



New from Atari

SPECTRUM TOOLKIT

Helpline for programmers-p12

CANON'S CONTENDER

Can it stand out from the MSX crowd? -p24

BBC EXPANSION

More ways with ROMs-p33

PLUS...

Programs for QL, 64 and BBC

COMMODORE AND ATARI STEAL THE SHOW Magnificent seven from US giants



NEWS EXTRA INSIDE



Choosing a printer is a lot easier than choosing a computer.

THERE are dozens of quality printers from which to choose. With quality price tags of around £250.

The Brother M-1009, however, breaks all the rules.

Stavs defiantly below the £200 barrier.

Though it has far more than its fair share of features, it maintains the extraordinarily low price of £199.95.

Travels at a steady fifty.

In the speed stakes, the M-1009 is certainly no slouch, being fully capable of up to 50 characters per second.

Providing bi-directional and logic seeking printing for normal characters and uni-directional printing for super and sub script and graphics.

Prints on any paper.

Being an impact printer, the M-1009 will print on virtually any paper, including letter headings, invoices and standard office stationery.

It will even print two copies together with your original.

A superb character recommendation.

In its price range, the M-1009 has a great deal more character than many printers.

96 no less, plus international type and graphic characters.

Reliability comes as standard.

Built to the same exacting standards as Brother's elite office

printers, the Brother M-1009 already has faultless credentials for reliability.

Its 9 pin dot matrix head, for example, has an astonishing 20 million character service life.

One printer that doesn't block out the light.

Many home computers tend to be a little on the large side. In contrast, the compact M-1009, at only 7 cm high, keeps a discreet profile.

Well designed, reliable – and conscientious.

The Brother M-1009.



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Apologies to faithful followers of the Next Week panel on the Quit page. In recent weeks we have constantly been over-taken by events — this issue is no exception.

Those of you eagerly looking forward to our reviews of home robot systems will have to contain yourselves. We decided to hold that for a while in view of the momentous events in Las Vegas. Watch out for robots (and other missing features) in coming issues.



OUTPU

PECTRUM toolkit	12

Make programming easier with this collection of utilities.

A handful of routines that will solve some of those mindbending

problems. 64 Sprites

Super fast sprites at your fingertips — machine code is the key.

Bruce to the rescue Pt II The concluding part of this animated game for Commodore

owners **BBC Lander**

Forget the Superbowl — these are the touchdowns that matter.

HARDWARE

CANON's contender

A long, hard look at the latest of the MSX masses.

PERIPHERALS

SPECTRUM teletex

Keep in touch with OEL's communications adaptor.

Acorn ROM routines Two new ways to expand your BBC Micro.

The Beeb makes music

Roll over Beethoven, Island Logic rolls out The Music System

How close is Samna III to the ultimate word processor? We take a look.

REGULARS

Currah lost and found, page 3; Hewlett-Packard puts Unix on the hoof, page 4; Home Front assesses the Christmas sales figures, page 5.

Who's up, who's down in the computer business.

Random Access

Get letters before your name and a chance at £15 into the bargain.

Routine Enquiries

Wit, wisdom and answers to your most perplexing questions.

Microwaves

Handy hints and a batch of useful routines from

readers. Dungeon

> An adventure that will have you climbing the walls - Spider-Man from the old master. Scott Adams.

Gameplay

Billboard Dozens of bargain buys and

swaps.

Now that you've read the good buys, read our goodbyes.

ES SHOW

Magnificent seven lead out by Atari

the wreckage was cleared away and the bodies removed, the score at last week's Consumer Electronics Show in Las Vegas was Atari 5, Commodore 2.

'Business is War,' says Atari boss Jack Tramiel, and his new-look corporation went for every jugular in sight, as its multiple product launch stop-ped the show. Commodore hit back, but was beaten for panache, scope, and sheer nerve. The rest were nowhere.

The Atari slogan at Las Vegas was 'Power without the Price'. When the dust settles and the machines get the chance to prove themselves, we'll know about the power; but the prices are amazing. On paper Atari has killed off the Macintosh, the QL, and any number of mid-range micros in one fell swoop.

That's on paper. Coleco made a splash along the same lines at the same show two years ago, and in the end it couldn't deliver. Atari's machines look far more ambitious, but with Tramiel involved anything could happen.

As he'd promised before Christmas, Atari had complete families on show at Las Vegas. The XE line of 8-bit systems are direct descendants of the 800XL: the ST twins break new ground for Atari with Motorola 68000 processors. For good measure there were also new peripherals and some startling software. Members of the Tramiel family were also in evidence.

