0	speed
f1	fix
f2	join
f3	tring
f4	circle
f5	moiré
f6	text
f7	colour
f8	gcol
f9	palette

The function of each of these PROCEDURES should be obvious – the set is completed by some less obvious ones:

PROCNEWCOL is called PROCCOLOUR to step the foreground colour through a range of values. The parameter indicates whether the step is up (+1) or down (−1).

Similarly, PROCNEWGCO performs the same service for procedure PROCGCOL. Two such procedures are required by the palette-changing procedure; one to change the logical colour number and one to change the actual colour once the logical colour has been selected. These are denoted by PROCCHCOL and PROCVDUCOL respectively.

If there are fixed points, pressing the Delete key will remove the latest one and calls PROCDEL to do so.

One very important routine is PROCMOVE which is used to move the cursor, update the display and draw a new line if 'Moiré' mode is set; this procedure is called each time a cursor key is pressed. It takes two parameters, namely: amount of horizontal and amount of vertical movement in that order.

Last and least, PROCBEEP does just what the name says.

Extensions

The number of variations is basically limited to the number of functions you can squeeze out of your function keys. In this utility, the keys are programmed to generate ASCII codes from 200 upwards. To get more from them, you can reprogram the CTRL, SHIFT and CTRL/SHIFT versions of the key (using *FX 225–228) and extend the program loop by including one or more of the relevant procedures.

As written, the routine falls neatly between 'useful' and 'enjoyable' – if you have more (or less) serious uses for it, then this will be reflected in the modifications you choose to include. For example, if you want to use the program for drafting out plans or mathematical figures a grid of squares would be useful for guidance. One key could be used to switch the grid in or out.

Another useful facility is sometimes known as 'rubber-banding' which means that as you move a line around, the previous copy of the line is deleted giving the illusion of a rubber band fixed at one point with the other being dragged around the screen under your control. This is an easy amendment, as the Moiré facility is itself a simplified version of this technique. To enable the Moiré mode to become a 'rubber-band' mode you will need the following additions to the routine:

```
1765IF' moire% MOVE X%,Y%: GOTO 1780
1795IF' moire% GCOL 3,col%: DRAW FX%(nf%),FY%(nf%)
```

The effect of this is to EOR the colour of the line you have just drawn with itself, producing black. (Probably – it depends very much on how the colours got onto the screen in the first place. Because this is not a 'pure' effect, and depends on other factors, it has been omitted from the original list of facilities.)

Unless you use a monitor for your display, you have some difficulty in reading MODE 0 screens. At present, the cursor is only the size of the smallest dot possible in the chosen mode and this will not be visible on a television set. One worthwhile improvement would be to enlarge the cursor – perhaps to a 'crosshair sight' – so that it is easier to see. You might like to do this for yourself by amending lines 1770-1810.

We have already observed that any series of graphics commands can be thought of as a string of VDU statements. In many cases, the instructions that create a screen are far more compact than the screen itself and that set of instructions is nothing more than a list of VDU codes. This suggests the interesting possibility of remembering significant codes (ones that contribute to the form of the screen, rather than those associated with your wandering around it) and saving them for future use.

As an example, the four bytes:

12,17,1,65

are easily remembered and, when preceded by VDU, they will clear a MODE 2

Variables

Variables abound in this program – here is a list of the important ones, together with their meanings.

FX%(2)	The X co-ordinates of the fixed points.
FY%(2)	The Y co-ordinates of the fixed points.
mx%	The width of the screen (constant = 1280).
my%	The height of the screen (constant = 984).
X%	The current X co-ordinate of the cursor.
Y%	The current Y co-ordinate of the cursor.
D%	Displacement of each step in a move. For 'slow' D%=2 and for 'fast' D%=16.
nf%	The number of fixed points at any time.
gcol%	The current GCOL mode in the range 0-4.
col%	The current foreground (plotting) colour.
was%	The colour of the point 'underneath' the cursor.
fix%	Set to 1 to indicate that the point beneath the cursor is to be replotted, instead of being blanked out. Otherwise fix % is set to 0.
white %	The number that represents white in the current mode. With one exception (what is it?), this is one less than the number of colours available in that mode.

In addition, quite a few 'local' variables are used within PROCEDURES (but not across the program) as temporary storage. The use of these variables is reasonably obvious when you look at how they are used. One variable may serve several functions in the different sections in which it appears, but because of the way it is used, this will not cause any problems.

16 ▶

(say) screen and print a red letter A in the top corner. This may not seem very interesting, but if you want to store that screen (in the normal way with *SAVE), it will cost you 20,480 bytes! The four single byte codes, together with a small overhead to do the VDUing are definitely a better bet. Even fairly complicated screens can be broken down into a shortish list of VDU codes which could be stored and then 'drawn' back onto the screen using VDU commands (or OSWRCH if you are writing in Assembler).

To implement this feature in the utility will require some care. Basically, an area must be set aside to hold the data and important VDU codes (such as those from PLOT or GCOL commands) should be stored there as they are executed. When the screen is complete, saving the table of data is tantamount to saving the instructions for drawing the screen and those instructions can be implemented by a one-liner as simple as this:

```
MODE 2:X=OPENIN("data"):
REPEAT  VDU  BGET#X:UNTIL
EOF#X
```

This interesting technique would allow many 'screens' to be stored in a much smaller space than would normally be occupied by just one normal high-resolution screen. Furthermore, for certain types of screen, it would be much faster to 'draw' than it would be to *LOAD it from tape (but probably not disc); and so, for once, we gain on the roundabouts *and* the swings.

Although this feature is not included in our utility, the program was written with the idea in mind and the amendments should not be too difficult. The best approach would be to take one function at a time and to include in its PROCEDURE the correct instructions for generating the appropriate VDU codes. Calling a new PROCEDURE would execute that list of codes (thereby updating the screen) and also store them in the table. Before you quit the program, *SAVE the table to tape or disc.

If you go through with this modification you will need one further PROCEDURE to read the data back into the program, ready for further processing. We have already seen that this is a fairly simple job.

Alternatively, the code could be merged into an entirely different program, for example a game. This could then create the screen from a small amount of data held either within the program (as DATA) or on file outside it. If you decided on the latter approach, then the data would be available to any program that cared to use it, provided it contained the 'drawing' procedure.

Program listing

```
10 REM GRAPHICS AID
20 REPEAT
30 INPUT "MODE (0,1,2,4,5) "MX
40 mc%=VALMID$("82841680084",2*MX+1,
   2)
50 UNTIL mc%>0
60 MODE MX
70 DIM FX%(2),FY%(2)
80 mx%=1280:my%=964
90 GX=4:XX=0:YX=0:DX=16:nfX=0
100 gcol%=0:wax%=0:fix%=0:moire%=0
110 white%=(mc%-1) AND 7
120 col%=white%
130 VDU 23,1,0;0;0;0;
140 VDU 24,0;0;mx%-1;my%-1;
150 VDU 23,224,-1,-1,-1,-1,-1,-1,-1,-1
160 PRINT"   0   0 F 0 0"
170 GCOL 0,7:PLOT 69,0,0
180 *FX 4,1
190 *FX 225,200
200
210 REPEAT
220 FX=INKEY(0)
230 IF FX=208 PROCspeed
240 IF FX=201 AND nfX<2 PROCfix
250 IF FX=202 AND nfX>0 PROCjoin
260 IF FX=203 AND nfX>1 PROCtring
270 IF FX=204 AND nfX>0 PROCcircle
280 IF FX=205 PROCmoire
290 IF FX=206 PROCtext
300 IF FX=207 PROCcolour
310 IF FX=208 PROCgcol
320 IF FX=209 PROCpalette
330 IF FX=127 AND nfX>0 PROCdel
340 IF FX=136 PROCmove(-DX,0)
350 IF FX=137 PROCmove(+DX,0)
360 IF FX=138 PROCmove(0,-DX)
370 IF FX=139 PROCmove(0,+DX)
380 UNTIL FX=81
390 *FX 4,0
400 *FX 225,1
410 END
420
430 DEFPROCspeed
440 PROCbeep(6)
450 DX=18-DX
460 IF DX=2 A$="S" ELSE A$="F"
470 PRINT TAB(18,0)A$
480 ENDPROC
490
500 DEFPROCfix
510 PROCbeep(7)
520 GX=1:fix%=1
530 nfX=nfX+1
540 FX(nfX)=XX:FY(nfX)=YX
550 PRINT TAB(12,0)nfX
560 ENDPROC
570
580 DEFPROCjoin
590 PROCbeep(8)
600 GCOL gcol%
610 DRAW FX(nfX),FY(nfX)
620 FX(nfX)=XX:FY(nfX)=YX
630 ENDPROC
640
650 DEFPROCtring
660 PROCbeep(9)
670 MOVE FX(1),FY(1)
680 MOVE FX(2),FY(2)
690 GCOL gcol%,col%
700 PLOT 85,XX,YX
710 FX(1)=FX(2):FY(1)=FY(2)
720 FX(2)=XX:FY(2)=YX
730 ENDPROC
740
750 DEFPROCcircle
760 PROCbeep(10)
770 R=SGR((FX(nfX)-XX)^2+(FY(nfX)-YX
    )^2)
780 VDU 29,FX(nfX);FY(nfX);
790 MOVE 238,0:MOVE R,0
800 GCOL gcol%,col%
810 FOR P=S TO 2*PI STEP S
820 MOVE 0,0
830 PLOT 85,R*COSP,R*SINP
840 NEXT
850 VDU 29,0;0;
860 ENDPROC
870
880 DEFPROCmoire
890 PROCbeep(11)
900 moire%=1-moire%
910 IF moire% A$="M" ELSE A$=" "
920 PRINT TAB(19,0)A$
930 ENDPROC
940
950 DEFPROCtext
960 PROCbeep(12)
970 VDU 5
980 REPEAT
990 WX=GET
1000 IF WX>31 AND WX<127 VDU WX
1010 UNTIL WX=13
1020 VDU 4,23,1,0;0;0;0;
1030 ENDPROC
1040
1050 DEFPROCcolour
1060 PROCbeep(13)
1070 GX=1
1080 REPEAT
1090 FX=INKEY(0)
1100 IF FX=138 PROCnewcol(-1)
1110 IF FX=139 PROCnewcol(+1)
1120 UNTIL FX=13
1130 PRINT TAB(14,0)gcol%
1140 COLOUR white%
1150 ENDPROC
1160
1170 DEFPROCnewcol(dy%)
1180 SOUND 1,-9,248,1
1190 col%=(col%+dy%+mc%) MOD mc%
1200 COLOUR col%
1210 PRINT TAB(14,0)CHR$224
1220 ENDPROC
1230
1240 DEFPROCgcol
1250 PROCbeep(15)
1260 COLOUR col%
1270 REPEAT
1280 FX=INKEY(0)
1290 IF FX=138 PROCnewgco(-1)
1300 IF FX=139 PROCnewgco(+1)
1310 UNTIL FX=13
1320 COLOUR white%
1330 ENDPROC
1340
1350 DEFPROCnewgco(dy%)
1360 gcol%=(gcol%+dy%+5) MOD 5
1370 GX=1:PRINT TAB(14,0)gcol%
1380 ENDPROC
1390
1400 DEFPROCpalette
1410 PROCbeep(16)
1420 GX=2:VX=0
1430 REPEAT
1440 FX=INKEY(0)
1450 IF FX=138 PROCvhcol(-1)
1460 IF FX=139 PROCvhcol(+1)
1470 UNTIL FX=13
1480 VDU 7
1490 REPEAT
1500 FX=INKEY(0)
1510 IF FX=139 PROCvducol
1520 UNTIL FX=13
1530 COLOUR white%
1540 ENDPROC
1550
1560 DEFPROCvhcol(dy%)
1570 VX=(VX+dy%+mc%) MOD mc%
1580 PRINT TAB(16,0)VX
1590 ENDPROC
1600
1610 DEFPROCvducol
1620 WX=(WX+1)MOD 16
1630 VDU 19,VX,WX,0,0,0
1640 COLOUR VX:PRINT TAB(16,0)VX
1650 ENDPROC
1660
1670 DEFPROCdel
1680 PROCbeep(3)
1690 GCOL 0,0
1700 PLOT 69,FX(nfX),FY(nfX)
1710 nfX=nfX-1
1720 GX=1
1730 PRINT TAB(12,0)nfX
1740 ENDPROC
1750
1760 DEFPROCmove(dx%,dy%)
1770 IF fix%=0 GCOL 0,wax%:PLOT 69,XX,Y
     X
1780 XX=(XX+dx%+mx%) MOD mx%
1790 YX=(YX+dy%+my%) MOD my%
1800 wax%=POINT(XX,YX)
1810 GCOL 0,col%:PLOT 78,XX,YX
1820 GX=4:fix%=0
1830 PRINT TAB(0,0)XX" "YX
1840 GCOL gcol%,col%
1850 IF moire% DRAW FX(nfX),FY(nfX)
1860 ENDPROC
1870
1880 DEFPROCbeep(WX)
1890 SOUND 1,-9,12+WX,10
1900 ENDPROC
```

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SCREEN ANTICS

Are you using your Atari's graphics to their fullest? Richard Parkes explains how you can exploit their potential by using the display list controlled by your friendly Antic.

The Atari Computer is noted for the outstanding graphics facilities which it possesses. However, their full potential is, more often than not, unrealised.

This is often the case when it comes to the display list and its applications. For example, the Atari Basic Reference Manual sent out with the 400 and 800 computers lists only 9 out of the 15 graphics modes possible and does not explain how to mix modes.

First, it is necessary to know what the display list is. Inside the Atari computer there is a microchip called Antic which is used to control the graphics. The program that Antic runs is the display list. It governs which graphics mode(s) are to be displayed and any special instructions that are to be carried out.

To understand the display list it is best to consider the Atari's screen as a number of horizontal lines, each as thick as a graphics mode 8 horizontal line. These are scan lines. Thus, a graphics 0 line is 8 scan lines high and a graphics 2 line is 16 scan lines. The display list just involves telling Antic which mode lines to display to build up a graphics screen.

There are two ways of utilising the features of display lists, either write one from scratch or customise an Operating System display list.

The first consideration when writing a display list from scratch is the number of scan lines; this should not be many more than 192 as this could cause the picture to roll. Less than 192 is all right, in fact it will increase the speed of the program as less time is spent on drawing the screen.

Figure 1 shows a typical display list. It has a graphics 2 heading, graphics 1 subheading, two graphics 0 lines, some graphics 8 lines and finally another graphics 0 line. To seperate the text some blank lines have been inserted, this is not necessary but can give a neater more easily read display.

Figure 1

ANTIC MODE	OS MODE	MODE TYPE	HORIZ. ROWS	SCANS PER LINE	BYTES PER LINE	NO. OF COLOURS
2	0	TEXT	40	8	40	2
3	-	TEXT	40	10	40	2
4	-	TEXT	40	8	40	5
5	-	TEXT	40	16	40	5
6	1	TEXT	20	8	20	5
7	2	TEXT	20	16	20	5
8	3	GR.	40	8	10	4
9	4	GR.	80	4	10	2
10	5	GR.	80	4	20	4
11	6	GR.	160	2	20	2
12	-	GR.	160	1	20	2
13	7	GR.	160	2	40	4
14	-	GR.	160	1	40	4
15	8	GR.	320	1	40	2

To enable Display List Interupt add 128 to instruction.

To enable Load memory scan add 64 to instruction.

To enable vertical scroll add 32 to instruction.

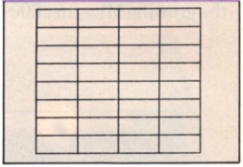
To enable horizontal scroll add 16 to instruction.

(n - 1) * 16 : Blank n scan lines, where $0 \le n \le 8$

1 : Jump over 1K boundary.

65 : Jump to start of display list.

Figure 2



Before writing the display list the number of scan lines must be worked out using Figure 1. The text at the top will use the following number of scan lines: 16 (for graphics 2) + 2 (blank lines) + 8 (for graphics 1) + 2 (blank lines) + 8 (graphics 0) + 2 (blank lines) + 8 (graphics 0) + 2 (blank lines) = 48. The text at the bottom of the screen uses 2 (blank lines) + 8 (graphics 0) = 10 scan lines. The text modes will, therefore, take up 48 + 10 = 58 scan lines, leaving 192 − 58 = 134 scan lines for graphics 8. It is now possible to start writing the display list.

112 The vast majority of display lists
112 start off with three blank 8 lines
112 instructions, giving a total of 24 blank lines. This is to prevent overscan.
71 This is more easily thought of as 64 + 7. The 7 means display Antic mode 7 (graphics 2) and the 64 is a load memory scan instruction, which tells Antic that the next two numbers are where the screen RAM starts.
8 The address is stored low then high.
40 So the screen RAM starts at 40 * 256 + 8 = 10248.
16 Leave two blank lines.
6 Display Antic mode 6 (Basic mode 1).
16 Leave two blank lines.
2 Display Antic mode 2 (graphics 0).
16 Two blank lines.
22 Antic mode 2.
16 Two blank lines.

Then for the graphics 8 part of the screen the next instructions should be 134 lots of 15, right? Wrong! A load memory scan instruction is needed when the screen RAM passes over a 4K boundary. Therefore, the number of bytes used so far needs to be calculated. This is 20 (for Antic 7) + 20 (for Antic 6)

+ 2 * 40 (for two lines of Antic 2) = 120 bytes. Note — no memory is used up when blank lines are displayed).

As screen RAM starts at 40 * 256 + 8 = 10248, the first 4K boundary will be at 48 * 56 = 12288 (*ie* on page 48, 1K is 4 pages, therefore, 4K boundary at page multiple of 16). As screen RAM starts at 10248 then 12288 − 10248 = 2040 bytes of memory can be used before crossing a 4K boundary. Because 120 bytes have already been used, 2040 − 120 = 1920 bytes are available for graphics 8 before crossing the 4K boundary, this is 1920 / 40 = 48 lines of graphics 8 (Antic 15).

Therefore, the next numbers in the display list are 48 lots of 15, after which follows an Antic 15 line with a load memory scan, *ie* 15 + 64 = 79. The next two numbers are where the rest of the screen RAM starts from, low then high. As this is page 48 (address 12288), the next two numbers are 0 and 48. 134 Antic 15 lines are required so there follows 134 − 49 = 85 lots of 15. Finally:

16 Blank two lines.
2 Display Antic mode 2.
65 Jump to start of display list which,
0 Starts at page 6, *ie* 6 * 256 = 1536
6

The display list is poked into RAM — program 1, page 6 is used. The computer is told where to find the new display list by poking the address of the display list, low then high, into 560 and 561 — line 110.

The difficulty arises when PRINTing or PLOTing to a new display list. However, this is overcome by considering each section of different modes as separate 'graphics windows'. The top left corner of each window is coordinate 0,0. The Basic mode number of the window is poked into location 87, and the address of the start of the screen RAM for the window poked into locations 88 and 89, low then high. This is shown in program 1 lines 120 to 180.

Customising an Operating System display list is probably easier than writing one from scratch as it just involves calling a graphics mode, finding the display list start and then a few simple pokes. For example, program 2 shows a graphics 0 display list customised with a line of graphics 1 (Antic 6) and a line of graphics 2 (Antic 7).

Line 20 calculates where the display list starts by peeking locations 560 and 561. Lines 30 and 40 insert the different modes. It is important to remember when poking into the display list that the first 6 numbers are blank lines and load memory scan instructions. Care must be taken when PRINTing to the screen because of different byte lengths per line. Experimentation is probably the best idea with display lists to get the display required.

Characters in Antic modes 2, 3, 6, and 7 are defined in the usual way, but Antic modes 4 and 5 offer multicoloured characters and they are defined differently. In these modes each character is in fact four pixels wide, but each pixel can be one of four colours, therefore, unlike Antic modes 6 and 7, the colour is defined by the character and not by the character number.

The best way to define the characters for Antic modes 4 and 5 is to draw a 4 by 8 grid as shown in Figure 2. Then for each of the four colours assign a number 0 to 3, and in each box write the number of the colour as shown in Figure 3. Each of the numbers has a bit pair associated with it as shown in Figure 5, with the colour register used.

The character can then be worked out in binary and this is then converted as shown in Figure 3.

The use of display lists makes scrolling easier, as by changing the values after the load memory scan the display can easily be scrolled up or down — Program 3 illustrates this, the joystick being used to scroll the screen up or down. The display list is set up in lines 30 to 80, and consists of a whole screen of Antic mode 6.

Figure 5

Number	Bit pair	Colour register character <128	Colour register character >128
0	00	4	4
1	01	0	0
2	10	1	1
3	11	2	3

As can be seen by running the program, the scrolling is very jerky. To overcome this problem there is a fine scrolling capability built into the Atari. This means that a character can be scrolled a scan line at a time instead of a character at a time as before. Fine vertical scrolling is implemented by first of all changing the display list. From Figure 1, each mode line that requires fine vertical scrolling must have 32 added to its display list instruction. The number of scan lines to be scrolled up is then poked into location 54277. This should be a number between 0 and 7 for Antic modes 2, 4 and 6; a number between 0 and 15 for modes 5 and 7; and a number between 0 and 9 for mode 3.

Fine scrolling can be linked to course scrolling as shown in Figure 4, this is to scroll up — the reverse can be applied to scroll down. By adding the lines in Program 3a to Program 3, this will show the display being fine scrolled. The display list is changed in line 40 to accept fine scrolling. Note the last line is not set for fine scrolling as it acts as a 'buffer' so it does not jump up and down (see later).

The scrolling appears to be a bit flickery. This is because the changing of the screen parameters occurs whilst the screen is being drawn by the television. The way to overcome the problem is to change the parameters between drawing screens. This can be done by using the Vertical Blank Interrupt (VBI) which occurs when the television's electron beam is leaving the bottom of the screen to return to the top.

The VBI should only be a short machine code routine ended with a JMP 58466 instruction. The vectors pointing to the VBI are set up by loading the X register of the 6502 with the high byte of the VBI address, the Y register with the low byte, the accumulator with a 7 and then a JSR 58460.

Program 4 uses a VBI to smooth scroll the display down. The display list is set up in lines 20 to 90. Each mode line being Antic mode 2 with a load memory scan instruction and smooth vertical scrolling set, *ie* 64 + 32 + 2 = 98. The machine code is entered in lines 110 to 140.

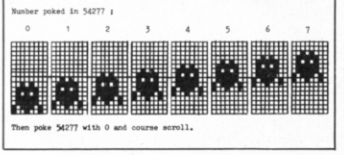
When the program is run the scrolling should appear smooth and flicker free. Looking at the bottom line shows why the buffer was used before. Changing the last number 98 in line 40 to just Antic mode 2 line with a load memory scan will insert the buffer, therefore the 98 should go to a 66 (64 + 2). The scrolling now should be smooth with no unsightly effects.

The game *Time Trial* illustrates how display lists can be applied to programs. Lines 70 to 120 of the program custo- 20 ▶

Figure 3

0	1	2	3	= 00 01 10 11 = 27
1	0	1	2	= 01 00 01 10 = 70
2	1	0	1	= 10 01 00 01 = 145
3	2	1	0	= 11 10 01 00 = 228
2	3	2	1	= 10 11 10 01 = 185
1	2	3	2	= 01 10 11 10 = 110
0	1	2	3	= 00 01 10 11 = 27
1	0	1	2	= 01 00 01 10 = 70

Figure 4



mises a graphics 18 (16 + 2) display to have a line of Antic mode 2, this screen being used for the title page. The display list used for the game screen is set up in lines 440 to 520, this consists of a line of Antic mode 2 with a load memory scan set, with the rest of the lines Antic mode 4 with a load memory scan and a smooth vertical scrolling instruction (4 + 64 + 32 = 100), apart from the last line which acts as a buffer so does not have a scroll instruction.

The program also shows that by poking display list locations into 560 and 561 it is possible to switch from one screen to another stored in RAM. The scrolling of the road is handled by the VBI, set up in lines 140 to 280, which is a longer version of the VBI used in Program 4. This one also produces a random road.

All underlined characters should be typed in inverse. After typing in the program it should be saved without running as a mistake could cause it to crash. If the data check routine is then typed at the end of the program and run by typing in GOTO 32000, any data errors should then be displayed. When they have been corrected the data check routine should be deleted (important on 16K models) and the new version saved.

The object of the game is to drive the buggy as far as possible in 60 seconds using the joystick in port 1. Driving over an oil slick will cause the buggy to skid. Moving the joystick forward increases the speed and moving it back decreases the speed.

When the game screen first appears there is a red light at the top of the screen, this will change to green after a random amount of time and only when the joystick is in a central position. When this changes to green, the time immediately starts ticking down and lo and behold, your Time Trial has begun.

Program listing

```
10 REM ************************
20 REM *                      *
30 REM *  T I M E   T R I A L  *
40 REM *                      *
50 REM ************************
60 CLR
70 GRAPHICS 18
80 POKE 559,0
90 POSITION 5,1:? #6;"STRIMEX":POSITIO
N 5,3:? #6;"TRIAL"
100 POSITION 1,6:? #6;"best score  00000
":POSITION 1,8:? #6;"last score  00000"
110 GR18H=PEEK(56):GR18L=PEEK(560)
120 POKE GR18H*256+GR18L+15,2:POSITION 0
,10:? #6;"          PRESS TRIGGER TO PLAY
"

130 REM VBI ROUTINE IN STRING UBI$
140 RESTORE 150:DIM UBI$(391):FOR J=1 TO
 391:READ A:UBI$(J,J)=CHR$(A):NEXT J
150 DATA 173,136,6,208,53,208,135,6,208,
43,169,50,141,135,6,206,97,6,173,97,6,20
1,16,240,13,176,26,169,25
160 DATA 141,97,6,206,96,6,56,176,15,173
,96,6,201,16,208,8,169,1,141,136,6,56,17
6,5,173,131,6,208,3,76,98
170 DATA 228,201,1,208,14,169,2,206,133,
6,240,7,162,1,142,133,6,208,235,168,136,
206,132,6,162,6,254,110
180 DATA 6,189,110,6,201,26,208,9,169,16
,157,110,6,202,24,144,237,136,208,229,17
3,132,6,48,15,141,5,212
190 DATA 173,134,6,240,193,169,0,141,134
,6,240,72,24,105,8,141,132,6,141,5,212,1
69,1,141,134,6,173,79,6
200 DATA 141,81,6,173,78,6,141,80,6,173,
74,6,141,79,6,173,73,6,141,78,6,162,66,1
89,5,6,157,8,6,202,189,5
210 DATA 6,157,0,6,202,202,208,239,173,8
1,6,141,8,6,173,80,6,141,7,6,76,98,228,1
73,78,6,133,207,173,79,6
220 DATA 133,208,160,39,169,64,145,207,1
36,16,251,173,130,6,240,62,16,30,206,129
,6,173,10,210,48,12,173
230 DATA 129,6,201,2,240,5,169,70,56,176
,86,169,0,141,130,6,169,71,56,176,76,238
,129,6,173,10,210,48,12
240 DATA 173,129,6,201,26,240,5,169,67,5
6,176,56,169,0,141,130,6,169,68,56,176,4
6,173,10,210,201,80,144
250 DATA 5,169,65,56,176,34,74,144,17,17
3,129,6,201,2,240,241,169,255,141,130,6,
169,69,56,176,14,173,129
260 DATA 6,201,26,240,224,169,1,141,130,
6,169,66,172,129,6,145,207,24,105,7,170,
152,24,105,10,168,136,145
270 DATA 207,136,162,9,169,0,145,207,136
,202,208,250,173,10,210,162,3,74,176,20,
202,208,250,41,15,240,13
280 DATA 201,10,176,9,24,109,129,6,168,1
69,79,145,207,76,98,228
290 REM CLEAR P/M AREA & PUT CHARACTER
300 REM SET IN RAM & INSERT VBI
310 REM CODE IN STRING SET*
320 RESTORE 330:DIM SET$(70):FOR J=1 TO
70:READ A:SET$(J,J)=CHR$(A):NEXT J
330 DATA 104,169,0,133,203,133,205,173,2
44,2,133,204,165,106,56,233,24,133,106,1
33,206,162,8,160,0,177,203,145
340 DATA 205,200,208,249,230,204,230,206
,202,208,242,230,206,230,206,230,206,162
,5,169,0,160,0,145,205,200
350 DATA 208,251,230,206,202,208,246,160
,0,162,0,169,7,76,92,228
360 UBI=ADR(UBI$):UBH=INT(UBI-256):UBL=U
BI-UBH*256:SET$(63,63)=CHR$(UBL):SET$(65
,65)=CHR$(UBH)
370 POKE 1672,1:A=USR(ADR(SET$))
380 C=PEEK(106):POKE 756,C:DC=C*256+512:
RESTORE 390:FOR J=DC TO DC+119 STEP 2:RE
AD A:POKE J,A:POKE J+1,A:NEXT J
390 DATA 85,85,85,85,96,96,96,96,86,88,9
6,96,86,88,96,128,96,96,96,128,128,96,96
,96,128,96,88,86
400 DATA 96,96,88,86,37,37,37,37,2,9,37,
37,2,9,37,149,37,37,37,149,37,37,37,149,
37,37,2,37,37,9,2
410 RESTORE 420:FOR J=DC+120 TO DC+127:R
EAD A:POKE J,A:NEXT J
420 DATA 12,63,252,252,255,255,60,0
430 REM SET UP DISPLAY LIST
440 RESTORE 450:FOR J=1536 TO 1541:READ
A:POKE J,A:NEXT J
450 DATA 112,112,112,66,84,6
460 DH=PEEK(106)+16:DL=0
470 FOR J=1542 TO 1605 STEP 3:POKE J,100
:POKE J+1,DL:POKE J+2,DH:GOSUB 480:NEXT
J:GOTO 500
480 DL=DL+40:IF DL>255 THEN DL=DL-256:DH
=DH+1
490 RETURN
500 POKE 1608,68:GOSUB 480:POKE 1609,DL:
POKE 1610,DH
510 POKE 1611,65:POKE 1612,0:POKE 1613,6
520 GOSUB 480:POKE 1614,DL:POKE 1615,DH
530 POKE 712,6:POKE 708,22:POKE 709,12:P
OKE 710,0
540 RESTORE 550:DIM ROAD4(60):FOR J=1 TO
 60:READ A:ROAD4(J,J)=CHR$(A):NEXT J
550 DATA 184,165,186,24,105,16,133,213,1
63,0,133,212,162,25,160,39,169,64,145,21
2,136,16,251,160,14,169
560 DATA 65,145,212,200,169,0,145,212,20
0,192,24,144,249,169,72,145,212,202,240,
13,169,40,24,101,212,133
570 DATA 212,144,215,230,213,176,211,96
580 RESTORE 590:DIM GAME$(274):FOR J=1 T
O 274:READ A:GAME$(J,J)=CHR$(A):NEXT J
590 DATA 104,169,180,141,135,2,169,0,141
,136,6,173,136,6,240,1,96,173,120,2,174,
138,6,240,8,206,138,6,74
600 DATA 74,24,144,36,74,176,16,174,131,
6,224,5,240,9,238,131,6,174,147,6,142,13
8,6,74,176,14,174,131,6
610 DATA 240,9,206,131,6,174,147,6,142,1
38,6,174,131,6,240,73,74,176,15,162,255,
142,140,6,174,131,6,224
620 DATA 47,144,3,206,137,6,74,176,15,16
2,1,142,148,6,174,137,6,224,198,176,3,23
8,137,6,169,25,141,147,6
630 DATA 173,133,6,240,27,206,133,6,169,
40,141,147,6,24,144,2,144,134,173,137,6,
185,140,6,141,137,6,169
640 DATA 6,24,144,2,169,0,141,3,210,174,
131,6,185,141,6,141,0,210,174,137,6,142,
0,208,142,2,208,232,142
650 DATA 1,208,173,97,6,201,21,208,5,162
,0,142,3,208,172,131,6,190,148,6,160,48,
234,136,208,252,202,208
660 DATA 247,173,4,208,13,5,208,74,176,2
4,74,176,21,162,1,142,154,6,74,144,166,1
69,10,141,139,6,169,0,141
670 DATA 30,208,24,144,153,174,154,6,240
,17,162,0,142,131,6,160,200,234,136,208,
252,202,208,247,142,154
680 DATA 6,142,133,6,142,30,208,232,142,
131,6,162,25,142,138,6,24,144,201
690 PM=PEEK(106)+8:POKE 54279,PM:PM=PM*2
56:POKE 53277,3
700 POKE 623,1
710 RESTORE 720:FOR J=1 TO 14:READ A:POK
E PM+113*J,A:NEXT J
720 DATA 28,127,247,247,255,99,99,99,227
,255,255,247,127,62
730 RESTORE 740:FOR J=1 TO 14:READ A:POK
E PM+139+J,A:NEXT J
740 DATA 0,0,1,1,1,0,0,0,1,1,1,1,0,0
750 RESTORE 760:FOR J=1 TO 14:READ A:POK
E PM+164+J,A:NEXT J
760 DATA 0,0,8,0,8,28,28,28,28,0,0,8,0,0
770 RESTORE 780:FOR J=1 TO 6:READ A:POKE
 J+PM+1835,A:NEXT J
780 DATA 2,7,7,7,7,2
790 POKE 704,14:POKE 705,14:POKE 706,50
800 DIM LAST$(5):BEST$(5)=BEST$+"00000"
810 POKE 559,62:GOTO 960
820 POKE 707,50
830 RESTORE 840:FOR J=1620 TO 1668:READ
A:POKE J,A:NEXT J
840 DATA 0,0,0,0,0,0,0,0,52,41,45,37,0,22,
16,0,0,0,0,0,0,0,41,51,52,33,46,35,37,0,1
6,16,16,16,0,0,0,0,0,0
850 DATA 0,0
860 RESTORE 870:FOR J=1665 TO 1683:READ
A:POKE J,A:NEXT J
870 DATA 0,0,0,0,0,1,0,1,1,120,1,0,0,150,
120,100,90,80,76,0,2,160,148,120,100,80
880 A=USR(ADR(ROAD4)):SOUND 0,0,0,0:POKE
 53761,200:POKE 53760,150:POKE 53762,0
890 POKE 560,0:POKE 561,6:POKE 53251,180
:POKE 53248,120:POKE 53249,121:POKE 5325
0,120
900 FOR J=1 TO 200:NEXT J
910 A=INT(RND(1)*200+200):FOR J=1 TO A:N
EXT J:IF STICK(0)<15 THEN 910
920 A=INT(RND(1)*200+100):FOR J=1 TO A:N
EXT J
930 A=USR(ADR(GAME$))
940 FOR J=1 TO 5:LAST$(J,J)=CHR$(160+PEE
K(J+1647)):NEXT J:IF LAST$>BEST$ THEN BE
ST$=LAST$
950 POSITION 13,8:? #6;LAST$:POSITION 13
,6:? #6;BEST$
960 POKE 53761,0:POKE 53763,0:FOR J=1 TO
 400:NEXT J:FOR J=0 TO 3:POKE J+53248,0:
NEXT J
970 POKE 53278,0
980 POKE 561,GR18H:POKE 560,GR18L
990 IF STRIG(0)=1 THEN 990
1000 END
1010 GOTO 820
32000 REM DATA CHECK ROUTINE FOR
32001 REM TIME TRIAL
32002 RESTORE 150:T=0:FOR J=1 TO 391:REA
D A:T=T+A:NEXT J:IF T<>42354 THEN ? "DAT
A ERROR-LINE 150 TO 280"
32003 RESTORE 330:T=0:FOR J=1 TO 70:READ
 A:T=T+A:NEXT J:IF T<>10903 THEN ? "DATA
 ERROR-LINE 330 TO 350"
32004 RESTORE 390:T=0:FOR J=1 TO 74:READ
 A:T=T+A:NEXT J:IF T<>9857 THEN ? "DATA
ERROR-LINE 390 TO 450"
32005 RESTORE 550:T=0:FOR J=1 TO 60:READ
 A:T=T+A:NEXT J:IF T<>8288 THEN ? "DATA
ERROR-LINE 550 TO 570"
32006 RESTORE 590:T=0:FOR J=1 TO 274:REA
D A:T=T+A:NEXT J:IF T<>30778 THEN ? "DAT
A ERROR-LINE 590 TO 680"
32007 RESTORE 720:T=0:FOR J=1 TO 114:REA
D A:T=T+A:NEXT J:IF T<>4531 THEN ? "DATA
 ERROR-LINE 590 TO 680"
```

Program 1

```
1 REM PROGRAM 1
10 GRAPHICS 0
20 POKE 752,1
30 FOR J=40*256 TO 64*256:POKE J,0:NEXT
J:REM CLEAR SCREEN R.A.M.
40 FOR J=1536 TO 1548:READ A:POKE J,A:NE
XT J
50 DATA 112,112,112,7,1,0,40,16,6,16,2,16
,2,16
60 FOR J=1549 TO 1596:POKE J,15:NEXT J
70 POKE 1597,79:POKE 1598,0:POKE 1599,48
80 FOR J=1600 TO 1684:POKE J,15:NEXT J
90 FOR J=1685 TO 1689:READ A:POKE J,A:NE
XT J
100 DATA 16,2,65,0,6
110 POKE 560,0:POKE 561,6
120 POKE 87,2:POKE 88,0:POKE 89,48:POSIT
ION 3,0:? #6;"graphics demo"
130 POKE 87,1:POKE 88,28:POKE 89,48:POSI
TION 6,0:? #6;"SHOWING"
140 POKE 87,0:POKE 88,48:POKE 89,48:POSI
TION 11,0:? "AN APPLICATION OF":POSITION
13,1:? "DISPLAY LISTS"
150 POKE 87,8:POKE 88,128:POKE 89,40:COL
OR 1
160 PLOT 10,1:DRAWTO 10,133:PLOT 10,66:D
RAWTO 312,66
170 DEG :FOR X=0 TO 360 STEP 0.5:PLOT 10
+X*5/0.66+65*SIN(X):NEXT X
180 POKE 87,0:POKE 88,112:POKE 89,6:POS
ITION 15,0:? "SINE WAVE"
190 GOTO 190
```

Program 2

```
1 REM PROGRAM 2
10 GRAPHICS 0
20 DL=PEEK(560)+256*PEEK(561):REM DL IS
START OF DISPLAY LIST
30 POKE DL+10,7:REM INSERT ANTIC MODE 7
LINE (GRAPHICS 2)
40 POKE DL+12,6:REM INSERT ANTIC MODE 6
LINE (GRAPHICS 1)
50 POSITION 15,4:? "GRAPHICS 8"
60 POSITION 5,5:? "GRAPHICS 2"
70 POSITION 35,5:? "GRAPHICS 0"
80 POSITION 25,6:? "GRAPHICS 1"
```

Program 3

```
1 REM PROGRAM 3
10 GRAPHICS 0:POKE 82,0
20 LIST
30 FOR J=1536 TO 1562:READ A:POKE J,A:NE
XT J
40 DATA 112,112,112,70,0,0,6,6,6,6,6,6
,6,6,6,6,6,6,6,6,6,6,6,6,6,6,65,0,6
50 DL=PEEK(560)+256*PEEK(561):REM FIND
START OF OLS DISPLAY LIST
60 L=PEEK(DL+4)+H*PEEK(DL+5):REM FIND
LOW & HIGH BYTES OF START OF SCREEN DATA
70 POKE 1540,L:POKE 1541,H:REM START OF
SCREEN DATA POKED IN PAGE 6 DISPLAY LIST
80 POKE 560,0:POKE 561,6:REM ADDRESS OF
NEW DISPLAY LIST
90 LS=L:HS=H
100 A=STICK(0)
110 IF A=13 AND (LS+HS#256)>(L+H#256) TH
EN LS=LS-20:IF LS<0 THEN LS=LS+256:HS=HS
-1
120 IF A=14 AND (LS+HS#256)<(L+H#256+480
) THEN LS=LS+20:IF LS>256 THEN LS=LS-256
:HS=HS+1
130 POKE 1540,LS:POKE 1541,HS
140 FOR J=1 TO 100:NEXT J
150 GOTO 100
```

Program 3a

```
1 REM PROGRAM 3a
40 DATA 112,112,112,102,0,0,30,30,30,30,
30,30,30,30,30,30,30,30,30,30,30,30,30,3
0,30,30,30,6,65,0,6
95 SMOOTH=0
110 IF A=13 AND (LS+HS#256)>(L+H#256) TH
EN 150
120 IF A=14 AND (LS+HS#256)<(L+H#256+480
) THEN 170
135 POKE 54277,SMOOTH
140 GOTO 100
150 SMOOTH=SMOOTH-1:IF SMOOTH<0 THEN LS=
LS-20:SMOOTH=7:IF LS<0 THEN LS=LS+256:HS
=HS-1
160 GOTO 130
170 SMOOTH=SMOOTH+1:IF SMOOTH>7 THEN LS=
LS+20:SMOOTH=0:IF LS>256 THEN LS=LS-256:
HS=HS+1
180 GOTO 130
```

Program 4

```
1 REM PROGRAM 4
10 GRAPHICS 0:POKE 752,1
20 FOR J=1536 TO 1613:READ A:POKE J,A:NE
XT J
30 DATA 112,112,112,98,0,0,98,0,0,98,0,0
,98,0,0,98,0,0,98,0,0,98,0,0,98,0,0,98,0
,0,98,0,0,98,0,0,98,0,0
40 DATA 98,0,0,98,0,0,98,0,0,98,0,0,98,0
,0,98,0,0,98,0,0,98,0,0,98,0,0,98,0,0,98
,0,0,98,0,0,65,0,6
50 DL=PEEK(560)+256*PEEK(561)
60 H=PEEK(DL+5):L=PEEK(DL+4)
70 FOR J=0 TO 69 STEP 3:POKE 1540+J,L:PO
KE 1541+J,H
80 L=L+40:IF L>255 THEN L=L-256:H=H+1
90 NEXT J
100 REM READ IN MACHINE CODE ROUTINE FOR
 VBI
110 FOR J=1614 TO 1686:READ A:POKE J,A:N
EXT J
120 DATA 104,162,6,160,89,169,7,32,92,22
8,96,206,255,6,173,255,6,16,48,173,73,6,
141,253,6,173,74
130 DATA 6,141,254,6,162,69,189,2,6,157,
5,6,202,189,2,6,157,5,6,202,202,208,239,
173,253,6,141,4,6,173
140 DATA 254,6,141,5,6,169,7,141,255,6,1
41,5,212,76,98,228
150 POKE 560,0:POKE 561,6:REM DISPLAY
LIST IN PAGE 6
160 REM DRAW DISPLAY
170 FOR Y=0 TO 23:READ X,C
180 POSITION X,Y:? CHR#(C);:FOR J=0 TO 8
:? CHR#(160);:NEXT J:? CHR#(C+128):
190 IF R>0.9 AND X<27 THEN X=X+1:C=138
200 POSITION X,Y
210 NEXT Y
220 DATA 15,32,15,8,14,8,13,32,13,32,13,
32,13,8,12,32,12,32,12,32,12,32,13,138,1
4,138,15,138,16,138
230 DATA 16,32,16,32,16,32,17,138,17,32,
17,32,17,8,16,8,15,32
240 A=USR(1614):REM CALL ROUTINE TO SET
UP VBI
250 GOTO 250
```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GRANADA-COLLINS

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EXPANDING

In part two of his article, Keith Hook explains how you can add those new commands to your Amstrad screen.