30

33

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From the bottom: the 65XE is an 800XL with a face-lift, but the differences aren't all superficial. The XE range has rejigged circuitry, with the result that they are visibly faster than the 800XL and reputedly more reliable. The 65XE will cost about \$120

The 65XEM adds a music synthesiser to the basic design its price will be under \$160. The 65XEP is a luggable version of the 65XE, with a built-in 3.5in floppy drive and a 5in monochrome monitor, for about \$400

At the top of the XE range is the 130XE, with 128K to the 64K of the others. This machine will reach US shops later this year with a price tag of about \$200. Like the others, it's driven by a 6502 with a new version of Atari DOS. Owners of the 800XL are promised an upgrade from their DOS 3.0 to the new version, and Atari is claiming compatibility with all 800XL software for the new systems

The XE range looked good in its own right, but it turned out to be just an appetiser before the main course -- the 130ST and the 520ST. Both machines run a 68000 processor with a proprietary operating system that is still called TOS (Tramiel Operating System). Anybody who thought that this might be a temporary name while something more suitable was devised looks like being disappointed. Tramiel seems to be making a bid for immortality in more ways than one.



Atari 130ST - what price a tatty old Mac with this on the way?

PCN JANUARY 191985

ES SHOW

TOS incorporates Digital Research's GEM. That means mice, windows, icons, handsome graphics, the whole Macintosh kit and caboodle. Wags around Las Vegas were calling the machines Jackintoshes. With 128K and 512K they will cost \$399 and \$699 respectively.

Apple executives will find it hard to hide the lump in their throats. IBM will refuse to Tramiel also launched a disk drive. Like everything else, its price is breathtaking - 500K on a 3.5in drive for \$100. It can be hooked up to any of the new systems, EX and ST alike. A 3.5in hard disk is due to follow shortly, offering 10Mb. Shellshocked industry analysts wouldn't speculate on what the price tag on 10Mb might be.

Atari demonstrated a trio of printers in the \$50 to \$100



tre of attention — Atari rules the roost at the CES

comment, since it never acknowledges competition; if it gets its head out of the sand it may find that Atari has stolen

its feathers. The crucial feature will be software. Atari demonstrated an impressive package called Infinity on the XE range, but applications for the STs will depend on how well software suppliers respond to TOS. Infinity is a combination of spreadsheet, word processor and rerange. There was a thermal colour printer, an impact dotmatrix unit, and a daisywheel. The company said that these devices were compatible with current Apple and IBM machines, and you got the impression that Atari was on

The other 1.399 or so exhibitors could only look on in awe. Atari's new systems should start appearing in the US in the spring. But Commodore clawed





Commodore's 128 plus business additions — a Plus/4 killer?

unlike any previous Commodore system, and the company has broken with another tradition by making it compatible with the 64. But, elegant as it was, it paled beside the clumsily named Commodore LCD.

This is a portable in the tradition of the Tandy Model 100: it tips the scales at 3lbs. carries 32K of RAM, and has basic business software builtin. The LCD name refers, of course, to its screen, an 80 by 32 display. Power is from standard batteries or, through an adaptor cord, from the mains. It is expected to cost about \$500.

The C128 appeared with a trim half-height 360K disk drive, and the layout on Commodore's vast display area was calculated to appeal to business users as well as home micro fans. The system has the dimensions of an Apple IIc, and a keyboard with clusters of keys all over the place.

Will the C128 put pressure on the Plus/4? Its price is likely to be about \$250; its 128K can be built up to 512K and it holds out the rather vague promise of

'CP/M-compatibility'. In any other context this would look very attractive; but at CES, with Atari running amok, the Plus/4 looks irrelevant.

Commodore might stolen some of Atari's thunder if it could have demonstrated the Amiga machine — or it might. have risked having the system submerged before it has a chance to make an impact.

In the world's most famous gambling city Jack Tramiel was in his element. The most awe-inspiring feature of Atari's performance at CES is that the new machines are the first to be released under his leadership it was far from being the last desperate throw of a cornered man. There are more on the way: 32-bit systems due to be demonstrated in the spring.

According to Tramiel, he spent a lot of last year touring Atari's manufacturing plants and building up capacity. If the market responds to his new machines in the way you'd expect, the company will need every last inch of production line to meet demand.



XEP-new-look Atari packaging around 800XL compatibility.

lational database with on-line | help, windows, and a shared command structure, described by an observer as 'jazzy'.