Expanding on the sprite controller, and adding two more commands, will allow us to PEEK at the Amstrad screen, create up to eight pseudo — sprites, and move them about the screen.

For those people who like to get their hands dirty, Listing One is the source problem for the Basic driver.

The method of using the program is as before. The Basic loader program and a demonstration program will be published in next week's issue. Type it in, save it and run the program. The demonstration module will show you what is possible with these routines. But it is not meant to be an elite piece of programming.

Driver program notes

The PUT routine has now been extended to include one more parameter. The correct syntax for this command is:

:PUT, <Sprite Number>,<Direction>

The sprite number can be 1 to 8, and the direction can be 1 to 8 with the sprite moving in exactly the same direction as shown in part one. But if a zero is placed in the <Direction> it will cause the sprite to be cleared from the screen and then place &FF (Sprite Not Created Marker) & 00 (First time routine entered Flag), in the sprite table.

You must then re-create the sprite before you can display it on the screen. This is helpful when a collision with another object is detected and you wish to blank the sprite and leave the screen as before.

To create a sprite you must use the command, :CRSPR. The routine then stores the information into the correct entry point of the sprite table. The syntax for this command is:

:CRSPR,<SPRITE NO>,<PATT NO>,<X POS ON SCREEN>,<Y POS>,<COLOUR>

Program listing

```
;LISTING ONE
;           Modified Program to add 3 New commands
;           to Amstrad CPC 464.
;(c) K.Hook & PCN 1984.
;
;
                ORG     40000
                ENT     $
                LD      HL,CONTAB
                LD      BC,BUF
                CALL    &BCB1           ;Log on New command table.
                ;

CONTAB:         DEFW    NMETAB
                JP      PUT
                JP      CRSPR           ;Additional new command
                JP      SCRN            ;Additional new command
                ;

NMETAB:         DEFB    "PU"
                DEFB    "I"+&80         ;&80 tells Amstrad Basic last
                DEFB    "CRSP"          ;letter in command name
                DEFB    "S"+&80         ;It sets BIT 7 HIGH.
                DEFB    "SCR"
                DEFB    "R"+&80
                DEFB    &00             ;End of table marker.
                DEFS    &02             ;Padding.
                ;

PUT:            LD      A,(IX+02)       ;Sprite Number
                LD      (SPRNO),A
                CALL    FINDISP         ;Find displacement into sprite table.
                                        ;Returns with IY pointing to first entry.
                LD      A,(IY+00)       ;1. Position.
                CP      &FF             ;&FF signifies not yet created.
                RET     Z               ;Back to Basic if not created.
                LD      A,(IX+00)       ;PUT direction.
                CP      &00             ;00 means erase sprite  New action
                JP      Z,BLANK
                CP      &09             ;Test if >8
                RET     NC              ;Jmp back to basic if yes.
                LD      (IY+02),A       ;Else save in sprite table.
                CALL    &BB78           ;Get current Basic csr pos.
                LD      (BASPOS),HL     ;Save it.
                LD      L,(IY+00)       ;Y POS
                LD      H,(IY+01)       ;X POS
                PUSH    HL              ;Save
                CALL    &BB75           ;Mve csr to our current position.
                LD      A,(IY+04)       ;Check flag byte in sprite table.
                CP      &00
                JR      NZ,SKIP         ;If not zero sprite has already been moved.
                LD      ,&FE            ;&FE is flag to say routine has
                LD      (IY+04),A       ;Already been entered and
                CALL    &BB9F           ;is also signal to write in transparent mode.
                CALL    &BB93           ;Find current ink
                LD      (INK1),A        ;save it.
                LD      A,(IY+03)       ;Get our ink
                CALL    &BB90           ;Change to it.

                POP     HL              ;Get csr position back.
                JP      REINIT
SKIP:           LD      A,(IY+05)       ;Character that was in sprite pos.
                CALL    &BB50           ;Put it back on screen.
                LD      A,&FE           ;Transparent mode flag.
                CALL    &BB9F           ;Send it.
                CALL    &BB93           ;Current ink
                LD      (INK1),A        ;Save it
                LD      A,(IY+03)       ;Our ink from sprite table.
                CALL    &BB90           ;Make sure we write in it.
                POP     HL              ;Csr posit our routine.
                LD      A,(IY+02)       ;Direction byte
                CP      &01
                ;  ############################
                ;  From here to RESTOR as last weeks listing
                ;  ############################
                ;
RESTOR:         LD      A,H             ;Get X pos
                CP      01              ;1st x pos
                JR      C,REINT2        ;JP if less than
                CP      41              ;Last X pos+1
                JR      NC,REINT2       ;JP if greater than
                LD      A,L             ;Now do same for Y pos.
                CP      &01
                JR      C,REINT2
                CP      26
                JR      NC,REINT2
                LD      (IY+00),L       ;Save new X pos
                LD      (IY+01),H       ;Save new Y pos
REINIT:         LD      HL,(IY+00)      ;Get our new position
                CALL    &BB75           ;Move csr to it
                CALL    &BB60           ;so we can read char on screen.
```

SPRITES

This command must be used to create your sprite before invoking the :PUT command. The sprite can now be displayed on the screen at the location specified in :CRSPR by issuing a :PUT,<SPRITE NO>,1 command.

The :SCRN command peeks the screen and places the result in location £9DF3. Amstrad Basic is suppose to allow the passing of parameters back to Basic from an external command. However, after checking with Amsoft, I am still no wiser, and therefore, I have used this as a temporary way around the problem. Use the following syntax when invoking this command:

:SCRN,<X POSITION>,<Y POSITION>

A typical Basic line may look like this:

10 :SCRN, 3,5: LET PK = PEEK (&9DF3)

Variables can be used with all commands, such as:

:SCRN,X,Y or :CRSPR, 3,249,X,Y,3

This section of code can be detached, and used as a screen peek utility with any other Basic program.

The sprite table starts at location £9DB3. The method of finding the correct displacement into the table is as follows:

SPRITE TABLE+(SPRITE NUMBER — 1*8):

If you wished to check which direction sprite 3 is moving you would use £9DB3+(3-1*8+2) to find the correct entry point.

The sprite table entries are as follows: Byte 1 Y Position, Byte 2 X Position, Byte 3 Direction, Byte 4 Ink, Byte 5 Flag, Byte 6 Basic Character, Byte 7 Sprite Pattern, Byte 8 Sprite Number.

One point to note is that when two sprites collide, you should erase the last sprite first by using the :PUT command followed by the sprite with which the collision occurred.

The DEMO-PROG. BAS caters for most situations that could arise in your programming. Type it in, and then study how it works, if you want a working insight on how to use these commands. The source listing can be used as a matrix to create your own routines.

```
        LD    (IY+05),A     ;and save it in sprite table.
REINT2: LD    HL,(IY+00)
        CALL  &BB75
        LD    A,(IY+06)     ;Get sprite character.
        CALL  &BB5D         ;write it to screen
        LD    HL,(BASPOS)   ;Get Basic's position
        CALL  &BB75         ;Pos cur to it
        LD    A,&00         ;Flag for opaque mode.
        CALL  &BB9F         ;Let Basic know we are now writing opaque.
        LD    A,(INK1)      ;Basic's ink.
        CALL  &BB90         ;Send it.
        RET                 ;JP back to main program.
;
;
FINDISP:LD    A,(SPRNO)     ;Get sprite
        DEC   A             ;ALIGN  #SEE NOTES
        RLCA                ;#2
        RLCA                ;#4
        RLCA                ;#8
        LD    C,A
        LD    B,&00
        LD    IY,SPRTBL
        ADD   IY,BC         ;IY now points to correct entry.
        RET
        ;
        ;
CRSPR:  LD    A,(IX+08)     ;Sprite no
        CP    09            ;Check if legal
        RET   NC            ;because only 8 allowed.
        LD    (SPRNO),A     ;save it for FINDISP
        CALL  FINDISP       ;find start in table for this sprite number.
        LD    A,(IX+02)     ;X pos
        LD    (IY+00),A     ;save in our table.
        LD    A,(IX+04)     ;Y pos
        LD    (IY+01),A
        LD    A,(IX+00)     ;Colour
        LD    (IY+02),A
        LD    A,(IX+06)     ;Pattern
        LD    (IY+06),A
        LD    A,(SPRNO)
        LD    (IY+07),A
        LD    A,&00         ;FLAG
        LD    (IY+04),A
        RET                 ;Return  to  main program.
        ;
        ;
SCRN:   LD    A,(IX+00)     ;X pos
        LD    L,A           ;
        LD    A,(IX+02)     ;Y pos
        LD    H,A
        LD    A,H           ;padding.
        CP    01
        RET   C
        CP    41            ;We've been through this before.
        RET   NC
        LD    A,L
        CP    01
        RET   C
        CP    26
        RET   NC
        CALL  &BB75         ;Update cur
        CALL  &BB60         ;Read screen
        LD    (PEEK),A      ;save it so we can peek it.
        RET                 ;That's all folks.
        ;
        ;
BASPOS: DEFW  0000
INK1:   DEFB  00
BUF:    DEFS  &04
SPRNO:  DEFB  00
SPRTBL: DEFS  64
PEEK:   DEFB  00
;
BLANK:  CALL  &BB78         ;Cur pos
        LD    (BASPOS),HL   ;Save it
        LD    HL,(IY+00)    ;Our position
        CALL  &BB75         ;Send it
        LD    A,(IY+05)     ;Basic's character


        CALL  &BB5D         ;Send it to screen
        LD    A,&FF         ;Sprite not created flag
        LD    (IY+00),A     ;Put it in sprite table
        XOR   A             ;Zero A reg
        LD    (IY+04),A     ; Flag
        LD    HL,(BASPOS)
        CALL  &BB75         ;Make sure cur back to basic's
        RET
        END
```

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OUTPUT: SPECTRUM

LEGIBLE LISTINGS

Stuart Cooke unlocks the secret of how to get readable listing from your Spectrum, with the help of an Interface 1, a Microdrive, and this program.

Getting a listing from a Spectrum Basic program is not the easiest thing to do. OK, so you can buy yourself a Centronics interface which will allow you to use a high quality printer with your Spectrum — some of them even print out italic characters to represent the Spectrum user defined graphics.

Of course, if you have a Sinclair ZX printer you can actually get the graphics themselves but the listing is not as good.

Even though you can print out graphics to some printers, there are still a number of problems. With the Spectrum it is possible to put embedded control codes within a listing. These codes could be used to change the colour of the ink or paper, flashing characters on and off, and even alter the brightness. Of course, none of these control codes can be sent out to your printer, which means that when you next type the program in, it won't look the same.

This is where the Sinclair Interface 1 and Microdrive can help out. It is now possible for a program to interrogate another file that is held on a Microdrive cartridge and send modified data out to the specified printer. It makes sense to use the RS232 port for the printer if you have an Interface 1.

It is quite a simple matter to develop a program to do this but first you will need to know what all of the character codes are that you will be looking at.

Normally if you wish to use graphics within a Spectrum listing you will use graphics characters. Most printer interfaces, including the Interface 1 if you are using the text channel, will ignore any graphics characters. Therefore you need some way of being able to figure out at a glance what graphics characters are used. A very simple solution would be to substitute the graphics character with something like {gA} for graphics character a or {gB} for graphics character b.

All you have to do is get the code of the graphics character to be printed, send the characters {g to the printer, then subtract 47 from the code of the graphics character changing it to the relevant alphabetic character, then send this character to the printer followed by the } symbol and your new easily readable graphic is complete.

Of course, user definable graphic characters are not the only ones used on the Spectrum. There are a number of block graphic characters on the keys 1 to 8 which can be used, and again the printer will ignore these symbols. Following the same procedure you simply examine the character code and if the code is between 129 and 143 you know it's one of these characters.

Probably the easiest way to make these characters readable is to insert codes similar to the ones explained before. For example, {g1} would mean use the graphics character on key 1 and {gs1} would mean use the shifted graphics character on key 1.

Now for the control codes. As mentioned, it is possible to put embedded control codes within a program, *eg* going into extended mode by pressing the two shift keys and then pressing the 2 key which will cause all future text to be printed with red ink. Alternatively, pressing extended mode and shift 3 will cause the rest of the listing to have magenta paper.

All that has to be done is to interrogate the listing and change any occurrences of the codes to the new format; {e1} would mean extended mode and 1 while {es1} would mean extended mode and shift 1.

Program interrogation

It is not easy to examine all of the characters of a progam and then send it out to a printer on a normal Spectrum. However, once an Interface 1 and Microdrive have been added, it is possible to list your program to a file. Every character will then be stored in sequential format using its ASCII representation.

Now you can use another program to open this sequential file, read it into

memory as required, change the character as necessary and then send it to the printer.

Saving a progam in sequential format is extremely easy. Have the program in memory and then type in the following:

```
OPEN#5;"m";1;"filename"
```

then LIST the program out to the **Microdrive** by typing:

```
LIST#5
```

then close the file:

```
CLOSE#5
```

Now the program is stored on the Microdrive in sequential format and can be read back in by simply opening the file:

```
OPEN#5;"m";1;"filename"
```

and each character can now be read back into memory using the GET# command.

The following program uses all of the above procedures to print out a readable listing on the screen, a ZX printer, or an RS232 printer. If you have a Centronics printer that will work on the Spectrum and it causes any LPRINT to be sent, you could also use this by specifying ZX printer.

The program below is fully documented and it should be easy to understand how it works.

Program listing

```
  10 REM spectum lister
  20 REM PCN 1984
  30 BORDER 1: PAPER 1: INK 7: CLS
  40 REM make sure all files
  50 REM are closed.
  60 CLEAR #
  70 FORMAT "t";1200: REM baud rate
  80 REM get file name and
  90 REM microdrive number
 100 PRINT AT 3,3;"PLEASE TYPE IN THE FILE
"
 110 PRINT AT 4,3;"THAT YOU WISH TO USE."
 120 PRINT AT 6,0;"N.B.  dont forget that
the file"
 130 PRINT AT 7,0;"      must have been sa
ved"
 140 PRINT AT 8,0;"      onto microdrive a
s a "
 150 PRINT AT 9,0;"      SEQUENTIAL file"
 160 INPUT "NAME:";in$
 170 CLS
 180 PRINT AT 6,9;"WHICH MICRODRIVE (1-8)"
 190 INPUT "NUMBER:";number
 200 REM get output device
 210 CLS
 220 PRINT AT 4,0;"PRESS LETTER FOR OUTPUT
 DEVICE"
 230 REM flash codes or bottom
 240 REM line of the screen
 250 PRINT AT 6,8;"ZX PRINTER,RS232,PRINTE
R,SCREEN"
 260 PRINT #0; FLASH 1;"Z"; FLASH 0;"X pri
nter"; FLASH 1;AT 1,11;"R"; FLASH 0;"S232
printer"; FLASH 1;AT 1,25;"S"; FLASH 0;"CR
EEN"
 270 LET k$=INKEY$
 280 IF k$="R" OR k$="r" THEN  OPEN #4;"T"
 290 IF k$="S" OR k$="s" THEN  OPEN #4,"S"
 300 IF k$="Z" OR k$="z" THEN  OPEN #4;"P"
 310 IF k$="" THEN  GO TO 270
 320 REM now we're ready to read
 330 REM the file and print it
 340 OPEN #5;"m";number;in$
 350 REM get one character at
 360 REM a time from file
 370 LET k$=INKEY$#5
 380 LET ascii=CODE k$
 390 IF ascii>=144 AND ascii<=164 THEN  GO
 SUB 500: REM this is a udg
 400 IF ascii>=128 AND ascii<=143 THEN  GO
 SUB 570: REM this is a spectrum graphics
character
 410 IF ascii=17 THEN  GO SUB 730: REM is
signifies next character is ink colour
 420 IF ascii=16 THEN  GO SUB 840: REM it
signifies next character is a paper colour
 430 IF ascii=19 OR ascii=18 THEN  GO SUB
940: REM these are bright and flash
 440:
 450 REM now print out the character or st
ring
 460:
 470 PRINT #4;k$;
 480:
 490 GO TO 370
 500 REM replace user defined
 510 REM graphic characters
 520:
 530 LET k$="(G"+CHR$ (ascii-47)+")"
 540:
 550 RETURN
 560:
 570 REM replace spectrum
 580 REM graphic characters.
 590:
 600 IF ascii=128 THEN  LET k$="(SP)"
 610 IF ascii=143 THEN  LET k$="(GS8)"
 620 IF ascii>=129 AND ascii<=135 THEN  LE
T k$="(G"+CHR$ (ascii-80)+")"
 630 IF ascii=142 THEN  LET k$="(GS1)"
 640 IF ascii=141 THEN  LET k$="(GS2)"
 650 IF ascii=140 THEN  LET k$="(GS3)"
 660 IF ascii=139 THEN  LET k$="(GS4)"
 670 IF ascii=138 THEN  LET k$="(GS5)"
 680 IF ascii=137 THEN  LET k$="(GS6)"
 690 IF ascii=136 THEN  LET k$="(GS7)"
 700:
 710 RETURN
 720:
 730 REM alter ink character
 740 REM next character is the
 750 REM colour code so this
 760 REM must be input
 770:
 780 LET k$=INKEY$#5
 790 LET chr=CODE k$
 800 LET k$="(F"+STR$ chr+")"
 810:
 820 RETURN
 830:
 840 REM alter paper character
 850 REM next character is the
 860 REM paper colour
 870:
 880 LET k$=INKEY$#5
 890 LET chr=CODE k$
 900 LET k$="(ES"+STR$ chr+")"
 910:
 920 RETURN
 930:
 940 REM Change bright and flash
 950:
 960 LET k$=INKEY$#5
 970 LET val=CODE k$
 980 LET letter$=a$+val
 990 LET video=3+val
1000 IF ascii=18 THEN  LET k$="(ES"+STR$ l
etter+")"
1010 IF ascii=19 THEN  LET k$="(E"+STR$ le
tter+")"
1020 IF ascii=20 THEN  LET k$="(S"+STR$ vi
deo+")"
1030:
1040 RETURN
```

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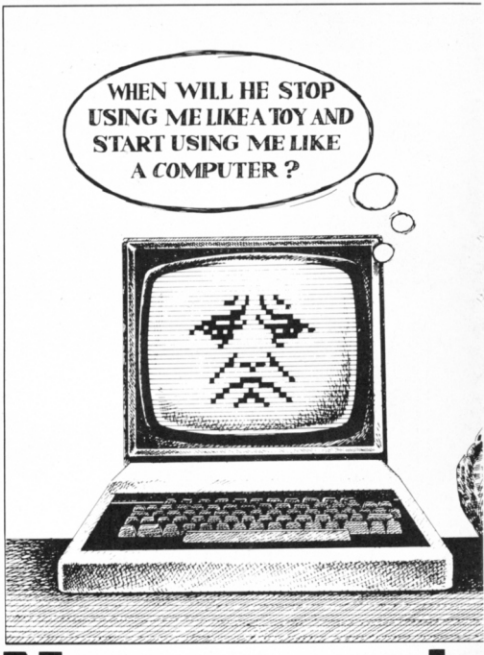

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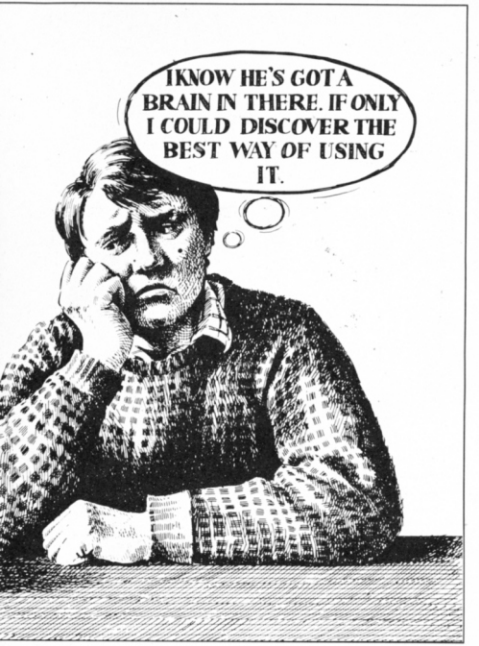

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BRAINPOWER

DRAGON DELIGHTS

Dragon users beware — there are plenty of good adventure games that will land both you and your bank account in desperate straits, as Mike Gerrard discovers.