GEM (and CP/M-68K) are implemented in ROM on the STs, but for old time's sake

back some of the attention with a couple of releases of its own. At any normal show it might have made the headlines.

The C128 (whose appearance was forecast in last week's PCN) proved to look completely





Money talks in Currah collapse

Currah Computer Compo-nents, well-known for its speech synthesis devices, has been bought out by DK Tronics.

The Hartlepool-based company went into receivership on December 20, and following a request by the directors of Barclays, MJ Moore and DM Middleton of Coopers and Lybrand were appointed as joint receivers to attempt to find ways of resolving the company's problems.

Then in stepped DK Tronics. with expertise in the same field as Currah, with a bid to rescue it from sinking. Neil Rawlinson, financial director of DK Tronics said: 'The reason why DK Tronics has bought Currah is to ensure the Currah name and reputation is maintained.

Currah's products are complementary to our own. We have both produced speech devices for popular home micros.

'In addition to giving support and backup to the current Currah range of products, we are going to finish off the final development of a product called Microsource which Currah was working on.'

If you intend buying a Currah speech add-on you should keep a sharp eye on the warranty. Although DK Tronics has exclusive rights to manufacture. market, and sell Currah products. Welwyn Electronics also has some contractual rights to sell to retail outlets stocks of

Currah products it has. In a statement from the receivers the situation was clarified: 'At the date of receivership, Welwyn was the sole manufacturer for Currah's Microspeech, Microslot. and

Speech 64. Welwyn has stock of the above products which it has decided, as it is entitled to, to sell to the market direct. The right stems from a contractual situation between Welwyn and

Currah, and ends when Welwyn has disposed of outstanding stock.
"The receivers feel that it's important to stress that Welwyn has purchased none of the support information and back-

up to the products that now belongs to DK Tronics.' What this boils down to is that Welwyn will have to put is own warranty card with products sold - and therefore has the responsibility to support and backup any of its products.

Sending the MSX

menace packing
Japan over Christmas and the
New Year should be a home computer owner's dream: most companies shut down from noon on December 28, not to open again until January 4. This year my company ex-tended that to January 7, there-by providing an abundance of time for personal computing. So why is it that I feel I'd rather have gone to the office?

The reason is MSX, which has invaded my home. Yes, we're a two-computer family, and if my experience is any-thing to go by there should be an adventure game on the pitfalls of introducing a games-type computer into the home.

In Japan at the moment there are two classes of citizen: the proud, patriotic, upstanding type who buys an MSX micro and glories in it; and the neo-Luddite who skulks in dark corners avoiding the ladies who press white feathers into his clammy palms. Under these circumstances I hardly had a

You may have read that MSX isn't going down too well in its native land, but like everything else you read in the papers (well, almost everything - we still strive for excellence in some quarters), you ought to take this with a pinch of salt. From all appearances MSX is gathering strength all the time, and there is excited talk of MSX II, which is supposed to be just around the corner.

Meanwhile, as I reported in a previous column, the prices are attractive and they're becoming more so all the time. There is an element of the football pools about all this, or, to borrow a slogan from the national Australian lottery, 'You've got to be in it to win it'.

There is a standing rule here that my kids can watch television for 30 minutes of their choice every day. If my wife wants to watch something, they're welcome to join her. In some mysterious fashion, they have worked out a schedule of programs they've all agreed to watch, but when my daughter missed her favourite show because her older brother has the MSX machine linked to the set, the entente cordiale became the enfant terrible. I don't know

where she learned the language she used, but MSX gained another enemy in the house.

EW FROM JAPAN

Then my wife got involved with a game called Clapton II (nothing to do with the cream of blues guitarists or the much maligned town near London). it's my solemn belief that nothing should come between a man and a hot cup of tea - now it seems that my demure Japanese wife would rather blast objects in space than put the kettle on to boil.

And naturally, as I'd expected, my seven-year-old son takes great delight in embarrassing me at a game called Pair-Pair, in which the object is to match hidden pairs of fruit, vegetables and animals while avoiding being gobbled up by little black things that wander about the screen. Not only has he managed to embarrass me in front of his friends, but on one occasion in front of mine

In desperation I turned to my own machine for the companionship and solace that old friends are said to offer. Ha! A simple act like updating my mailing list on dBase II turned into an act of contrition, with a dozen or so letters aimed at various destinations around the globe. Looking on the bright side, I'd again managed to avoid writing the accounts receivable and invoicing program I'd been meaning to set up to keep track of my free-lance work.