Bad news for Dragon users who are adventure fans . . . there is now so much good software around that it's going to cost you a fortune to keep up with it. Hot on the green heels of *The Incredible Hulk* from Adventure International at £7.95 comes *Return of the Ring*, Wintersoft's follow-up to *The Ring of Darkness*, which will set you back £9.95. The same applies for each of the titles in the series of *Mysterious Adventures* currently being released by Channel 8 Software in text-only versions for the Dragon 32 and graphics versions for the 64, both on the same tape.

Questprobe

Hard to know where to begin, except maybe with a request to the bank manager (PRAY, BRIBE MANAGER and GROVEL might be useful commands here). There are some unusual commands needed in the adventure starring Bruce Banner as The Incredible Hulk, which is actually called *Questprobe*. The first is the one needed to turn Bruce into The Hulk . . . the accompanying leaflet gives you a clue, but if you don't get it, you're told in coded style at the back of the leaflet, though that's about the only hint you'll pick up.

The Scott Adams style is to make 'em tough. Just to uncover a new location can seem like a major achievement. No frills in the opening description where you're faced with: "I'm Bruce Banner, tied hand and foot to a chair . . . What shall I do?" A pretty desperate situation, but in fact there's more than one way out. Once you're free, you're then faced with the task of escaping from the Dome in which you were imprisoned. As Bruce Banner, you're killed by the rockfall in the tunnel leading out, but as The Hulk, you're tough enough to get through. But, alas, you cannot stay as The Hulk forever, because in certain locations poisonous gasses escape, and these turn you back into Bruce Banner. An example of Adams' deviousness is that in one of the spots where this happens, there's a ring set in the floor. As Bruce Banner you can't move it, so you're just itching to turn into The Hulk and tug it like a ring-pull, but unfortunately the minute you do so, the gasses come along and turn you straight into Bruce Banner again.

The aim of the adventure is basically to collect as many gems as you can find and return them to a set location which you can find by reading the many signs that are helpfully scattered around. A constant running score lets you know how well you're doing, and if you fancy your talents as an adventure-solver then this is definitely one game that will test just how good you think you are.

The one thing I didn't like about Questprobe though, as with so many adventures, is simply the bulky and unattractive Dragon text layout.

For its series, Channel 8 Software has redesigned the character set to come up with a neat little text that looks very attractive on the screen. The whole series follows the same pattern, and if you're not too bothered about the fairly simple graphics, you can either play the 32 version or toggle them on and off in the 64 version by pressing ENTER.

It's rather odd that many software houses stress that adventures should have graphics, and then give uses with the facility for ignoring the graphics — which is what I suspect most adventure players do anyway.

Waxworks

As for Mysterious Adventures, I looked at the latest in the series, *Waxworks*, but as the accompanying leaflet only gives outlines of the first ten in the range, I can't tell you what the purpose of this one, Number 11, is.

You begin in the leisure lounge of a deserted waxworks decorated with a wooden beam, a public telephone, a slot machine and some seating. One thing you must do in this series is LOOK in every location, which occasionally uncovers new objects, and you must also EXAMINE everything you come across. Go UP from the leisure lounge and you're in part of the waxworks display — there really can't be that many adventures that let you EXAMINE JACQUES COUSTEAU.

I like the idea of the maze in the Hall of Mirrors, where you can't see which way is out, and this leads to one or two new locations, such as an airlock to a large aquarium tank: "I can see Jaws IV — oh! oh!". How can we get Jacques Cousteau to help us out of this one? Some people do find this series rather simple, and it is certainly not for those who like their location descriptions to be more than just "I'm in leisure lounge", but they all have brain-teasing and have sold very well on other machines.

One of the best-selling adventures that originated on the Dragon, and was subsequently converted for the Spectrum and Oric, was the Ring of Darkness, with *Return of the Ring* taking over where the former left off — almost literally. As in the first location, you find Shedir, the ring that you were searching for in the original game. This time, though, you're on a mysterious planet and charged with returning the ring to the Masters of Ringworld, with whom you have somehow lost contact. You don't know why you're on the planet, though you can sense the presence of the Evil Sage . . . but no Evil Parsley that I could find.

Return begins in similar fashion to the earlier adventure, requiring you to set up your character's name and features, distributing points between Regenerations, Intelligence, Strength and Charisma.

Then it's on with the game, which is divided up into various graphical areas. You begin in a city on a decaying planet, using the arrow keys to move about the maze of streets. You encounter various mutants, to fight or trade with, and there are also several transporters which can ACTIVATE (if you have found the various passes that some of them need) to take you to places such as human town or the Krell village. You explore these in turn, finding tasks and objects and slowly trying to build up your Experience points, as well as finding food to replace your diminishing supply.

The game is different enough from Wintersoft's earlier effort to be satisfying, presenting the same challenge of strategy and adventuring mixed. If you liked The Ring of Darkness, which many evidently did, then you'll enjoy this, but if you didn't sample that game you can still plunge straight into Return of the Ring. So have a good plunge, whichever adventure you plump for.

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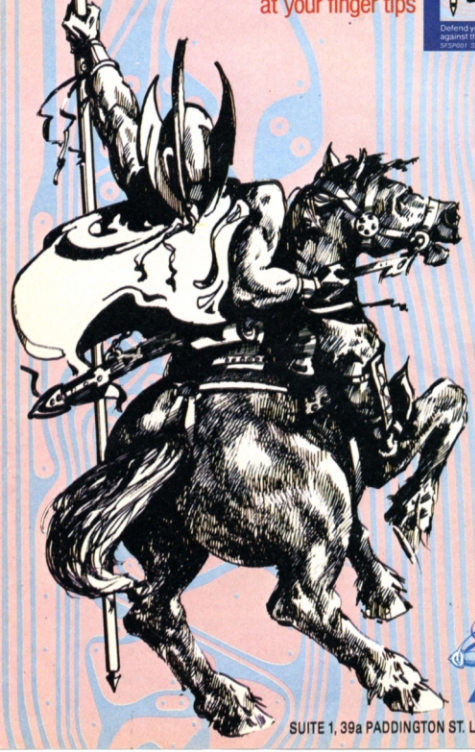

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HP'S SAUCY PORTABLE

Hewlett Packard's latest portable — the HP 110 — is a complete desktop system. Brendin Lewis takes a look at this saucy micro with the built-in memory drives and software.

The HP110 basic system consists of carrying case, a mains adapter/recharger and boxed sets of documents.

Many advances have been made in the area of portable micros over the last few years, the most obvious of which is that the machines are just that — portable. Other advances, in the fields of liquid crystal displays (LCD), semiconductor technology including CMOS low power microprocessors, larger memory devices and uncommitted logic arrays (ULA) have meant that the desktop system of three years ago will now fit into a briefcase.

The HP 110, incorporating MS-DOS, the Lotus 123 package and two other packages within the system's ROM memory, is such a system. A built-in Ramdisk ensures fast, reliable data transfer between disk and main memory. External micro floppy disk drives can be added along with printers, plotters and to top it all the machine contains a built-in modem.

First impressions

The basic system consists of the HP 110, carrying case, a mains adapter/recharger and two boxed sets of documents, one system manual and a Lotus 123 user guide. Once on a desk the whole thing looks very impressive, something that we have come to expect from Hewlett Packard.

The first problem I encountered was moving the system around when out of its carrying case; though quite small, the system is surprisingly heavy and needs both hands to carry it around safely as there are no handles or hand holds.

Closed, the system gives away nothing as to its contents. Externally, the only things visible are the thumb clips to open the lid and various strange looking

connectors on the back. Flicking the thumb clips and lifting the lid reveals all; keyboard fixed to the main unit and LCD contained within the lid. The lid itself holds perfectly in position at any angle, which is most important for comfortable viewing.

I made a futile attempt at finding the on/off switch before realising that pressing any key on the keyboard powers up the system. Another knob noticeable by its absence is the contrast control for the LCD. One key on the keyboard is etched with the same logo as that on a TV contrast control and by using this and its shifted counterpart, the contrast of the display varies up and down. For those not familiar with LCDs, an LCD can only be viewed from one quite narrow angle, so if the screen is tilted slightly then the characteristics of the LCD must be altered to compensate for this movement. Basically it allows the screen to be viewed from any angle.

The display itself is not one of the best I've seen — it was very difficult to get a clear, reflection-free display. I had to angle the display very sharply indeed to get an adequate view and even then the light/dark contrast was poor.

This is not the norm with LCDs as I have seen much better displays. On the other hand it is something that Hewlett Packard should look into, as it mars what otherwise seems a most impressive system.

The keyboard has a total of 76 keys including the usual alphanumeric keys, eight function keys, cursor keys and six special function keys, among them keys for printing, a break key for the modem, a key which toggles the on screen display of the eight normal function keys and a key which toggles between user and system defined function keys. Though there are only eight function keys, they can also be used shifted, giving a total of 16 unique definitions.

Although small, the system is heavy to carry around.

It's size and facilities makes the HP 110 truly portable.

Overall the keys are good quality, but, as I have found previously, it is the space bar that lets the system down. When touch typing on this system the space bar needs to be pressed slightly harder than the other keys, and it also has a tendency to print double. The keys work on the single key lockout principle. This simply means that if one key is depressed then all other keys are disabled, which again makes touch typing difficult.

The documentation available with the system is comprehensive — two boxed, ring bound volumes, one for the system and one for Lotus 123. The system user guide explains two of the built-in packages, Memomaker, the word processor, and Terminal, the communications package. Both these sections and the section on MSDOS are covered in detail.

In use

The system contains two memory disks configured as MSDOS drives A and B. ▶

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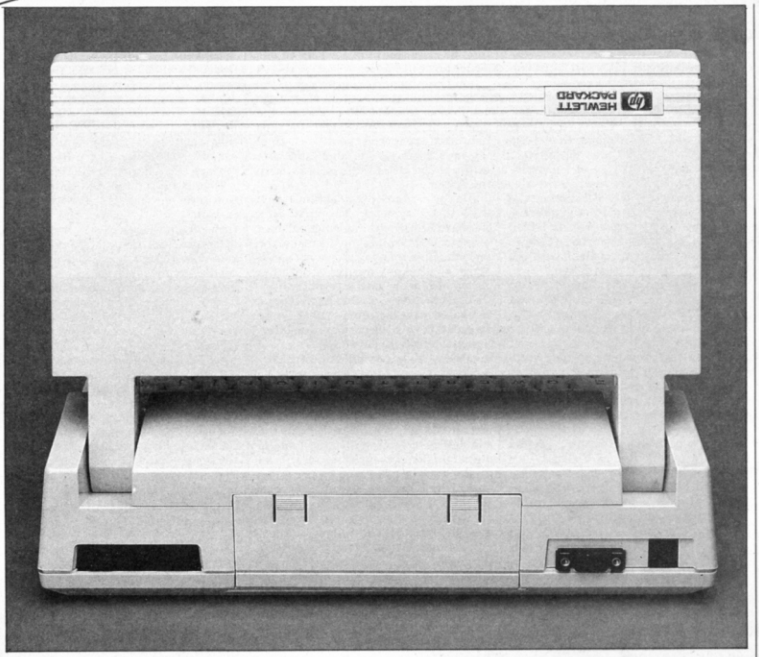

The HP 110 gives nothing away when closed, showing only the thumb clips on the front, and the connectors on the back.

Drive A is a RAM disk and drive B a ROM disk. Though the concept of ROM disk was quite new to me I soon realised that it is analagous to a fixed, read-only hard disk and can be accessed in the normal way using B for its commands. The disk itself contains all the operating system software and all the built-in packages such as Lotus 123. The RAM disk, on the other hand, is a read/write disk with battery backup to prevent the loss of data.

Total memory is split between disk and user memory and is configured with the PAM option (see below). The total 272K memory can be split as follows: the RAM disk, any value between 16K and 176K in 4K intervals, leaving main memory taking up the remaining RAM between 96K and 256K. The default values for these settings give 96K user memory and 176K as drive A.

On power up an auto boot file called PAM (personal applications manager) runs. This removes all the mundane typing in of file names when running packages. Four options are displayed on screen, offering Memomaker, Lotus 123, Terminal and DOS commands. The first

three are the packages on B while the DOS commands option merely jumps to the MSDOS command input level. It is possible to type in the normal MSDOS commands within PAM, so normally this option is not necessary. All four options are accessed by moving the cursor to the required option and hitting the select key.

While at the PAM command level it is possible to configure the various parts of the system.

This includes the clock, which can also be done from within MSDOS using the time command, the data communications port and the system itself which includes the printer characteristics. The serial port is configured along with the modem with the datacom option.

A help facility is available on running PAM from the function keys. This goes into some depth and even gives help on how to use the help facility itself. Various items of system information are displayed while PAM is running, including the number of bytes on drive A, the remaining battery charge as a percentage, the time, the date and the row and column position of the cursor.

An interesting feature offered by PAM is the use of alarms. This is achieved by setting up a file called PAM.ALM, in which is stored a date and time and a message, if required. PAM reads this file and sounds the internal beeper at the given time and outputs the message. It is possible to run a program instead of outputting the message, making this a very useful facility about the home or office.

Normally the system would be used on its internal batteries alone and, because of this, two methods of preserving the charge within these batteries is utilised. The first simply turns off the display after a given timeout period. This period is set within the system configuration mode and can have a value ranging between 30 minutes and half a minute or can be disabled. The second and most impressive method actually halts the processor when an application program waits for input: again, this facility can be disabled.

Using these methods, the time between charges can be prolonged considerably. On the other hand, it is advisable to use the battery charger whenever possible. This not only insures against flat batteries and the resulting data loss but actually prolongs the life of the batteries.

Though the system is quite self-contained it is obvious that external devices such as printers will be required at some point if only to print a file. The expansion options available include up to eight external micro floppy disk drives plus various printers and plotters.

All these devices are connected via the in-built HP-IL port. This is more on the lines of a mini network where a cable makes up a loop with the various devices linked into it. There are two connectors used with this port, marked in and out; the link goes from the out port on one device to the in port on the next and so on round the loop and finally back to the computer. Using this arrangement it is possible for one machine to access the memory drives of another machine thus indirectly expanding the disk space of the host machine. For this purpose a utility called HPLINK is included with the system.

The two remaining options deal with serial systems. The first is a standard RS232 port implemented via a nine pin 'D' type socket on the rear of the machine: this opens a gateway to a vast array of different devices. The other option also deals with a serial system, though one which is often neglected by computer manufacturers — serial communication with the national and international telephone network by means of a modem. It is possible to connect a modem to a standard serial port but this would entail carrying around another box.

The HP 110 has a built-in 300 baud modem which connects directly into the standard telephone socket: it is able to dial a number, present log-on string and finally hang up after data transfer. The big problem with this particular modem is that it is an American standard and not British Telecom approved. It must be said, though, that this is not a British production model and when the machine is released in Britain no doubt a British Telecom approved modem will be installed.

Software

The system includes a very useful range of software packages and utilities resident in its internal ROM disk. The MSDOS operating system is also built in, making the system almost wholly self-contained: it needs only external devices for hard copy output and extra disk space. PAM handles most of the housekeeping tasks, so this section will deal with only the internal software packages.

There are three packages within the system — Memomaker, Terminal and Lotus 123. Memomaker is a word processor/editor aimed at the user who occasionally needs to write letters, documents or memos: it is not designed as a word processor to be used for very large documents. There is no reason why it can't be, but HP realises the problems with using LCD displays for very long periods and this includes the small screen. Within its limitations the package is good, with reasonable help facilities and wide use of single function key entry of commands. The one thing that stands out with Memomaker is its ease of use. It took me literally minutes to learn enough to write a letter.

It must be said that the main attraction of the machine is that Lotus 123 is in-built. This package, now famous throughout the computer world, contains graphics output of information stored in the database and a spreadsheet. Unlike Memomaker this package is very complex and I found it impossible to use without first looking at the manual if only to find out how to use the excellent help facility. Space prevents an in-depth look into Lotus 123 but this would only be re-inventing the wheel — there is an abundance of literature. Here I shall content myself with the way in which the package is implemented on this system.

The size of the work sheet depends on the settings of user/disk memory within the system but with the default of 96K. The worksheet empty is 256 by 2048: ample space for all but the most complex of problems.

Verdict

As it becomes easier to implement hardware in smaller and smaller boxes, the most important criterion for a successful system is going to be the amount of work one is able to do without the use of other boxes. So it will be systems such as this, with built-in memory drives and software, that will win in the race toward the ideal portable micro.

With this system it is the display which is the most obvious drawback. Whether or not this is rectified in later models is something to be seen. Discounting the display, the system is a joy to work with.

There are big advantages to be gained by the use of RAM disks, in particular the speed of data transfer. So it will be the use-integrated software and hardware that wins on the day. This system has a good measure of both, which will, I am sure, lead to success.

SPECIFICATIONS

System	HP 110 Portable
Processor	8086
ROM	274K as disk B
RAM	176K as disk A: 96K user
Screen	80 × 14 LCD plus status line
Keyboard	76 keys, cursor, contrast, 8 function
Interfaces	HP-IL, Serial, Modem
Operating system	MS-DOS in ROM
Software included	Terminal, Hplink, Memomaker, Lotus 123
Distributor	Hewlett Packard (UK)

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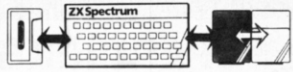

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PLUG IN THE IVORIES

Stuart Cooke cleans out his lugholes and flexes his playing fingers to bring you a quadrophonic review of the Microsound 64 peripheral for the CBM 64.

The Commodore 64 has what is possibly the most advanced sound chip on any home computer. However, if you simply wanted to use the 64 for musical purposes you would find it difficult to get even a quiet beep from your computer.

This is where the Microsound 64 is designed to help. A four-octave keyboard plugs into your computer, then load the software and you're away. Watch out Mike Oldfield.

Presentation

The Microsound keyboard has a black plastic case with a robust appearance. It would look quite at home on the stage, but I doubt whether it would stand up to the battering.

Setting up

Connecting the keyboard to the computer couldn't be simpler. All you need to do is plug the two joystick-type plugs into the connector at the side of the machine.

Both these plugs are clearly marked so you know which sockets they go into. And no other connectors are needed to the keyboard as any power it needs is taken from the Commodore via the joystick ports.

The manual clearly explains in a step-by-step fashion how to load the software supplied. And within minutes you should be able to set up and play the synthesiser.

Unfortunately, other sections of the manual aren't up to scratch. For instance it explains what all the key functions are but fails to tell you exactly what effect they have on the sound produced. So you waste time constantly referring to the Commodore manual for more information.