Not that I get to do too much of that. I'm the only writer at the office with a word processor at home, so guess who got to bring home an urgent project. Working at the office with only the telephone for interruptions is one thing, but working at home with three children, a wife, and an MSX computer with earshattering sound effects, each trying to outdo the other, is a situation no writer should have to endure

So I didn't. For all their faults, MSX systems are lightweight and compact. They pack easily into the trunk of a car, and hook upjust as easily to grandparent's television as they do chez Powell.

So it was with great pleasure that I stood in the driveway waving goodbye to my wife and kids as they headed off in the direction of the grandparents. I must confess I even uttered a slightly vindictive chortle as I remembered that the most audible irritant among the accompanying ROM packs had been a Christmas present from their grandfather.

Until I remembered that although it does many things well, I've yet to figure out how to teach my trusty NEC to make a proper cup of tea. Naturally I blame that on MSX as well wouldn't you? Serge Powell

Spectrum/C64 top Xmas micro sales Sinclair with the Spectrum and

Commodore with the 64 were the winners in the last-minute Christmas sales rush. them Retween accounted for around 65 per

cent of all home micros sold with the Spectrum (in both its guises) outselling the 64.

For Acorn, the figures make depressing reading. Despite its expensive TV advertising campaign, the Electron accounted for only around nine per cent of home micro sales, and the BBC B around four per cent. In fact, the BBCB was overtaken by the Amstrad, which accounted for around five per cent of all sales. The Commodore 16 accounted for four per cent.

Perhaps the biggest loser was MSX, which taking all models together barely made an impression on the buying public. This was predictable, as few of the MSX manufactures showed any sign of wanting to take this Christmas seriously.

The figures come from RAM/ C, the market research company that compiles the *PCN* Charts (see page 5). According to Simon Treasure, RAM's managing director, Sinclair's and Commodore's share of the market is a significant increase on last year, and they now

dominate this market sector. News of the figures hit Acorn's share price with the

company forced to respond with a public relations campaign to re-inspire City confidence. An Acorn spokesman said that sales of both the BBC and the Electron over the Christmas period were satisfactory. Win £100 per words!

This could be the easiest £100 you've ever made — thanks to PCN's unparalleled generos ity. In last week's Random Access page we omitted the caption on Benian's cartoon (reprinted below). All you have to do to get your hands on the cash is write your own caption — tell us what any of

The entry deemed the funniest by the laugh-a-minute staff of PCN will receive the £100. Send your entry to Missing Caption Competition. Personal Computer News, 62 Oxford Street, London W1A 2HG, by Friday, January 25

the characters might be



ONITOR

Unix on the move with H-P source

Personal computing took another step forward last week with Hewlett-Packard's launch of the Integral, a luggable micro that runs Unix.

Unix or one of its clones is usually regarded as the operating system of the future, a multi-tasking environment that will take over from MSDOS as the standard in microcomputing. So far it has been living up to its billing in dribs and drash, but the appearance of the Integral could give it a shot in the arm.

a shot in the arm.
Hewlett-Packard's machine
weighs in at 25lbs. Besides
Unix System III implemented
under the name of HP UX, it
offers 512K of RAM, 32K more
to drive the 9in amber electroluminescent screen, 256K of
ROM to accommodate the oper-



H-P Integral: Unix on the move.

ating system, a built-in 710K floppy, and the H-P Thinkjet printer — an impressive package for the price of £5,450.

H-P says it expects the machine to sell mainly to scientific and engineering users (the company's traditional market), but it has also put windows and its Personal Applications Manager into the bundle.

Version 7 Unix, at the core of System III, was developed in 1977, but was't distributed until 1979. Estimates of the number of working Unix or Unixlike systems in the UK last year vary from 4,500 to 12,000 - a minute total when you consider that there are now more than 200 hardware vendors offering Unix or its more common derivative, Xenix (75-80 per cent of Unix licences around the world are, in fact, for Xenix. Microsoft's version that recently won the support of IBM in its

Business software publishers are making sure that when Unix takes off they'll be in a position to supply the applications. Redwood, for example, claims to have the first integrated packages developed in Europe for Unix systems.

But the turning point will probably come when users move in large numbers from stand-alone single user personal computers to communicating, multi-tasking systems.

R&R and Abbex — '85's first casualties

Two software companies, R&R Software and Abbex, saw in the

New Year by going bust.
Robert Brenchley, managing
director of R&R, blamed large
sums of money owed to it by a
South African company, allied
to a bleak Christmas period, for
the downfall of the business.

He said: It was a quiet summer, but we were keeping our head above water. Then came Christmas and we thought we'd have good sales—

but it didn't happen.'
R&R's best-known game for
the Spectrum was appropriately called Titanic, and the company was in the process of
making a 64 version. However,
on December 12 things ground
to a halt, and the receiver Mr
David Lovett was brought in on

January 8, 1985.

Mr Brenchley, who will find refuge in the industry doing freelance work, had no immediate plans to start all over again. It would be unwise to jump into a similar venture as a lot of medium-sized companies are having a hard time at the moment, 'he said.

Abbex also hit the dust. The last game that the company produced was All or Nothing for the Spectrum. Numerous attempts to contact the company last week failed.

Further signs of trouble and strife in the computer games market come from K-tel. It has withdrawn financial backing from its software subsidiary Front Runner 'for the time being'.

A spokesman for K-tel said that Front Runner is continuing to trade and will continue to fill orders for existing products; but it is not planning to bring out any new titles.

Wayward path for Spectrum upgrade

Sinclair has come up with an upgrade path for Spectrum owners, to the surprise of some of its staff. But the cost of the upgrade is the difference between a new Spectrum and a new Spectrum Plus, unless you fancy yourself with a soldering iron.

The kit costs £30 and the upgrade service £50. It may pay you in the long run to make the change one way or the other — Sinclair says that future software and add-ons will be de-

signed with the Plus in mind.
Sinclair is advertising the
upgrade widely. That must be
why we're getting people's
machines in, said a Sinclair
livewire as realisation dawned.
See Quit (page 48) for a full
explanation of the upgrade.

Optical reader for mass market

Optical character recognition is at last available for the mass market with the launch of the Omni-reader from Oberon Interntional. (Tel. 0442-3803).

terntional. (1el. 0442-3803).
The Omni-reader is a device that lets you read the printed word driectly into a computer via the RS232 port. Previous machines that could do this cost from £6,000 to £10,000. The Omni-reader is a breakthrough at a price of £458.85, although it is limited.

The four typefaces it is capable of reading are courier 10, courier 12, letter gothic 12, and prestige elite 12. It may also be possible, at a later date, to load new fonts from the host compu-

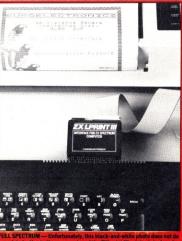
Omni-reader is a manual



Read Only Memory — Omni-reader takes it all in.

system that uses a scan head moved across a line of text by hand, using a ruler as a guide. The data is output via an RS232 port as ASCII characters, and the accuracy depends on the quality of the text to be read. Oberon claims that on average there will be only one error per A4 sheet.

At the moment there is software for the IBM PC only, but Oberon will be bringing out software for CP/M systems, the Apple IIe and IIc, the Mac, the Lisa, and the Sirius. The complete package also includes full details on the RS232 connec-



complete justice to the new version of the ZXLprint III printer interface for the Spectrum. Euroelectronics (D684-222448) has upgraded the firmance so that it can now handle screen dumps in glorious technicolour, on printers like the Epson IX80, Seikosha GP700, and MDP40. The interface costs 124.495 and the printer cable (RESZ3 or Centronics) 15.95.

OMEFRONT



Dominant duo should look to their laurels

Behind the news that Sinclair and Commodore dominated the Christmas sales table (page 3), there are signs that a more significant change is taking place in the home computer market.

For a start, home computer sales this Christmas were no higher than in the previous year. This has led some prophets of doom to forecast that the great home computer boom is over. But as always, the entrails of Christmas require careful reading.

In terms of actual machines, sales may have levelled out. But sales of software, peripherals and upgrades have surprised some retailers.

'Overall, we probably sold about the same value as in previous years, but fewer computers,' said John Flatman, merchandise controller foots. The peripherals and software business was very bouyant and disk drives sold particularly well,' he added.

'Sales were really very good, well up on last year,' said Richard Francis, retail operations controller for Dixons.

'The principal reason for this was our special promotions like the Commodore business outfit, which bundled the 64 with disk drive and printer,' he added.

On the software front games

continued to dominate the sales chart but as with the hardware, the winners were the big names with top selling titles.

Simon Treasure, managing market research company RAM/C, agrees that software sold very well over Christmas. "The big dozen software houses did particularly well but after that sales started to fall away very rapidly."

In the peripherals sector, equipment related to games playing, such as joysticks, did

best of all.