It would also have been useful if the manual gave some examples of sound — such as a piano, harpsicord etc. Instead, you're left to your own devices to produce sounds by trial and error.

In use

The software proved to be very simple and easy to understand. Most of the changes are made by single keypresses, although it does become a little difficult to remember which key does what. This becomes more evident when the keys chosen bear no resemblance to the function you're altering. For example the 5,6,7, and 8 keys select triangular, sawtooth, pulse and noise wave forms respectively.

All changes are quickly displayed on the screen which shows you all of the settings but this can be replaced by a help screen when you press the '?' key.

Any changes to the voices have to be made to each voice independently. A small pointer is used to select which voice you are using and is moved by using the cursor keys.

As the 64 has three voices it is possible to set up each individually. Pressing between one and three keys on the piano keyboard will sound the relevent voices. If you press more than three keys it will only sound the lower three of the notes, (this is only to be expected and is not a real problem once you become used to it). In fact, it is quite unusual for a keyboard in the Microsound price range to offer more than one voice.

As well as the control panel, used to set up the filters and wave forms, there is also a patching panel. At the bottom left of the music keyboard there are a couple of slider controls of the type you sometimes find on a hi-fi.

Not only can you control the type of sound that is produced, but the software also contains a simple sequencer, accessed by the '£' key. Once you have entered the sequencer you can set up a sequence of notes that your 64 will happily play until you tell it to stop.

A very good editor will allow you to enter the sequence of notes, hear them played back and change any of them.

Verdict

The Microsound 64 keyboard is both fun to use and suitable for professional use. There are a few bad points in the software and there are better packages around, but unfortunately these do not allow you to use a proper music keyboard with them.

It would be very difficult to find a keyboard that offers the facilities that the Microsound 64 keyboard together with the Commodore 64 gives you. That alone must make it a good buy.

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VIC GAINS ADDED RAM

Lack of memory poses a serious problem for the Vic 20. Kenn Garroch looks into a possible solution.

One problem with the Vic 20, apart from the fact that Commodore is abandoning it, is its lack of memory. A number of memory expansion packs are available but generally these come in set sizes — such as 3K, 8K, and 16K — making it necessary to either buy two different expanders, or ignore some of the software.

The Expand-O-Ram gets round these problems by supplying an extra 16K of RAM in two banks of 8K with a set of selector switches to position the RAM in the memory map.

Presentation

On removing the device from the box, it is immediately apparent that either Tymac forgot to put a case on the thing, or they think one is unnecessary. The Expand-O-Ram comes packaged in a tough cellophane wrapping which was difficult to remove.

One the board is 16K of RAM set out as eight chips. A closer look at these reveals that they are CMOS 2K by eight bits each. These are very low power and give rise to the possibility of battery back-up for the contents of the memory.

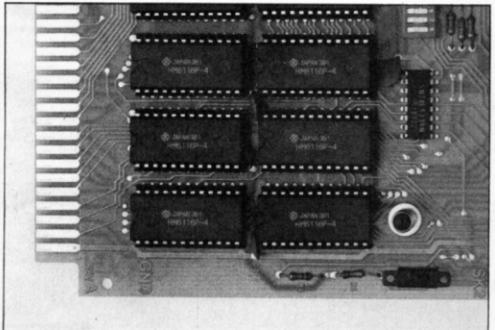
The rest of the board contains two expansion slots with a selector switch which defines which slot is the auto-start cartridge. Also included is a reset switch, allowing you to reset the Vic without having to switch it off, and the dip switches to select where the memory expansion sits in memory.

Documentation

Following the introduction, the first thing the guide tells you is how to backup your cartridges to cassette or disk. Useful information, but rather confusing — until you realise that the reload instructions mean that the cartridge software is being reloaded into RAM.

The style is concise and all the explanations on how to set up the dip switches are understandable. One useful section, covering the reset switch, describes in detail how to retrieve NEWed programs and explains how the program lines are set out in the memory.

Overall, the documentation covers everything you will need to know to operate the expander. It also offers a few points that, perhaps, you should not know. But if you read them, it can't be helped.



The Expand-O-Ram solves the problem of the Vic's lack of memory, but it's a pity it doesn't come in a box.

In use

Connecting the expander up to the Vic was straightforward matter of shoving it into the expansion port, once the dip switches have been set up correctly. Two small legs at the back of the board prop it up when its connected.

Once connected, the expander makes an extra 16K of RAM available, over the 3.5K in the main machine. If you already have the 3, or 16K expanders, then these can be placed into one of the expansion sockets and switched into the memory of 27.5K. Not a lot compared with modern-day machines, but a darn sight better than the measly amount that comes with the Vic as standard.

Don't touch the connections on the underside of the board if you have walked across nylon carpets. It will give you a nasty shock.

One of the capabilities of the expander is its ability to position the expansion in different memory areas. These are:

$2000-3FFf	8191-16383
$4000-5FFF	16384-24575
$6000-7FFF	24576-32767
$A000-BFFF	40960-49152

The first three areas are normally used to expand the memory used by Basic programs; the last area is that used for cartridge software. The 16K of memory on the Expand-O-Ram is split into two 8K blocks. Using the dip switches, these can be separately assigned to different sections of the memory.

A nice trick is the ability to change the dip switches while the machine is switched on, allowing blocks of memory to be protected, effectively making the RAM into ROM.

You can also make your own software appear to be an auto-start cartridge by setting its memory position to the cargridge section, and including the nine byte boot routine at the beginning. So you'd have this:

$A000-A001	Cold start pointer
$A002-A003	Warm start pointer
$A004-A008	$4130C3C2CD

The last five bytes signal to the system that the software is to be accessed as an auto-start program. To auto-start the program, just press the reset switch.

Verdict

The Expand-O-Ram is quite a nice add-on for your Vic if you keep running out of memory. Its major drawback is the lack of a case. Apart from this, the documentation is clear and should enable you to turn your Vic into a much more flexible system.

REPORT CARD

Features	○○●●●
Documentation	○●●●●
Performance	○○●●●
Overall Value	○●●●●

Product Expand-O-Ram **System** Commodore Vic 20 **Price** £119.95
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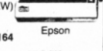

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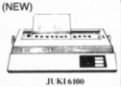

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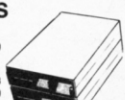

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SOFTWARE PRE-VIEW

We take a peek at the new software packages, and give you a taste of things to come. Note to software publishers: If you wish your company's product to be included, please send only the very latest releases to *Bryan Skinner, Software editor*, PCN, *62 Oxford Street, London W1A 2HG.* Please don't forget to include prices and telephone numbers.

BBC

Cracker is a machine code spreadsheet which allows up to 52 columns by 255 rows, can read and write files for Basic and Fortran, and comes with a conversion utility for dBase II files.

The Music System is from Island Logic, the new sister company to Island Records. The program will be available from mid-October and comes with a song and sound library. The claim is that the suite is the most advanced micro-music based program on the market.

Microgo 1 is a computer version of the Japanese 'national' game Go. Versions for Commodore 64, Spectrum and MSX are under development. The rules of the game are fairly simple, but it's one of the most absorbing and demanding board games. The program has variable skill levels, beginner mode and rule demonstration.

French on the Run tests your knowledge of grammatical structures, vocabulary, idiomatic phrases etc. Using multiple-choice answers you plough your way through the four different routes (though you'll have to call Silversoft for the code for the fourth). The scenario is war-time France and in your roll as a grounded pilot you have to work your way back to Blighty, in contact with French-only speakers.

Cracker	**£80.00**	**GCC 0223-835330**
Mailmerge & Mailbase	**£19.95**	**Future Data 0923-678007**
The Music System	**£24.95**	**Island Logic 01-741 1511**
French on the Run	**£9.95**	**Silversoft 01-748 4125**
The Magic Sword	**£8.95**	**Database Publ 061-456 8383**
Millionaire	**£6.50**	**Incentive 0734-591678**
Evil Dead	**£7.99**	**Palace Software 01-278 0751**
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Mr T in the Mystery Maze	**£9.95**	**Ebury 01-439 7144**
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COMMODORE 64

Music programs are very much in vogue at present. Supersoft's *Music Master* requires no prior musical knowledge, but Supersoft claim that 'in the hands of an experienced musician it will prove in an invaluable tool'. We'll be reviewing the program in the next few weeks and it'll be interesting to compare it with the brilliant *Musicalc*.

Rolf Harris' Picture Builder is more a younger user 'fun' package than a graphics designer. It offers sets of pre-designed characters which can be used to build up a picture in 17 colours, then saved to tape or disk.

The software bandwagon rolls on — the latest fad is BMX games. *Hyper Biker* allows up to four players to turn their hands to the handlebars of 'bikes, doing long jumps, bunny hops, wheelies and the like on tracks such as table tops, whoop-de-doos (who dreams up these names?) and ramps.

The *Magic Sword* is described as 'a totally new experience for the very young', but is really a sort of watered-down adventure. There are magic objects to collect and the text is double-height.

Music Master	**£19.95**	**Supersoft 01-861 1166**
Rolf Harris'Picture Builder	**£9.99**	**Commodore 01-930 6711**
Special Delivery	**£7.95**	**Creative Sparks 0252-543333**
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Vic 20

Mega Vault shows what made Imagine great, and is the best game for the unexpanded Vic since *Chariot Race*. The game is pretty simple but quite amazing given it fits in just 3.5K. You have to negotiate a maze containing corridors down which hurtle deadly beings — it's all a matter of timing and is infuriatingly difficult.

Squish and *Bricks* are both from Palace Software, the publishers of *Evil Dead* for the Commodore 64 and BBC. Neither of them are easy, far from it, but they lack the direct impact of Mega Vault.

In *Bricks* you have to avoid falling masonry, but once it's landed you can shunt blocks around to make stairs to climb. In *Squish* you shunt green blobs around trying to trap beasts and avoiding their deadly arrows.

Snake Bite	**£2.50**	**Firebird 01-357 3814**
Micky the Bricky	**£2.50**	**Firebird 01-357 3814**
Mega Vault	**£5.50**	**Imagine 01-567 9710**
Bricks	**£5.99**	**Palace Software 01-278 0751**
Squish	**£5.99**	**Palace Software 01-278 0751**

SPECTRUM

Possibly the best releases this week were *Battlecars* and D-Day from the Games Workshop. *Battlecars* is for one or two players — you first have to build your cars, select a setting (speed circuit or town) and it's a battle to the death. The excellent graphics feature speed, fuel and damage gauges. *D-Day* is a two-player graphics strategy game based in Normandy 1944. Reviews of both are on their way.

With less than 12 weeks to Christmas, Creative Sparks, the games software arm of Thorn-EMI, has launched *Special Delivery*. The game involves helping Santa deliver Christmas presents and is released simultaneously on the Spectrum, Commodore 64 and Atari 32. *Danger Mouse in Double Trouble* has an associated, if small, competition — spot the screen change after a few successful world savings and you could win a ride in a Rolls-Royce and free software for your Spectrum.

Underworlde and *Knight Lore* are continuation of Sabreman's adventures. Ultimate claim that the latter 'represents the very pinnacle of software development on the Spectrum'.

Tiny Code is a 'teach yourself the rudiments of assembly language' program. It's a sort of mini-assembler, but the lack of useful sample listings rather detracts from its potential value.

Underworlde	**£9.95**	**Ultimate 0530-411485**
Knight Lore	**£9.95**	**Ultimate 0530-411485**
Swords and Sorcery	**£9.95**	**PSS 0203-667556**
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Danger Mouse in Double Trouble	**£6.95**	**Creative Sparks 0252-543333**
Toolkit	**£9.95**	**Temptation 0797-223642**
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The Fall Guy	**£6.95**	**Elite 0922-611215**
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TORNADO LOW LEVEL *"This is the best flight game for the Spectrum" (C&VG). "It's exciting and technically breathtaking... some of the most impressive 3D graphics I've ever seen on the Spectrum" (PopCompWkly)* **(Vortex) £5.95**

LORDS OF MIDNIGHT *"THE game for the Spectrum... a superb game and a must for all 48K Spectrum owners" (PCGames) "Stands head and shoulders above any other... quite breathtaking (PersCompNews)* **(Beyond) £9.95**

JACK AND THE BEANSTALK *"Excellent graphics ...a very flashy game" (Games Comp). "The graphics are superb ... definitely a game well worth buying" (C&VG).* **(Thor) £5.95**

CURRAH SPEECH OK

SPECIAL OPERATIONS *"Has class and makes good use of graphics. The difference between this and an arcade game is the difference between 'The Merchant of Venice' and 'Batman' (CompChoice)* **(Lothlorien) £5.95**

WAR OF THE WORLDS *"STUNNING GRAPHICS, which are identical to the pictures supplied with the LP" (GamesComp)* **(CRL) £7.95**

CURRAH SPEECH OK

FULL THROTTLE *"SUPERB! The 3D is some of the best I've seen. The game itself is fun to play and is exhilarating" (Crash).* **(Micromega) £8.95**

PAINTBOX *"One of the most outstanding programs I've seen this year" (YrSpectrum). "I've never had so much fun with a utility program... I think you'll find it's the best £7.70 you've ever spent" (ZXComp).* **(Print'n'Plotter) £7.70**

WHITE LIGHTNING *"White Lightning is the best package I have used on the Spectrum. Its features and flexibility are second to none and have to be seen to be believed" (PersCompNews).* **(Oasis) £14.95**

CURRAH SPEECH SYNTHESIZER *"An interesting and effective extension to my Spectrum. I will make much use of it. Recommended to anyone who has an interest in going one step further" (S.User).* **(Currah) £29.95**

COMMODORE 64

BEACH HEAD *"Stunning sound effects.... excellent graphics... ONE OF THE BEST GAMES TO BE RELEASED FOR THE C64" (PersCompNews). "Spectacular sound and graphics bring amazing realism to your 64" (PCGames)* **(US Gold) £8.95 CASSETTE £12.95 DISK**

VALHALLA 64 *"Valhalla on the Commodore is a better game... a unique and important game 64 owners should beg or borrow the money to get this one (PopCompWkly). "GAME OF THE YEAR 1984" (British MicroComputing Awards)* **£14.95 CASSETTE NO DISK**

AZTEC CHALLENGE *"Full marks all round for a program that points the way for CBM-64 programming" (YrComp). "Five stars... an excellently challenging game" (CompGames).* **(Audiogenic) £8.95 CASSETTE £12.95 DISK**

DENIS *"Denis Through the Drinking Glass is a rapid-response, superbly complex game that is great fun to play .... an excellent game" (PopCompWkly).* **(Applications) £5.50 CASSETTE £9.50 DISK**

FOOTBALL MANAGER *"AN EXCELLENT SIMULATION... enjoyable to anyone with the slightest interest in soccer" (PersCompNews). "The truly addictive quality of this game is the remarkable way it mirrors a real football manager's problems" (PersCompGames).* **(Addictive) £7.95 CASSETTE NO DISK**

TRASHMAN 64 *"A brilliantly drawn, planned and executed game... thoroughly enjoyable and addictive ... colourful, clever animated graphics" (HomeCompWkly). "The graphic quality is superb... marvellous value for money" (Crash).* **(New Generation) £7.95 CASSETTE NO DISK**

BLUE THUNDER *"SUPERB GRAPHICS and smooth pixel-scrolling through six screens... hugely exciting and very frustrating" (HomeCompWkly).* **(Richard Wilcox) £8.95 CASSETTE NO DISK**

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ARABIAN NIGHTS *"One of the best games for the C64 I have seen for ages" (PopCompWkly).* **(Interceptor) £7.00 CASSETTE £9.00 DISK**

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STAR GAME

BBC B

ELITE

Standby for blast off for the most amazing and addictive game yet to appear for the BBC indeed for any computer. A game so impressive that it moved *PCN*'s most hard-bitten Commodore 64 loyalist to comment, 'It's even worth buying a BBC just to play it.'

Elite was written by two Cambridge undergraduates, Ian Bell and David Braben, who have extracted every ounce of performance from the Beeb.

The result is a unique 3D space adventure with real-time action. It's a game of almost unbelievable complexity combining the best of a 3D space flight simulator, arcade-style space battle and mindstretching trading strategy game.

To make even modest progress in the game you'll need a full range of flying, combat, navigational and entrepreneurial skills.

You command a Cobra space ship and your task is to fight and wheel-and-deal your way across eight galaxies with over 250 recognised planets in each.

Buying and selling goods and commodities generates profits that can be used to equip your ship with all manner of extra armaments, defensive systems, computers and cargo space.

Profits are greatly enhanced by shooting down pirates, for which credits are instantly paid by the GalCop Bank Federation Monitoring Authority.

You can trade with worlds that vary from corporate states to anarchies. Corporate states are safe and offer only modest profits. Anarchies can provide rich pickings but carry the highest risk of attack from pirates.

Your combative skills can be used to increase your rating from harmless through competent and dangerous to deadly.

Only the most skilful achieve the prized rating of 'elite' — the objective of the game.

To do that you have to arm yourself to the teeth which is expensive. Hence the need to become a canny trader and an ace space duellist.

Your problems start as soon as you launch yourself from the planet Lave's space station. You are not allowed to land on any planet's surface. The only place you can land is a space station and this requires a delicate docking procedure.

Space stations spin to create an artificial gravity and the only entrance faces the planet's surface. So you must get your approach right and then match the spin of your Cobra to that of the station.

By sheer fluke my first attempt was a complete success. Thereafter, my lack of skill was punished mercilessly.

Practice makes perfect and I found that using the keyboard rather than joysticks provided a better delicacy of touch.

Docking procedure perfected, I hyperspaced off to my target planet. A couple of space jumps and I was almost within range of the protective cover of the space station (any space combat in this zone sounds the alert to the deadly Viper craft of GalCop (the police) which come screaming out of the station all guns blazing on a 'shoot first, ask questions later' basis).

Suddenly, with little warning a pirate craft came swooping in from nowhere and straffed me with his pulse lasers. Diving and rolling did little to throw him off my tail.

With the three-dimensional radar at the bottom of the screen I could see where he was. But try as I might it was nigh on impossible to get him in the sights of my lasers.

A self-seeking missile proved to be a more effective weapon. But to target and fire seemed to require four hands, three eyes and two brains. I was blasted out of existence.

To date my most successful mission lasted as far as a fifth planet. Before being vapourised I was showing an insignificant profit of 100 credits and had not even been able to equip myself with an extra laser, let alone a fuel scoop, escape capsule, energy bomb or any of the other armaments that could have ensured survival.

By then a queue of people had lined up behind me in the office, all fighting for the chance to play the game.

Elite has to be played to be believed. The graphics are dramatic. You are offered views through forward, aft and side screens showing the action in 3D wire graphics at a speed that will leave you breathless, and with only the minimum of flicker.

At the bottom of the screen is a multi-coloured display giving information on the state of your shields, missiles, laser and cabin temperature, altitude, forward speed and energy banks.

Navigational aids include a 3D radar display, compass, and right/left roll and dive/climb indicators.

The sound is something of a let down giving the usual zapem sound effects. With the thought that has gone into the this game one would have expected a bit more imagination here.

Without hesitation I give Elite a maximum rating. It is a whole new generation of game that will leave your nerves shot to pieces, your brain cells blasted, and your whole body in a state of complete confusion — and that's after only the first battle sequence.

It will take you literally months before you have explored the depths and subleties of Elite and you will be thankful that Acornsoft has provided a save routine to store you current game status.

Successful pilots can enter Acornsoft's monthly competition for the most skilful players. Those playing at a more leisurely pace can draw inspiration from the enclosed 'novella' based on the game and written by science fiction author Robert Holdstock.

All players, whatever their skill, will benefit from careful study of the enclosed Space Traders Flight Training Manual — a work of art (and humour!) in itself.

It's the most addictive game I have ever come across and the first that could truly claim the title of 'mega-game'.

Ralph Bancroft

Rating: 10/10

Price £14.95 (£17.65 on disk, £12.95 for Electron) **Publisher** Acornsoft Ltd, Betjeman House, 104 Hills Road, Cambridgeshire CB2 1LQ.

An open letter to Acornsoft

The staff of *PCN* demand (beg, plead) that you either convert Elite to other machines, or license a third party to do so. It offends all rules of natural justice that opportunities to play this game of unparalleled excellence should be restricted in any way.

SPECTRUM

TILER

The trouble with being in the building trade is the way your customers tend to fuss around you while you're working. Normally this is just annoying, but in *Tiler*, where your goal is to tile Rob Rubber's roof, it's downright dangerous.