So why the trend away from hardware to software and peripherals? First, most people who are likely to buy a home micro have already bought one or had one bought for them. Second, having acquired a micro, most users now want to put it to work, usually as a games machine. Hence the sales of games software and peripherals like joysticks.

Christmas also confirmed that the shakeout of the computer industry is well under way. Sinclair and Commodore increased their stranglehold of the market because quality software for these machines is so abundant.

This creates a vicious circle.
The reason for the abundance of
software is the large user base
for the Spectrum and the 64.

The good news is that these machines should continue to be good sellers for some time.

The bad news is that users could find themselves locked into a dependence on these machines, both of which are beginning to look dated.

Commodore admittedly appears to be making the right move with the US launch of the C128—a machine that offers a higher performance while maintaining compatibility with the 64.

An alternative strategy is to diversify into other areas such as the business market. But Sinclair's and Commodore's attempts to tap the low priced end of this market have not been markedly successful.

Both the QL and the Plus4 have flopped as volume sellers, probably because neither has appealed to the top end of the home market (no games software). Nor have they appealed to the serious business user who is probably looking for something that has proper disk drives and is compatible with existing office machines.

The continued growth of games software suggests that home micros are still seen by the buying public as a home entertainment product.

Which is probably where MSX could come in. Sony has already demonstrated a home micro with a video interface that can be used to generate titles on home videos. Yamaha's MSX machine can be used to drive its electric organs.

In the not too distant future we are likely to see home micros that can interface with video disk players, opening up the possibility of interactive video games.

Which ever way you look at it, no home computer manufacturer — least of all British manufacturers—can afford to rest on its laurels.

In the games machine market, Sinclair and Commodore have effectively seen off the opposition. Anyone wanting to stay in the volume computer business would do best to concentrate on the next generation of machines that the buying public will want. Raph Bancroft

CHARTS

GAMES

TW	LW	TITLE	PUBLISHER	MACHINE	PRICE
1	1	Ghost Busters	Activision	SP,C64	£9.95
2	2	Airwolf	Elite	SP	£7.95
3	3	Match Day	Ocean	SP	£6.90
4	5	3D Star Strike	Real Time	SP	£5.95
5	11	DT's Decathlon	Ocean	SP,C64	£7.90
6	6	Elite	Acornsoft	AC	£15.00
7	4	Knight Lore	Ultimate	SP	£9.95
8	13	Skool Daze	MicroSphere	SP	£6.95
9	9	HunchBack II	Ocean	SP,C64	£7.90
10	8	Select 1	Comp Records	SP,C64	£12.49
11	10	Doomdark's Rev.	Beyond	SP	£9.95
12	7	Staff of Karnath	Ultimate	C64	£9.95
13	14	Gift of the Gods	Ocean	SP	£9.95
14	20	Kong Strikes Back	Ocean	SP,C64	£7.90
15	12	Underwurld	Ultimate	SP	£9.95
16	19	Combat Lynx	Martech	SP,C64	£7.95
17	15	Raid over Moscow	US Gold	C64	£9.95
18	16	Booty	Firebird	SP,C64	£2.50
19	_	F15 Strike Eagle	US Gold	C64	£9.95
20	_	Sabre Wulf	Ultimate	SP.AC	£9.95

	SPECTRUM	
TW	TITLE	PRICE
1	GhostBusters	£9.95
2	Airwolf	£7.95
3	Match Day	£6.90
4	3DStarStrike	£5.95
5	Knight Lore	£9.95
6	DT's Decathlon	£7.90
7	Skool Daze	£6.95
- 8	Select 1	£12.49
9	Doomdark's Rev.	£9.95
10	HunchBack II	£7.90

COMMODORE				
TW	TITLE	PRICE		
1	Ghost Busters	£9.95		
2	StaffofKarnath	£9.95		
. 3	HunchBack II	£7.90		
4	Kong Strikes Back	£7.90		
5	DT's Decathlon	£7.90		
6	Raid over Moscow	£9.95		
. 7	Select 1	£12.49		
8	Booty	£2.50		
9	F15StrikeEagle	£9.95		
10	Int Soccer	£12.90		

MICROS

BELOW £1,000

TW	MACHINE	PRICE		
1	Spectrum	£125		
2	CBM 64	£199		
3	Electron	£199		
1	Amstrad	£349		
5	CBM 16	£140		
3	BBC B	£399		
7	Atari 800XL	£125		
3	MSX (series)	£250		
•	Einstein	£500		
10	Sharp MZ700 £250			

ABOVE £1,00	_	-		-	-
		DO	15.0	3	nn

TW	MACHINE	PRICE
1	IBM PC/XT	£2,390
2	ACT Apricot	£1,760
3	Compaq	£1,795
4	Olivetti M24	£1,595
5	Televideo TS1603	£2,640
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NDOM ACCESS

Anti-MSX stand leads to dead end

I looked at myself in the mirror this morning and as far as I can see my skin isn't vellow and my eves don't slant. That's reassuring when you're psyching your-self up to write a pro-MSX letter

to PCN. To judge from recent letters, you're preaching to the conwith your anti-MSX verted stance. Sir Clive of the Black Watch has an obvious axe to grind, I suppose, but Anthony Cleall on last week's page misses the point by such a long way that he ends up almost arguing against himself.

You don't have to be a Spectrum owner to know that it's out of the question to buy a new computer every time a better one is produced. It's possible that Spectrum owners actually have an advantage in this respect - the chances are that they paid so little for their machines that they can consider buying another more easily than those of us who forked out £200 or more. But that's beside the point. Producing newer and better machines isn't the way to beat the Japanese.

Acorn has the right idea with the BBC B; here's a machine that can serve as the engineroom of a system that can be expanded in any number of ways. Sir Clive can't do that with the Spectrum because the Spectrum isn't suitable for anything that needs more than two or three key strokes. But the BBC B is expensive. What we need is a half-way house - a system that can be expanded without costing you an arm and a leg in the process.

Isn't that what MSX will offer? I don't know whether they've got disk drives sorted out yet, and I don't know what the impact of MSX Mark 2 will be, but it seems to me that a group of big companies that set out to promote a standard can be relied on to maintain compatibility as the standard and the systems develop.

The prospect of a Spectrum with extra ROM and perhaps a music synthesiser is enough to make a cat laugh. It wouldn't be a Spectrum any more, so why not call it a day and put it out to grass somewhere while you go ahead with a system that will let you expand in those kinds of Your opportunity to vent spleen or bestow praise on PCN. Let us know your reactions to what appears between these esteemed pages: what you've liked — and what you haven't. Write to Random Access, Personal Computer News, Evelyn House, 62 Oxford Street,

London W1A 2HG. The grand sum of £15 goes to the star letter.

It needn't be MSX, strictly speaking. An Electron, an Amstrad, maybe even an Oric will give you the same scope eventually. But you're still out on a limb with them. With an MSX machine you'll have first call on all the little extras that people put out for all the systems in the

At the moment that could mean any one of a dozen micros. Isn't anything else a dead-end street by comparison? Jim Tappy,

Plymouth

'Doomdark' map dig unfair?

In your review of air game Doomdark (issue 93) you say we are cashing in with our Icemark chart; actually we are not.

To obtain a map of the Icemark, Mike had to write a special program. That took time and he couldn't do it until the game was finished. As he didn't finish the game until the day before we went to duplication we were obliged to put a pretty picture on the back of the rules - pretty, but no help to anyone; so the map seemed like a good alternative.

We produced the illustration and had the map printed and produced in one week flat (delivered on December 21), and kept the price to £1.95. If I gave it to our mail order fulfilment house, they would charge me £1 handling per item, so we would

end up making nothing at all. To hold costs further I spent | Over to you, Mr Webber - Ed.

Christmas Eve, and the two days after Christmas stuffing maps into envelopes. We've sold over 1,000 to date, and people are now asking us for Midnight maps. So there.

We are going to be producing more add-ons like the map. hope to get an Midnight map out in February.

Clive Bailey, Beyond Software.

User group member moans

In June 1984 I paid £10 to the Independent Sinclair User Group (189 Rosehill Road, Burnley, Lancs) as my first annual membership fee. Within a few days I received the first newsletter. Since then, despite writing several letters, I have received nothing further. Neither have I had a reply to my

The Independent Sinclair User Group is reputedly run by a man called Vic Webber. If Mr Webber is reading this letter I invite him to justify his lack of action while holding money belonging to other people.

If any of your readers have had the same problem, or indeed if they have had successful dealings with this group, I should be obliged if they would write to me as soon as possible, so that I can get a clearer idea of what's going on. John Schofield.



Machine code!! I can't even understand the Green Cross Code.

Compatibility claim misleads

McGraw Hill publishes a business program for the Spectrum called Projector 1, which is good for displaying data in the form of graphs; however, potential users should be warned that. although it is described on the cover as 'Microdrive Compatible', they should not imagine that the program can be put on Microdrive. It takes five minutes to load the program from cassette. Only the data can be stored on Microdrive.