Rob, you see, is a man with a problem. It may have just started with a slight spring in his step, but now his condition is such that he just can't stop bouncing and, as he's also swollen up to Michelin man proportions, if he accidentally bounces on top of you — it's curtains.

Unfortunately, the game doesn't seem to have a facility for jumping on his back, grabbing hold of his ears and using him as a spacehopper. The only thing you can do is make your way back and forth between the roof and the stack of tiles, keeping clear of Rob.

The game consists of three screens, each one being a cutaway section of part of the Rubber residence. You start off on the ground floor of the main building, and to get to the tiles you must go through the garage into the garden, up to the tree house, then back onto the garage roof to collect a tile.

You then have to take your tile back the way you came, then up to the attic where you apparently stick it onto the

inside of the roof, and go back for the next one.

Along the way, you'll encounter several locked doors which you can only pass by using one of the keys sprinkled around the shop. And things are made more difficult by the stairways being one-way for you. Rob however, cartwheels up and down them with ease.

Visually, the game is a hoot, the detailed graphics being set off nicely by Rob's comic figure bouncing around. But the game isn't all that challenging.

Also the continuing trudge from attic to garage and back can get pretty tedious. The review copy also had a couple of odd flaws in it.

Assuming they are cured Tiler isn't at all a bad little game, but it could really have been a bit more difficult.

John Lettice

Rating 6/10
Price £5.50 **Publisher** Interceptor Micros 07356-71145

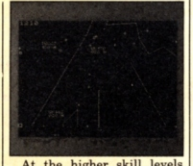
SPECTRUM

AIR TRAFFIC CONTROL

This flight simulator is a cut above some of the others but it has to be said that *Air Traffic Control* is not for your get-up-and-go gamesters.

You must monitor and control air traffic over a given air space. In this case you're looking after the air lanes around Bournemouth and Southampton. The airways here are bustling with planes bound for or arriving from Europe and the States. Keeping tabs on all this lot is not easy.

When asked you whether or not you want printed details of planes coming into your area, you can then select a skill level between one and nine. The package comes with a keyboard overlay and a detailed and easy-to-follow manual. The screen display is a bit drab, mostly black and white, but looks just as it should — lines all over the place showing flight paths. A flight data display, giving details of each flight currently monitored is available at the touch of a key.



At the higher skill levels there are all sorts of difficulties. For example you must keep your traffic well away from Military Crossers — RAF aircraft crossing the airways are out of your jurisdiction. Radio or pressurisation failure, which mean the pilot of the damaged craft will descend rapidly to the highest safe level, will have you hairless in an instant.

Air Traffic Control is very good, comprehensive and if you like this sort of game, well worth the price. **David Lester**

Rating 8/10
Price £9.95 **Publisher** Mikro-Gen 0344-427317

SPECTRUM

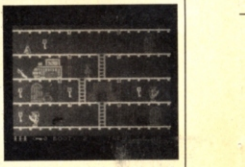
BOOTY

Booty is another of Firebird's £2.50 Spectrum games, and like the others it is good value for money.

Jim, the cabin boy of the good ship The Black Galleon, has to collect as much treasure as possible from the holds of the pirate vessel. Jim himself isn't very well portrayed and attributes are also a little clumsily handled. Jim is drawn on a rectangle which tends to overwrite any characters underneath, which means parts of ladders, cases and so on tend to vanish when Jim passes them. Hardly clever sprites, but then the charm of the game outweighs any such minor niggles.

You start off with a well executed picture of the Black Galleon, afloat on a shimmering sea. Define your own keys if using the keyboard, or take the joystick option, and it's anchors a-weigh.

Booty is basically a 'levels and ladders' game, but with several twists. The Black Galleon has 20 holds, each has four levels and patrolling, cutlass-waving ghost pirates. Each level is divided by numbered bulkheads, and you pass through these by picking up a key.



Treasure and keys are collected by simply moving over them, but only one key can be carried at a time. Once you've cleaned out a hold, or found that you simply cannot get to the last few items, there's always coloured doors to pass through. These lead into other holds, or in some cases mid-air — nasty.

Some of the treasure is booby-trapped, there's a ship's rat to beware of, trap-doors and vanishing floors to keep an eye on plus lots more.

Once you've collected all the items from all 20 holds, you have 45 seconds to find a bronze key.

The game is unusual, nicely executed, addictive and at £2.50, it's a steal. **Bryan Skinner**

Rating 8/10
Price £2.50 **Publisher** Firebird 01-379 7655

SPECTRUM

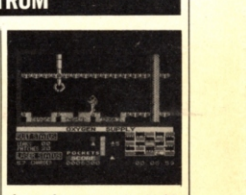
STRANGELOOP

Virgin Games is having another stab at the games market. Changes include better packaging and, yes, better games.

Strangeloop is in the 'mega-game' league. There are 240 screens, each depicted in very good graphics and the quest is hard. Your brief is to save the planet Earth (oh no, not again) by regaining control of a robot factory. The robots have been take over by aliens, and reprogrammed to destroy planet Earth.

The hero, a spaceman, is superbly detailed and well animated, but although keyboard and joystick options are available, I found them both unresponsive. Indeed, controlling the spaceman is quite a challenge in itself. Your laser pistol's current charge is shown, as is your pocket status, *ie* what you're carrying. At all times there's a compass, indicating the direction to the Control Room.

Once, or perhaps if, you master control of the hero you have to move from room to room, trying to work out what to do next. The screen display



shows the protagonist in his location, and below are all sorts of status indicators.

Naturally, there's an oxygen level to be carefully monitored, as well as a suit status indicator and a patches status report — you'll need these for repairing damage to your life-support system.

You start with eight lives, and a nice touch is that each time you lose a life you can start at any point on the current screen. Unusually for a game of this type, there's a save game facility.

Strangeloop is very well done, nicely presented and hard. **David Lester**

Rating 8/10
Price £7.95 **Publisher** Virgin Games 01-221 7535

GAMEPLAY

STAR GAME

AMSTRAD

ROLAND IN TIME

If you've looked through Amsoft's lists recently, you may have wondered how any software house could churn out the whole series of Roland games in such a short time.

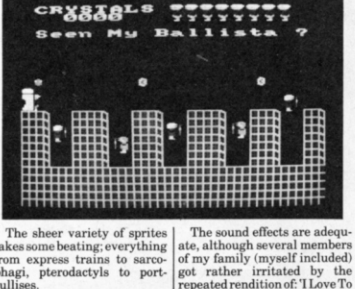
Amsoft hit on the clever idea of marketing a lot of different games featuring small human characters (or in one case a flea) under the one house character.

This latest game is written by Gem Software, authors of *Oh! Mummy and Spannerman*.

The title suggests a time trip, and in fact there are ten time zones, each of which may be entered independently, so you don't have to complete one screen before starting the next. Each screen shows a well-detailed scene depicting some pseudo-historical characters and enough crystals in various awkward locations to test the best of arcade adventurers. The sole purpose of the game is to collect these, and if the crystal counter is anything to go by, there are over a thousand!

When you start playing the game it is probably a good idea to visit as many of the locations as possible, before working out a strategy for collecting gems. Each of the ten main screens has several subsidiary ones.

I've come across 34 in the course of play and haven't got near to visiting them all. There are only three controls to the game: left, right and jump, but then it's nearly all a question of timing, anyway. There are some crystals that can only be reached from one direction and only carried off in another, and Roland will cover some pretty bizarre territory. A list of the ten starting titles may give a feel of the imagination used: *Down At Dollis Brook, The Roman Fort, Njorl's Dragon-boat, Seen My Ballista? Jenny Goes Spinning, Missile Silo No. 47, After The Holocaust, Heli-Hunter Station, West of Dome 9, The End Of Time.*



The sheer variety of sprites takes some beating; everything from express trains to sarcophagi, pterodactyls to portcullises.

This is a true arcade adventure, in that you are often caught unawares by sections of crumbling ground and limited in where you may go by unseen barriers. In one or two places you have to overstep any visible support in order to make a particularly long jump. On the occasions when I failed to make it, I felt justifiably cheated in losing one of my ten lives. When entering a new screen, be prepared for some meany attacking you immediately; only on the starting screens can you assume your entry point is safe.

The sound effects are adequate, although several members of my family (myself included) got rather irritated by the repeated rendition of: 'I Love To Go Awandering', which provides an unstoppable background to the game.

Overall, though, this is an excellent game, varied and imaginative with excellent use of graphics and at last showing something of the full potential of the CPC 464. It will keep most people (apart from those who write into games mags to boast of completing *Sabre Wulf* in under 30 seconds) entertained for many hours. **Simon Williams**

Rating 10/10

Price £8.95 **Publisher** Amsoft 0277-230222.

HIT

BBC

COPTER CAPERS

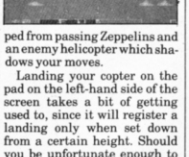
A & F Software built up something of a cult following for two of its previous games, *Cylon Attack* and *Chuckie Egg*, so a new release from it should be very entertaining.

One of the first things you notice on loading this game is the attention paid to the presentation of the program.

Although the initial header screen is a fairly straightforward teletext composition, the same can't be said of the interrupt-driven music which accompanies the loading of the game. It's a well-arranged piece of baroque-inspired Musak which nicely whiles away the minutes before you start.

The instruction sheets, control display and start of each game screen involve some clever manipulation of screen controller registers to produce the effect of unrolling the screen from left to right. Should you reach the high-score table at the end of your game, you're treated to a burst of fireworks.

The game is a lot less original than either of A & F's recent hits, and involves picking up little men from the sea, while avoiding ballistic missiles launched from patrolling submarines, guided missiles dropped from passing Zeppelins and an enemy helicopter which shadows your moves.



Landing your copter on the pad on the left-hand side of the screen takes a bit of getting used to, since it will register a landing only when set down from a certain height. Should you be unfortunate enough to let anything touch you, the helicopter-destroyed sequence is pretty original, although crashing in certain parts of the screen causes peculiar sprite anomalies.

Every two screens successfully completed leads you to a fairly easy bonus game which can earn you a lot of points. A well-executed game, but without the addictive quality of some of A & F's other offerings. **Simon Williams**

Rating 7/10

Price £7.95 **Publisher** A & F Software 0706-341111

HIT

SPECTRUM

PYJAMARAMA

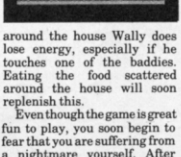
Pyjamarama is one of those games that you can play for hours on end and still not manage to get anywhere at all. frustrating isn't it?

Poor old Wally is suffering from a bad case of the nightmares. Not only is Wally suffering from a visitation by this nocturnal beast, but everything in the house seems to have expanded in size and is running riot around the place.

Our hero is simply given the task of waking himself up from this nightmare so he can go back to sleep in peace. Simply collect the alarm clock, wind it up and Wally will wake up. Well perhaps it's not quite so simple, first Wally has to find the alarm clock and just about every object in the house is out to stop him.

Pyjamarama has what is probably the most stunning graphics you are likely to see on a Spectrum. All the rooms in the house are depicted by very large and colourful graphics where animation is needed it is done extremely well. There is nothing more frightening than being attacked by an extremely large roast chicken while paying a visit to the kitchen.

Oh, by the way moving around the house Wally does lose energy, especially if he touches one of the baddies. Eating the food scattered around the house will soon replenish this.



Even though the game is great fun to play, you soon begin to fear that you are suffering from a nightmare yourself. After about three hours of play I still found myself going around in circles. Mind you the instructions do say that the game keeps repeating itself, repeating itself. The problem is that there are a number of objects scattered around the building many of which will help Wally in his travels, however you aren't told what they do.

Pyjamarama is probably one of the best ever games released for the Spectrum. **Stuart Cooke**

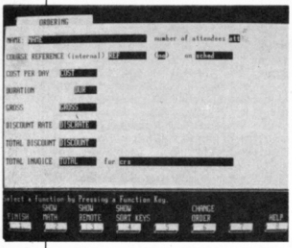
Rating 9/10

Price £6.00 **Publisher** Automata 0705-735242

FACTS ON FILE

Billed as the world's first electronic filing cabinet, Files and Folders is an interesting database package that offers a high level of sophistication, as Neville Ashe discovers.

Most of the programs for ACT's Apricot either come with the micro or are versions of PC software. Files and Folders belongs in the unusual category of software written in the first instance for ACT's juicy micro, with PC and Sirius conversions coming later.



Files and Folders is one of those packages you'd normally label 'database', but the manual describes the package as 'An interactive filing and reporting system'.

Starcom Corporation bills Files and Folders as the world's first electronic filing cabinet. So where is the justification for these claims, and just how far does the program itself live up to the 'interactive' angle?

To begin with, all files are represented on-screen as folders which you can tailor as various types of business forms, such as sales ledgers, invoices, cheques received and so on. An important feature of the program is that it uses commands that are very English in style and is geared round the use of function keys for ease of use.

Presentation

The package comes replete with manual, ring binder and three disks. There are two versions of the program, the standard version being for Apricots with 256K RAM, the extended version requires a minimum of 484K. ACT will upgrade your standard version should you decide you need the extra space.

Documentation

The manual is an A5 ring binder with plenty of screen shots and a good index. It's quite well designed, but with the full on-screen messages and the F8 Help key, documentation is rather redundant — most of the assistance you'll ever need can be displayed on the screen.

Getting started

The various sections load in as overlays when required, so the master program disk must be left in the default drive at all times. The first step is to enter OPENFILE, then specify whether a colour or monochrome monitor is being used. After that you may have to enter a password, if you've decided earlier to use this handy facility.

The main menu appears across the bottom of the display, with each option accessed by one of the Apricot's function keys. The main menu options include: make a folder, file cabinet, and help. The complete list is shown in Figure 1.

After selecting F6 (filing cabinet), you're presented with a sub-menu, in which you can alter the data drive assignation if necessary.

To create a document you select F3 which then shows yet another sub-menu. Selecting F3, 'Work on Folder', allows you to name a folder and create the first part of the folder's detail. This is where the boxes which will hold the information are designed. The cursor control keys are used to move around and make the frame for the information.

Once the boxes have been designed, the type of information in each one can be defined. There are facilities for specifying text, figures, dates, times, yes/no and so on, again using the function keys.

Data entry to the folder is activated by the 'Make Entries' option, and once information has been typed in, validated etc, the data is stored on disk and the Search menu can be invoked. Again eight options are available, such as : F2 Search for, F3 previous entry, F4 next entry, F7 delete current card, as well as Help and Exit.

Files and Folders has an automatic report writer. This comprises two sections — List and Sort. Information can be sorted by specified columns and there are facilities for using mathematical operations.

In the second section, page format, size and output device can be designated at will. There are also facilities for cut and paste as well as the ability to produce mailing labels.

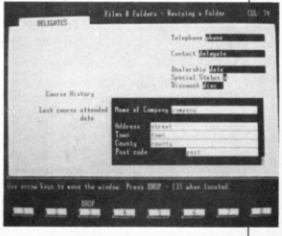
Figure 1: Main Menu options

Function key	Function
F1	Get Folder
F2	Revise Folder
F3	Make Folder
F4	Make Report
F5	Other Functions
F6	File Cabinet
F7	Master Exit
F8	Help

In use

Rather than wade through the manual, I used the tutorial disks to acquaint myself with the system. Given the copious on-screen messages it didn't take long to get to grips with it.

The standard version of Files and Folders can have up to 125 fields on each card. Each field has an upper limit of 78 characters. Up to 125 sort keys are possible and the maximum number of entries is 65535. Seven different number formats and three for dates and times are catered for.



Verdict

Files and Folders is an extremely easy-to-use database system with a large degree of sophistication that doesn't get in the way of its simplicty of operation. It can be learned extremely quickly — highly recommended.

REPORT CARD

Features	○●●●●
Documentation	○●●●●
Performance	○●●●●
Value for money	○●●●●

Name Files and Folders **Application** Database **System** Apricot **Publisher** Starcom Corporation **Distributor** ACT Pulsar Ltd., ACT House, 111 Hagley Road, Birmingham, B16 8LB 021 454 8585 **Format** Disk **Other versions** IBM PC/Sirius **Outlets** Dealers

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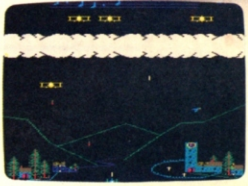
BOOTY

Well shiver me timbers and splice the mainbrace and pass the grog, me hearties. Here be the greatest pirate adventure of them all, aboard that scourge of the Seven Seas – the dreaded Black Galleon. Feast yer eyes on the BOOTY-ful treasure stored in 20 holds. There be pirates, parrots and fun galore. If you don't like it, matey, we'll hang you by the highest yard-arm!!!

THE WILD BUNCH

Blamed for a murder you did not commit, your only hope is to identify and capture the real killer – a member of the notorious gang, The Wild Bunch. But can you also survive life on the run in this adventure set in the Wild West...



BIRD STRIKE

Wing a plane to release a carrier pigeon... shoot the carrier pigeon and add a note to the stave at the top of the screen... shoot enough pigeons to complete the tune (without getting wiped out by the relentless, pursuing planes)... next wave.

Look out for these games in the FIREBIRD silver range at selected high street stores.

SPECTRUM: THE WILD BUNCH · BOOTY · MR. FREEZE · TERRA FORCE · VIKING RAIDERS · MENACE · BYTE BITTEN · EXODUS · RUN BABY RUN ·
COMMODORE 64: BOOTY · MR. FREEZE · EXODUS · HEADACHE · ZULU ·
VIC 20: SNAKE BITE · MICKEY THE BRICKY ·
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IT'S ULTRAKIT

David Janda pitches in with his sampling of a basic programmer's toolkit for Spectrum users from Hisoft.

If micro manufacturers ever wondered what they could do to make their latest toy more attractive to hackers, they couldn't do worse than include a suite of programming tools.

The importance of programming aids is enormous. Give a craftsman a good set of tools and he'll be able to do a good job. Give him only a few tools and he'll do the job a lot slower and not as well.

Hisoft, who produce the well known Pascal (issue 4) has come up with a Basic toolkit that is one hell of a piece of software. Interrupt driven, this software provides the programmer with 35 commands, ten function keys, Microdrive compatibility and toolkit customisation.

Features

The 7K Ultrakit can be loaded before or after program development and gives the programmer two types of command. First there are 23 kit-commands which require parameters such as numbers or strings, and there are 12 pre-defined commands which execute immediately and require no parameters.

Ten function keys can be set up with a string of 255 characters each. The string can include Ultrakit commands as well as normal Basic keywords.

Table 1: Ultrakit commands (abbreviated)

AUTO	Line generator.
BREAK	Error detection.
COPY	Duplicate program lines.
DELETE	Program lines.
EDIT	Program line.
FIND	String.
GRAB	Disables parts of toolkit for use by Basic.
HIDE	Temporarily disables Ultrakit.
INFORM	Display default parameters.
JOIN	Program lines.
KEY	Function key.
LOSE KIT	Deactivate Ultrakit
MOVE	Program lines.
NUMBER	Renumber.
ON ERROR	Error detection.
PUT	String buffer.
QSEPERATOR	Define separator.
RAMREL	Move RAMTOP.
SUBSTITUTE	String.
TRACE	Program execution.
UPDATE	Clock.
VARIABLES	Display.
WARNTIME	Clock.

Pre-defined commands:

K-MODE, PRINTERS, CRUNCH1, CRUNCH2, REMKILL, PACKER, MAP, LOWER CASE, UPPER CASE, CLOCK TIME, ALARM TIME, ALARM SWITCH.

AUTO, NUMBER, COPY and MOVE are used to generate line numbers, renumber and manipulate parts of the program being worked on. A flexible FIND and SUBSTITUTE will work in single-shot or globally, and in both cases line numbers are reported.

A very powerful command is TRACE which can be used to display program line and statement numbers as the program is running. Parts of the program can be selected, and a single step option is allowed. If single stepping, you have the further options to list variables, list current line, list next line, clear screen and restart trace at one of ten speeds.

The pre-defined commands include four types of program compactor, clock and alarm, as well as a command to display the Spectrum's memory map to screen or printer (Figure 1). Many of the commands can be dumped to the printer, and in all there is a lot (Table 1).

In use

The first thing I did was to transfer Ultrakit to Microdrive after stripping off the Basic loader. This enables the kit to be loaded when a program is already in memory and it's worth the effort.

Of all the commands available, TRACE is the one I used the most. The SYMBOL SHIFT key is used to single step and this is a wise choice because it's ignored by INKEY$. The only disappointment with TRACE is that it's not possible to make a dump of the line numbers to the printer. Hisoft assures me this will be included in a later version.

Verdict

This is by far the best Basic toolkit I have used on the Spectrum. Easy to use (which is important in program development), it enables the Basic programmer to get on with the job.

REPORT CARD

Features	●●●●●
Documentation	○●●●●
Performance	●●●●●
Overall Value	○●●●●

Name Ultrakit **Application** Basic programmers toolkit **Machine** 48K ZX Spectrum — Microdrive compatible **Publisher** Hisoft, 180 High Street North, Dunstable LU6 1AT (0582) 696 421 **Price** £9.45 **Outlets** Mail order & dealers

Figure 1: Screen dump of MAP command

Description	Bytes	Name
CHANNEL INFO	23792	CHANS
PROGRAM START	23813	PROG
PROGRAM END	24090	VARS
VARIABLES END	24104	E_LINE
1 FREE BYTE	24106	STKEND
TOP OF BASIC	58137	SP
RAMTOP	58176	RAMTOP
KIT STARTS	58178	KITRAM+1
USER GRAPHICS	65368	UDG
TOP OF MEMORY	65535	P-RAMT
PROGRAM SIZE	277	VARS-PROG
PROGRAM+VARS	291	E_LINE-PROG
SPACE (BASIC)	34031	SP-STKEND
SPACE (CODE)	1	KTRAM-RAMTOP

INTERRUPTS AND CUSTOMISING

Ultrakit uses interrupts to scan the Spectrum keyboard 50 times a second, thus slowing Basic by about 5 per cent. The reason for scanning is the necessity to intercept and interpret keystrokes that would normally do something else.

The effect of this scanning is to slightly change the characteristics of some keys. First, pressing REM in direct mode will display on the edit line the Hisoft copyright and wait for the user to input one of the 23 kit commands.

The SPACE and ENTER keys act as extra shift keys when Ultrakit is active. The effect of this is that auto-repeat on them is disabled and they respond AFTER they have been released. An example of this is when accessing one of the pre-defined commands. The required action is to press the ENTER key, then the key corresponding to the command, release ENTER followed by the letter key. Accessing the function keys is done in a similar fashion with the SPACE key being pressed followed by one of the digit keys.

Ultrakit can be customised in several ways. This is achieved by poking toolkit variables with parameters and then saving an image of the toolkit to tape or Microdrive. The clock, alarm and trace displays can be directed to any part of the screen, and in the case of the trace this facility will allow the output to be directed to the report lines, thus avoiding any clashes with the main program.

The toolkit can be customised so that the clock and trace are displayed in normal video. The copy routine to the printer can be re-directed thus allowing for many types of printer interface to be used.

Finally, saving the Ultrakit to tape or Microdrive will also save any function key definitions.

MACBETH

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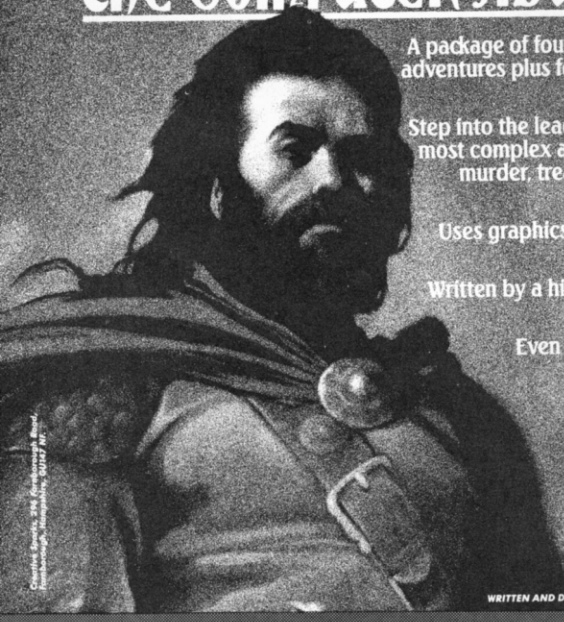

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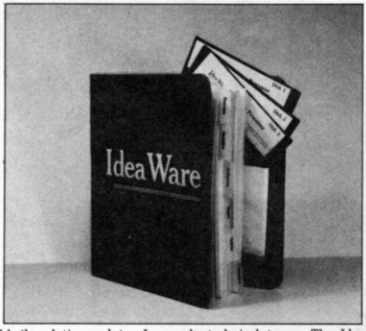

Neville Ash brings to your attention a new item of disk software for the IBM Personal Computer or the XT, which requires a minimum of 192K of RAM for operation

Most computer software can be slotted into definite categories. There are word processors, databases, spreadsheets, accounting packages and programs for vertical markets. Here we have a product which claims to create another category entirely — an Idea Processor which logically processes ideas just like a word processing package works with words.

There is even a bolt-on package, called Graphix Idea, that lets you create drawings, titles, graphs and pictures.

Getting started

The Idea Processor is only available for the IBM Personal Computer or XT and comes complete with three disks and a manual. Two of these disks are self-teach modules. One has a self-running demonstration and the other lessons and sample files. The Idea Processor requires a minimum of 192K of RAM for operation, so some users may need an extra RAM card.

Disk one contains the Idea Processor program, the Master Menu for DOS 1.1 or 2.0. The Help screens and Printer configurations are also on this disk. The second disk is a self-running demo with eight sections. Hello — the introduction, Enter — how to enter test, Insertion and deletion, Searching, Block moves, Cardfile, Format and Run the demonstration. On the third disk there's an interactive tutorial, the program to set up the Master menu and details for configuring other printers.

The first step is to make a self-booting working copy of the Idea Processor by adding the system tracks and program onto a new disk. Next the SAVESCRN program which can save a graph generated by Lotus 1-2-3 and similar programs is set to either DOS 1.1 or 2.0. Finally configure the printer and the program is ready.

In use

The Idea Processor certainly doesn't fit into any single software category. It's best described in outline. Imagine information available in the form of notes, spreadsheets, excerpts from books or magazines, reports, contracts and boiler plating and even sub-routines all needed in some way for use with the program. Then the visual side in the shape of drawings, diagrams, line charts, bar charts and titles.

Now imagine them being combined as needed through a third area and you have the Idea Processor in operation. The text source can be any standard ASCII files and the graphics from any graphics program.

So there's a text editor and cardfiling system all in one. Instead of using the manual, I decided to use the self-running demo and lessons to understand the Idea Processor. After loading the working copy of the program the main menu appears showing just four options: Cardfile, Directory, Editor and Quit.

After taking the Cardfile option, the ten choices are shown at the bottom of the screen:
1 Info, 2 Help, 3 FtSet, 4 TabSet, 5 Refrm, 6 FtCode, 7 Bold, 8 Ulin, 9 Wrdwrap, 10 +Lines.

At this stage any information is entered. Then The Idea Processor transfers this information onto electronic 'cards' which are in turn stored in 'drawers' just like a conventional filing cabinet. Each of these drawers can be stored in a cabinet which has a capacity of eight drawers.

Any card stored is indexed by one or more key words. When a report is produced and some extra information is needed, you switch to this Cardfile, use the Fetch card instruction and enter the keyword.

The text can easily be moved from the Editor to Card file for storage. Any card can be revised at any time and key words can easily be changed.

Two of the features most appealing when compared to other programs are the facility to replace anything accidentally erased and the ability to store images of screens produced with other software packages like Lotus 1-2-3, and store them on an electronic 'card'.

To make the program even easier to operate it's possible to create keyboard macros that can be up to 100 keystrokes in length, operated by a single key.

In purely technical terms, The Idea Processor can have up to 1,500 words on any card, and manage up to 64,000 cards in a database. The Editor and Cardfile are integrated and operate simultaneously. Files can be edited up to a maximum size of 160K. Graphs and spreadsheets can be included in the printed text.

Documentation

As a manual the documentation supplied with The Idea Processor is quite clear and divided into six sections. Overview, Narrative Reference, Expert, Tutorial and Appendix. I didn't get as far as the Expert section, but worked through the Overview, Narrative and Tutorial.

However working on-screen was better than reading the manual. In fact with the aid of the On-screen Help facility, it tended to make the manual redundant.

Verdict

If you write reports, articles, documents and want something more than a word processor without having a complicated database system to use, then the Idea Processor could be the answer. Priced in the mid-range for IBM PC word processors, you have WP and something more. The facility for using files from other programs and inserting graphics and spreadsheets makes it particularly valuable.

Maybe Idea Processor isn't strictly a processor of ideas as such, but a combination electronic card filing system and word processing package with other program compatibility is quite a combination in a single program.

REPORT CARD

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

Application Extremely wide **Price** £240, The Graphix Idea £65 **Publisher** Idea Ware, New York, USA **Distributor** CBIS International, 50A Pall Mall, London SW1Y 5JH, 01-930 6083 **Format** Disk **Outlets** Dealers

READOUT

'Advanced Machine Code Programming for the Commodore 64' by A P & DJ Stephenson, published by Granada, at £7.95 (paperback, 251 pages).

One great let-down of the Commodore 64 is its archaic version of Basic. It's not surprising therefore that machine code is a subject that most Commodore 64 owners decide to delve into at some stage.

For this reason machine code books keep appearing on the bookshelves, and this title is just one more to add to the throng.

However, this book does stand out from a lot of the others that are available, as it certainly is advanced. Even though the book does start off with the basics of machine code it is far too technical and a beginner would probably find it tough going.

I got the distinct impression that this is why the word advanced was stuck on the front of the title. This means that the first section of the book becomes no more than a refresher course in machine code and a few people will find that they can skip quite a bit of it.

Once you actually get into the book you will soon find it becoming an extremely useful reference guide as well as being an excellent tutorial in the way that your 64 works.

Sections cover sort routines, high resolution graphics, and input output techniques with a few simple circuits to build. Use of sprites in machine code and the sound chip are mentioned only briefly and for a book claiming to be for the 64 these subjects could have been dealt with in a much more informative way.

All in all, this is a handy book to have around. **SC**

'Intermediate Commodore 64' by Guy Grotke, published by Prentice-Hall at £14.95 (paperback, 184 pages).

A splendid book with one tragic flaw. Prentice-Hall has shipped it in from the US and done a straight dollar-to-sterling conversion to price it at £14.95. Even for such excellence that is grossly expensive.

Author Grotke has tackled the difficult aspects of using the 64 and used advanced techniques to do it. This makes the book an ideal choice for someone looking for a guide beyond the well-charted territory of simple Basic programming.

Structured programming, developing algorithms, file handling and graphics all receive comprehensive treatment with carefully explained machine code routines introduced where necessary.

The text is clearly written with a light touch that never stoops to strained humour or condescension, and the example programs and utilities have been well chosen.

Even at as much as £8 this would be essential reading for 64 owners looking to advance their programming skills. As it is, only those with money to spare should bother looking it out. **PW**

'Disk Programming Techniques For The BBC Micro' by Michael Coleman, published by Prentice-Hall (price £7.75).

For a book with 224 pages, this volume has little original content.

The first section of the book rehashes the contents of the Acorn disk manual, with lots of nice waffle to fill it out. There is no mention of some of the more advanced features available to the system using the OSWORD &7F or OSARGS calls.

There is also very little in the way of example programs and utilities that one would expect from a book that purports to be about disk programming techniques.

All the details are really only relevant to the Acorn system, although there is a chapter on alternative DFSs, Amcom and Watford only (two pages each).

Eventually, the book gets around to giving some examples, called case studies. These are: a telephone directory listing, a file-patching program, a procedure library program (without the procedures), a simple data base, a disk soak test, and a fairly simple file recovery program.

The best thing in the book was the way in which these examples are documented. The style is very Pascal-ish with all the variables stated at the beginning, and the rest of the program written in procedure and function blocks. Each one of these is described in detail and the whole program is listed at the end to allow it to be typed in — if you can work up that much enthusiasm.

Overall, the layout of the book is not particularly appealing, and appears to have been printed on a daisywheel. Whether this is to make the book look more 'computery' or is just cheaper to produce is anybody's guess. The few illustrations are generally very simple block diagrams with lots of white space around them.

If you have bought a disk drive for the BBC then the manual that will come with it, and the abundance of articles on the subject, will be more useful and informative than this amazing piece of tripe. **KG**

'Assembly Language Programming on the Sinclair QL' by Andrew Pennell, published by Sunshine Books at £7.95 (paperback, 168 pages).

One thing that many people will be buying the Sinclair QL for (God help them), is to learn 68000 assembly language. In particular, schools and colleges would like their students and pupils to learn a 16-bit microprocessor language.

Since the QL finally came out, there have been quite a number of books for it: this would appear to be one of the first that enables you to try out the assembly code itself.

The book starts out with a chapter entitled bits and bytes. This introduces you to the terms used; RAM being Random Access Memory, ROM is Read-Only Memory, and so on. Yes, it's as simple as that. Unfortunately, the next chapter makes a quantum leap (sorry) and throws you in at the deep end with a fairly concise description of the insides.

If you have had no experience of other microprocessors then this will appear a little complex since it gives details of such as the memory map and processors and architecture.

After this we are introduced to the basic move commands. This would be all very well except for the fact that there is very little explanation about word and byte sizes and instruction formats.

These are basically implied but if you have had any experience of other 16-bit processor coding languages such as MAC 11 then you'll have no trouble at all understanding any of this. If you haven't, then don't worry! A little practice will show you what's happening.

The next chapter of the book details the condition codes, branches, and arithmetic. This does not cover built-in multiply instructions.

From this point, things go a little down hill. There is less of the instruction, descriptions and examples type of thing and after a few chapters, you get a list and brief description of the commands available.

This latter section is very useful to anyone who has had a little experience of programming on other processors but needs an easy reference guide to the 68008.

The last part of the book consists mainly of a listing of a 68008 disassembler. It would have been nicer to have an assembler but you can't win them all. This listing is well-documented and without typing it in, it appears to be pretty good even though it is written in Superbasic.

Hidden away in the last chapter is multitasking. This is an assembler listing and hopefully, if you have understood the rest of the book, it will make some kind of sense. There could have been a lot more on this subject since the 68008 and the QL are, theoretically, good at it.

The fact that many QL owners could be first-time buyers will probably make this book a little hard going for them. **KG**

'The Complete Commodore 64' edited by Alian Scott, published by Granada Publishing at £9.95 (paperback, 488 pages).

A bit of a cheat on two counts, this. First, it contains little — if any — new material. The bulk of it is culled from previous Granada titles on the 64.

The second naughty aspect is in the title. Although it makes a reasonable effort to be 'complete' no book on the 64 can make that claim without a thorough guide to machine code, which this one lacks.

There is a section on assembler but it is nothing more than a cursory look at the subject and you'll find no mention of things like interrupt-driven graphics.

Some of it is very good, particularly Steve Money's section on graphics and sound.

To round things off there's a collection of programs but the emphasis is on games. A better bet would have been a collection of utilities like sprite and graphic designers, and a machine code monitor.

At the price, the book is good value, but there's still room for a real 'complete' guide to this powerful machine. **PW**

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Shinwa CP80 dot-matrix printer and Atari interface wanted. For sale: complete set "Computer and Video Games", offers? Buyer collects. Tel: 01-341-0464 evenings.

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Commodore

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CBM 64 software for sale: Jumpman (cassette) £10, Pharaoh's Curse, £8, Protector II £6, Soccer £5. Tel: Waterlooville 266855 after 6pm.

Vic 20 computer with cassette recorder, 16K switchable RAM, 40-column screen converter, books, and software, only £90. Tel: 01-952 7855.

Vic 20 starter packs, 32K, + joystick + cassette recorder + centronics interface + original software, accept £180. Tel: 01- 807 1724.

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Commodore 64 O'level history, Maths "2", £12 the two, brand new, also software to swap on disk or tape. Tel: 051 423 5493 after 6.30pm please.

Commodore 64 software sale, half price, Preppie 1, Gorf, write to A Jmel, 7 Holly Road, Northampton NN1 4QL.

Vic 20 starter, includes tape player, 11 cartridges, Quickshot joystick, cassette, large number of games all excellent condition, £200 ono. Apply: R Chamberlain. Tel: Milton Keynes 583076.

Swap CBM 64 disk, with printer plotter, cassette Simon's Basic, joysticks, books and software, for BBC B or Memotech MTX512. Tel: (0245) 350599. Will sell £340 ono.

Simons Basic £30, Scrabble, £8, lots of others, Hobbit, Soccer, Miner etc, for cash or swap for EPROM blower etc. Tony 0474-824155 after 7.30pm.

Commodore 4023 dot matrix printer, friction and tractor feed, very good condition, worth £400, selling for just £250 ono. Tel: (0272) 736666 after 4.00pm.

Programmer for 64, about £170 worth inc Simons Basic and Soccer Cart. Cash or swaps for CBM 64 EPROM blower. Tel: Tony 0474-824155 after 7.30pm.

Wanted 1541 disk drive for CBM 64, must be excellent condition plus extra's including manuals, disks and any software, price negotiable. Tel: (0438) 359583.

Vic 20 + C2N good condition, 16K switchable, cartridges including Gorf, Supersnit, Adventure land + Many, cassettes including Skyhawk, Donkey Kong, 2 books. £110 ono. Tel: Deeping 342249.

Vic 20 computer, 10 games, superexpander, joystick 3 books intro set, cassette recorder, £150, also printer, £120. Tel: Ferndown (0202) 873379.

Vic 20 starter pack, 16K RAM, 12" TV, Quickshot joystick, 40 tapes, magazines, Vic revealed, £250. Tel: 0279 33687 after 6pm.

Dragon

Wanted disk drive for the Dragon 32 (will consider tape drive) reasonable price carriage and paid. Tel: Brierley Hill 74308.

Dragon 32, 1 joystick, £90 software, mags, cassette recorder + leads + manuals sell, £100, + DASM/Demon assembler monitor + 2 M/C books, sell, £25. Tel: 047485 2026.

Dragon software for sale: Sprite Magic, Pettigrews Diary, UGH! Eight Ball, Skrambe, Ring of Darkness, Chess cartridge, plus microdeal joysticks, £40. Write to: 60A Hartuft Rd, Hull, HU5 4JJ.

Dragon 32, joystick, user magazines, dustcover and software, £110. Seikosha GP100A printer and lead, £130, both for £230 boxed and hardly used. Tel: 0622 62650.

Dragon 32 under guarantee, boxed as new, complete with accessories, including dustcover — £120. Dasm/Demon cartridge, £30 — games £5-£7 each plus books. Tel: 01-571-0634.

Dragon 32, guaranteed, boxed plus leads, manual, various books, magazines, software — £75 (buyer collects), £83 p/p'd. Tel: Glasgow 952 6136 Mon-Fri evenings. Ask for John.

Dragon 32 for sale, joystick, books, mags, £100 of original software, worth over £270, just £90 ono. Contact Richard on Ramsbottom (070682) 2025.

Memotech

Memotech MTX-500 + tape deck, £125. Tel: (0253) 403994.

MTX 512 64K computer. Software tapes, books, nearly new, under guarantee. £280 ono. Tel: 01-607 4019.

Memotech MTX512 80K RAM fitted Newsword word processor ROM and Memotech DMX80 printer boxed manuals, £500 — will consider cheap computer plus cash. Tel: Southend 529169.

Memotech MTX 512, 64K, tape recorder, five games, book, guaranteed, £265, also Vic-20 starter pack, £80. Tel: Dudley (0384) 57360.

Newbrain

Newbrain AD c/w green monitor, compatible cassette, software incl, Database, Pascal, Textwriter, Home Budget and games. Manuals, guide, leads, £220 ono. Tel: Cheltenham (0242) 522518.

Newbrain AD, tape recorder, technical manual, database, much software and Newbrain literature (software). £250. Tel: Medway 63427 (evenings only).

Newbrain AD, very little use, also tape recorder, printer, cable, spare p/supply, all mounted on one board, optional monitor. £225 or £325. Tel: Brighton (0273) 556184.

Oric

Oric Atmos 48K. New, still boxed, £170. Tel: Tonbridge (0732) 364185.

Oric 148K with Quickshot joystick, £80 software including, Hobbit, Xenon, Zorgon's Revenge. All originals, MCP-40 printer, £190. Tel: 01-460 9334 evenings.

Oric-1 48K in vgc, complete with software including Zorgons Revenge, 2-Gun Turtle, leads and manual, £89. Tel: 01-642 9803.

Oric 1 software, Hobbit, Wordprocessor, 68, Chess, Toolkit, 54, Xenon, Intercepter, Starfighter £3. All original. Tel: John Wright Ripley 860653.

Oric 1 48K, plus vgc, includes software Zorgons Revenge, Hunchback etc, books, £110 ono. Tel: Fleet, 28394.

Oric 1 48K excellent condition + software including Zorgons Revenge, Hunchback, Hobbit plus tape recorder only, £150. Tel: Jamie, Newquay (06373) 5130.

Oric 48K good condition, plus £50 worth software, leads, and books £80 ono. Tel: 041-952 6589 evenings.

Last chance to buy my Atmos, 4 months old, still in box plus some extras, phone me an offer. M. Swanson, Spilsby, Lincs. Tel: (0790) 52120.

Oric-1 48K includes cables for RGB printer and Byte Drive 500 disk drive cable, £100+ of software, £150 ono. Tel: Sunbury-on-Thames 84039 evenings.

Oric Atmos 48K, perfect condition plus £45 worth of software including The Hobbit and cassette recording, 9 months guarantee remaining, £130. Tel: 021-429 6056.

Oric Atmos 48K excellent condition, boxed, cassette player, over £70 of software inc Hobbit, Xenon 1, etc, worth over £270, will sell for £130. (01)-876-4332 (eves).

Sharp

Sharp MZ80K 48K, monitor, cassette recorder, £400 of software, Pascal, Forth, Xtal, assembler and 100 games, user notes good condition, £325. Tel: (0282) 692276.

Sharp MZ80A one year old worth, £450 new, plus £100 software and monitor, tape recorder, 15 blank tapes, £200 ono. Tel: Tony on Cardiff (0222) 842948.

Sharp MZ-80K, 48K RAM, built in tape unit and monitor, plus dual disk drive, printer and manuals, £620 ono. Tel: (064 73) 3392. Chagford, Devon.

Sharp MZ700, 11 months old, excellent condition with £70 s/w, data recorder, manuals and magazines, sell for £240 ono, will seperate. Tel: (0282) 865821 evenings.

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Prism VTX 5000 modem for Spectrum, best condition with box, instructions etc, £60. Tel: (01) 886 4797.

Software Spectrum, sold or scrapped! Psion Chess 48K, The Hobbit, Spectrum Forth, all guaranteed originals Tel: (0273) 725650.

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48K Spectrum interface 1, microdrive, three cartridges, lightpen, joystick interface, joystick, ZX printer, paper, sound board, over £100 worth tapes, and books. Only £325 ono. Tel: Guildford 65644.

48K Spectrum with printer, sound amplifier, dust cover and software and magazines, only £165. Tel: Slough 41066.

48K Spectrum interface 1, microdrive cartridges, WH Smith tape recorder, programmable interface and joystick plus software including White Lightning. £325. Tel: (0943) 863028 after 5.30pm.

48K Spectrum, Kempston interface + Quickshot 2 joystick, cassette recorder, DK Tronics keyboard, lots of mags. All for £220. Tel: (0279) 20045.

Spectrum 48K, Fuller Box, Quickshot, Interface Kempston/Cursor, 170 progs, books mags, £180 ono. Casio PT30 keyboard, £40. Tel: (0494) 443184.

48K Spectrum, Microdrive, interface 1, Alphacom printer, software, cartridges, perfect condition, with manuals, all for £280. Tel: after 4pm, (0267) 234719.

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ZX81 16K 5 games, all leads and manuals, £20 ono. Write to: Robin Jones, Morlan Bangor Road, Caernarfon, Wales.

48K Spectrum Alphacom printer plus books, selection of software. Value over £300, accept offers over £150. Tel: 01-459 3278 (evenings).

48K ZX Spectrum, tape recorder + over £200 of software, joysticks + interface guarantee, £180 ono. Swap for Electron, BBC-B cash adjustments maybe. Tel: 01-995 1874 after 4pm.

For sale Offers? A Epson MX100 printer to suit. Tel: Gerrards Cross (0753) 882686.

For sale interface 1 + two microdrives and RS232C cable + five microdrive cartridges and cartridges holder all leads + manual, worth about £200, sell for £130. Tel: 01-504 0565.

Spectrum 48K interface 1, two microdrives, DK' Tronics keyboard, ZXL print III, ZX printer, Tasword 2 wordprocessor plus software, books and manuals. boxed VGC £270. Tel: 01-898 0482.

48K Spectrum, Currah speech, light pen, software, lots of mags, sell for, £220 or swap for Commodore 64, joystick, cassette recorder, software. Tel: 01-207 1806.

48K Spectrum, RAM Turbo, joystick + cartridge interface, Quickshot II joystick, ZX printer, 4 rolls of paper, DK' Tronics light pen, tape recorder, books, magazines, software. £250 ono. Tel: Peterboro (0733) 241354.

48K Spectrum + Alphacom printer (hardly used) +5 rolls printer paper, software, magazines. Sell for £200 ono, buyer collects, York area. Tel: 03477 577 after 5pm.

Spectrum 48K plus recorder nine months old, hardly used, lots of games including Jet Set Willy, Stonkers, Blue Thunder. Only £110 ono. Tel: 01-735 6094.

Spectrum 48K, DK' Tronics keyboard, interface one, microdrive, Alphacom printer, Currah speech, RAM Turbo, joysticks plus software, half price, £350 ono. Dave Tel: 0702 552249.

ZX81 16K RAM, power supply in custom case with Maplin keyboard, software, books. £50 ono, or part exchange. Tel: Belbroughton (0562) 730 197.

48K Spectrum, ZX printer, Competition pro joystick and interface, nine games, one utility, all leads, five books, £50 ono. Wolverhampton/Birmingham area, Tel: (09073) 75200 for quick sale.

48K Spectrum, Kempston interface and joystick, lots and lots of software including the latest, mags, book, £120 ono. Computer one month old! Tel: Michael on 01-340 2630.

48K Spectrum, black and white television, Kempston joystick and interface, cassette recorder and leads, books, 10 programs including Penetrator, VU-3D, Hurg, Trans-Am, £165 complete. Tel: Ipswich (0473) 49025.

Spectrum 48K, interface 1, Microdrive, Saga keyboard, Kempston printer interface, £250 of software, may split. for details and offers ring (0377) 42803 after 7pm.

Spectrum software half price, Transform keyboard, £55, Fox programmable joystick interface, £25. Will deal for ZX printer and paper and for Currah Microspeech. Tel: 01-951-0007 after 6pm.

48K Spectrum tape recorder, stack, light rifle, 2 books, lots of games, offers. Tel: Steve (0203 418809, won't split!

48K Spectrum £50; interface, £30; Microdrive, £25; Spectrum printer, £15; Seikosha GP-100A printer, Kempston interface, £180; carriage extra, offers to Hinds. Tel: (0792) 69688.

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T199/4A mini memory £38, editor assembler, £40, Blasto cartridge, £7. P+P extra. Tel: 0245 72572 after 6.00pm.

Texas TI 99/4A bargain package. Console + extended Basic + several modules and cassettes, TI cassette + speech + joysticks + books + colour TV, £220 ono, buyer must collect. Tel: Pontefract 700702.

Wanted T199/4A extended Basic module with manual, will pay max. £25. Casio VL-10 mini keyboard for sale, £15. Tel: (0401) 50154 after 6pm.

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T199/4A computer, 3 cartridges, including extended Basic and Parsec, with speech synthesizer, manuals, magazines and cassette lead. £200 ono. Tel: 01-804 3382.

Texas TI-99/4A, cassette unit, leads, adventure module and 3 Scott Adams adventures, Pirate, and Blood-Bank. £80 ono. Tel: 021-743 5203 after 6pm, Dave.

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Kempston competition pro joystick and interface for Spectrum, 3 months old only, £15 ono. Tel: 01-883-0776.

DOT matrix printer, prints in 7 colours, mint condition, fast 125cps, parallel interface, £250 ono. Tel: 0865 750600 evenings.

Wanted simple working terminal with RS232 interface or 20MA coop, preferably VDU type, may consider teletype will pay around, £50. Tel: (0903) 42015 WABBS.

Alphacom 32 thermal printer plus one roll of paper, only five months old, Spectrum compatible, no interface required, £43. Tel: Shrewsbury 59356.

Qume Q30 daisywheel printer, 30CPS, perfect condition, 18-bit parallel bus with wheels and ribbons, interface and software for Nascom II if req, will demonstrate, £200. Tel: 061-236-8406 (day).

Seikosha GP100A printer, BBC cable, 5 spare ribbons and paper, £145. Also BBC software: Acornsoft, Micro-Power, etc. Originals, £3 each. Tel: Richard 01-236 6640.

Others

Flight simulator II user group (UK), having problems? phone us, diagrams of approaches, advice, monthly air race. Tel: Ray Jones (09803) 8865.

Video Genie I built-in cassette, Centronics printer interface, software Tandy compatible, £80 ono. Tel: after 6pm 0480 75036 or will exchange for Texas Extras an mini-memory.

Disc software for Apple 2, Flight Simulator 2, £30, Blade of Blackpoole, £12. CBM 64 cassette software from £1, all originals, as new. Tel: Slough 71392.

Colour Genie EG2000, 32K RAM, boxed and complete with demo and manuals, immaculate, unwanted gift, accept £120. Tel: Dave, Southampton (0703) 897110.

Sharp MZ-80A 48K computer with built in monitor and tape recorder, Basic and software tapes, well sell for £350. Tel: 01-373 4156.

Swop Sharp MZ80A, 100+progs 4 languages, wanted Commodore 64 with C2N cassette, and T.V monitor. (Excellent condition please). Tel: (0202) 672669.

Adam owners join the independent users club, P.O Box 9, Towcester, Northants, NN12 7QG.

Lynx 48K, boxed as new, manual leads, demo tape, plus Level 9 assembler, Lynx User magazines, plus extras, bargain, £80 ono. Tel: 061-962 5964.

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PCN issues 1 to 30 for £10, must collect, Chris Barnes on (0226) 285703.

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Sirius £2,347.55 plus Wordstar disk (no manual) MS-DOS, CPM86 Apricot, £1,912.75 plus Wordstar disk (no manual) MSDOS, Basic, Supercalc. Tel: 01-883 1681.

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Spectrum 48K ZX printer + 5 rolls paper, joystick interface 2, Ferguson tape recorder, plus £500 of best software worth £700, under guarantee, sell for just £200 ono. Tel: 0254 55364.

Sinclair QL for sale. No donggles. Tel: 01-692 7708.

48K Spectrum, ZX printer, tape recorder and software worth over, £300, total value, £490; sell for £150. Tel: Miguel 01-352 2979 after 5pm.

48K ZX Spectrum + joystick and interface + over £200 of software, guarantee + tape recorder, £180 ono or swap for BBC B or Electron. Cash adjustment maybe. Tel: 01-995 1874 after 3.30pm.

Digital Circuit Design Program (48K Spectrum), £8. Lords of Time, £5. Adventure Quest £5 Write to D. Hawkins, 107 Butts Hill Road, Woodley, Reading, Berkshire. Tel: 0734 698094.

Spectrum 48K brand new with software, unused and unwanted present with one year guarantee, £120 includes delivery. Tel: 01-636 9636.

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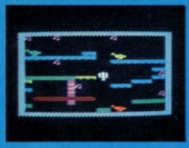
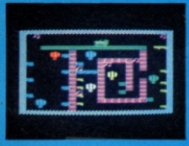
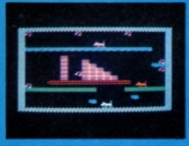


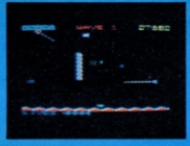


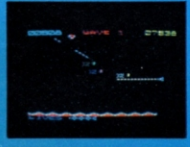


Oh what a night, drinking, dancing and singing 'til dawn. Now it's time for all the revellers to make their way home. Being a little worse for drink, you decide to walk home in the cool night air, rather than taking a taxi. Singing merrily along the way, you walk through the park and skip lightly over the ducks and catch the notes of music that seem to hang in the air. But be careful when approaching the railway, trains still run at this time of day and wild dogs are in search of food! When you have collected all the notes on the level you are on you will proceed to the next, collecting a time bonus on the way.

Miner Willy's first outing on the Commodore VIC 20.

Available on the VIC 20 + 16K expanded

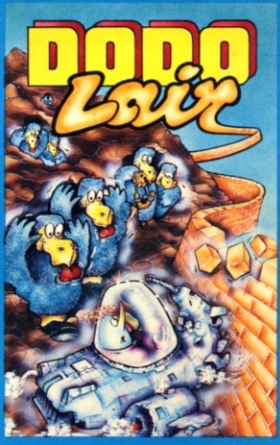




Its army to enormous dimensions, soon its attack on mankind will commence. Exploring the outer regions of a weird landscape, your secondhand 'ground skimmer' has only a single laser in its armoury. Discovering the Dodo's secret means you must destroy as many beings as possible, as the Dodo will try anything in its power to prevent the secret getting out. The game has 9 attack waves with progressive difficulty and speed. There's a bonus life every 10,000 points and bonus points after every wave, dependant on which level you are on (Bonus = Wave Number x 1000). After the wave bonus the Dodo must be hit 12 times, by bringing the number on the right of the score from 88 to 100. The number of 'Mults', 'Wallys' and 'Buildas' is also dependant on the wave number.

WARNING: 'Mults' are not affected by laser fire, but in fact, feed on it. The 'ground-skimmer' can be destroyed on collision with any enemy or enemies weapons, or by letting the 'BBs' (purple coloured enemy) getting to the far right of the screen.

Available on the unexpanded VIC 20



SOFTWARE PROJECTS

Software Projects Limited, Bearbrand Complex, Allerton Road, Woolton, Liverpool L25 7SF.
Telex: 627520 Telephone: 051-428 9393 (4 lines).

Deep in the kitchen of one of the towns first class restaurants amongst the hustle and bustle, Little Thwitchy Thwilly has just been selected from the aquarium as a customers main course . . . panic . . . sitting in the oven his first thought is survival and how to escape. As the oven is ignited and the flames start to rise he realises his only hope is to collect the dripping condensation from the pipe at the top of the oven and try to extinguish the flames. It's going to be tough, he must survive through ten different ovens and face added hazards such as the rotating spit, spinning food debris, oven foam and the restaurants pet dog, Fatty Schizo Henry, who by the way often enjoys a snack from the restaurants aquarium. Can you help him?

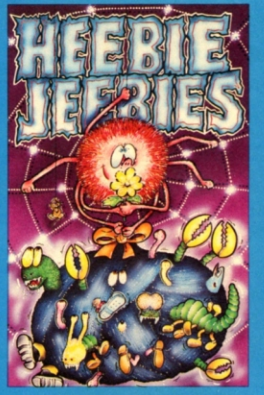
Available on the unexpanded VIC 20

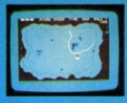
Once you were the head gardener in charge of a group of ten power-flowers. These have been stolen and hidden in a set of caves, from which you must retrieve them. The flowers are protected by forcefields, gates, begonias and patrolling snap-dragons. Be careful as the flowers are poisonous and you must find a pot to put each flower in before you try to pick it up.

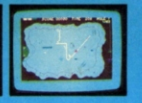
The beans in the cave are harmless and extra points will be achieved by picking them up along the way, but don't touch their stalks.

If anything is touched other than a pot, beans, fuel dumps for re-fueling, sprays which can be used to stun the snap-dragons, or a plant if you have a spare pot, the result will be that you are teleported to the start of the game. It is possible for you to leave your transported back to your teleport. You begin the game with four teleport charges and an extra charge is gained for every flower collected.

Available on the Commodore 64







You play the roll of a spider in this extremely compelling game and you are faced with escaping from some very perilous situations.

You are trapped in a hole from which you must escape, but there are other insects in the hole which make your task more difficult, as contact with any of them will lead to instant death. However you are not totally defenceless you are capable of leaving a web trail which only snails can cross. By collecting the twigs that are littered around and storing them against the left hand side of the hole between the two stones a bridge will form and you will be able to climb out. But be careful — there are 15 hazardous situations to contend with — each one more difficult than the last.

Available on the Commodore 64

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QUIT

Funny business

In smoke-filled rooms and dingy alleys around the country deals are being struck to get software to you. In the picture some of Palace Software's clean-living executives are signing an agreement (needing just a little gentle persuasion) to distribute Ram Jam titles. Or at least, that's what Palace says is happening. What do you think is being said?

Send us your suggestions and we'll award four ladies (£20) to the winner of this Laughline competition. The address to note is *PCN*, Evelyn House, 62 Oxford Street, London W1A 2HG. The winner will be announced in issue 85.

In the flesh

Curious goings-on in the Midlands last week, with the Birmingham Post reporting the case of a 15-year-old who had a 2in by 3in piece of flesh sewn back on.

Microsurgery isn't too uncommon these days but the bizarre feature of the case was that the piece of flesh was discovered in a home micro store before being re-united with its owner.

We wish the lad a speedy recovery. But Midlands readers should take care when visiting their local dealers — it sounds as if Pacman's runningamok.

Flight path

Now here's a puzzler. A member of the *PCN* staff was recently enjoying a quiet game of darts in the pub. Aiming for the treble 20 his first dart flew into the treble 11.

The second he also aimed at the treble 20. It followed an identical arc and — with surgical precision — pierced the dead centre of the first dart's flights.

And there they hung.

An animated conversation ensued. What are the odds against this happening?

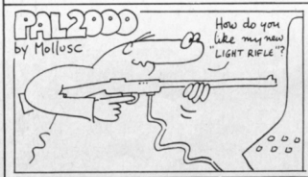
Easy, said one computer-literate observer. A dart board can be divided into 360 degrees, so its 360 times 360 to one.

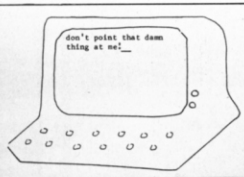
But hang on a minute. What about the distance from the centre of the board?

Matters started to get out of hand and we want you to help us out. Can you offer an algorithm to solve the problem?

BT not so OK

Which telephone number in this sceptred isle would you expect to be most often free from interference that gives you the engaged tone, the dialling tone, and acrossed line all in the space of seconds? You guessed it. The British Telecom technical press enquiries number.





SYNTAX ERROR

There are no Syntax Errors this week. Either we kept a clean sheet or you're not reading the magazine as closely as you used to.

NEXT WEEK

Commodore Four
Is Plus 4 the oddest name of the year or the biggest sure-fire winner? We get inside its skin.

Output
Treat yourself to a Tony Crowther original in our butterfly game for the Commodore 64 — back to back with listings for Spectrum, Amstrad and Oric owners. BBC/Electron users can also take advantage of our memory monitor.

Peripherals
Ravens have an eye for bright objects; we check one that aims to save memory on the BBC's displays. For Spectrum owners there's also a review of the Cheetah keyboard.

Software
Visual database management? What else would Filevision be for but Apple's Macintosh. Plus we review Musicalc for the Commodore 64.

Gameplay
Boulder Dash is the game of the week, but look out for the low-down on the latest games for Spectrum, Commodore 64, and BBC.

Regulars
The latest news in Monitor, food for thought in Random Access, guidance from Routine Inquiries, surf's up in Microwaves, and all our usual dainties.

PCN DATELINES

Event	Dates	Venue	Organisers
Localnet Exhbn	October 10-12	San Diego, USA	Online Conferences, 01-868 4466
Apricot & Sirius Computer Show	October 16-18	Manchester	Paradox Group Ltd, 01-241 2354
London Business Equipment Exhbn — LBES	October 23-26	Earl's Court, London	BED Exhibitions, 01-647 1001
Computer Exhbn — Computers	October 24-27	Johannesburg, S. Africa	Specialised Exhbns, 01-486 1951
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Electron & BBC Micro User Show	October 25-28	Alexandra Palace, London	Database Publications, 061-456 8383
Home Tech '84	October 26-29	Exhbn Complex, Bristol	Nationwide Exhibitions, 0272-650465/15
Computer Security Conf & Exhbn	October 29-30	Conf Centre, Nottingham	Elsevier Int Bulletins, 0865-512242
COMDEX/Europe	Oct 29-Nov 1	Amsterdam, Holland	Interface Group Inc., Amsteldijk 166, 1079 LH, Amsterdam, Holland
SE Asian Personal Computer Exhbn & Conf — PerCompAsia	Oct 29 — Nov 2	Singapore	Overseas Exhbns Services, 01-486 1951
Computers in Action	Oct 30-Nov 1	Anderson Centre, Glasgow	Trade Exhibitions, 0764-4204
Personal Computer Fair	Oct 30-Nov 1	Town Hall, Bournemouth	Mike Schofield Promotions, 0202-36899
Computer Conf & Exhbn —	Oct 30-Nov 2	Anaheim, USA	Electronic Conventions Inc, CA 90045

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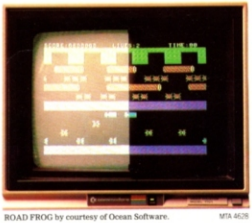

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