I think this term 'Microdrive Compatible' should be used only where the program itself can be loaded from Microdrive. This is especially true of business programs. Who wants to presentation from cassette, waiting five or more minutes?

Other important practical programs for the Spectrum — Tasword and Masterfile — can be loaded from Microdrive, and I regard these as genuinely compatible.

E G Matthews. Dorset

Virtues of Sanvo extolled

I certainly agree (Routine Enquiries, issue 90) that the Sanvo MBC is a worthy alternative to the QL. Indeed, I bought my SanyoinJuneafter cancelling a QL order, and have been pleased with the decision. But I really must take up the insinuation that the Sanyo only runs bundled software.

I have up and running Friday, dBase II, Cardbox, Easywriter, Wordstar Professional with Correctstar and Starindex, Multiplan, Supercalc 3 (with excellent graph making ability dumpable to a wide variety of printers), Pascal, Fortran 77, a painting programme called Graffiti, not to mention some arcade games that would put the 'populars' to shame

Any Sanyo owners out there who would like to know how to get these programs can ring me (01-986 6752), PCN might like to contact us at the Sanyo User Group before publishing rash comments about the machine. Keith Teare,

50 Airmead House, Kengsmead Way, London E9.

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Caught in the classic micro buyer's snag

QI am thinking of buying a computer and I'm torn between the BBC Micro and the Enterprise. I'd like the BBC because of its software but having seen it around for such a long time gives me second thoughts.

I like the Enterprise because I've heard that after buying a converter You can load Sinclair and BBC games on it. Is this true?

SA Mohyuddin, Putney, London.

A You're eaught in the classic snag of computer buying although for the wrong reason. So far no-one has produced a machine emulator for any of the popular computers and the Enterprise is the least likely candidate.

In short, no . . . you won't be able to run any of the Spectrum or BBC programs on the EnterIn deciding on the computer to buy, you will always be stuck between a tried and trusted system that has a lot of software and peripherals, and a red hot, new design with

very little available for it.

In deciding which machine to go for, you should look back at numerous issues of PCN where we have answered similar questions. Last week's review of the Enterprise, and our retrospective on the BBC in December should help you decide.

Can my typewriter double as a printer?

Can you please tell me if it is possible to use my typewriter as an input keyboard? I have a 48K Spectrum, with Kempston Centronics interface, and also a Silver Reed EX43N with IF/40 interface, and am using Spectext for word processing.

If it is possible, could you please suggest how I should begin to achieve this?

S A Young, London, NW6.

AWe're not aware of any way whis could be done; however, we recken that the best way of achieving something along these lines would involve connecting the typewriter to the Spectrum through an RS232 interface, and using the second of the se

Reed hasn't got this facility.
The Brother EP44 is an example of a printer/typewriter that will allow you to do this, and there are a few others around, but in this case you seem to be out of luck.

How to increase the Dragon's text screen

Ol have a Dragon 32 and would like to increase the text screen to around 30 × 60 characters. I would also like upper and lower case characters. Are there any products that do this, or could I try to convert a board from a

C Jones, Brierly Hill, W Midlands.

Alf you're up to converting boards you're way beyond any advice that we can give you.

any advice that we can give you.
The only product we know of
that will solve some of the
difficulties is the OS9 operating
system which gives you a display of 16×51 characters. This
was marketed by Dragon Data
before its demise and may still
be available from some dealers.
It was priced at around £40.

You could also try Premier Microsystems which produces a sprite board for the Dragon. (Tel. 01-659 7131).

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Flashy interrupt for the Atari

This machine code routine uses a vertical blank interrupt to flash the cursor on any Atari. In the routine it decreases memory location 71. When this reaches zero it turns the cursor off (using POKE 755,0), then repeats this but turns the cursor back on (using POKE 755,2). As POKE 755,0 also turns off inverse characters, this routine also flashes anything printed or

typed in inverse. After running this program it

will continue until the computer is turned off or reset is pressed (typing A=USR (1536) restarts the routine).

To change the speed at which the cursor flashes, alter line 105. Replace this number by the speed you want. The higher the number is, the slower the cursor will flash. After doing this RUN it and NEW it. If you wish to change the speed type POKE 1538, speed, (speed being the number for your speed) then type A=USR (1536)>. Jason Gosling.

Notts

```
REM FLASHING CURSOR BY JASON GOSLING
```

- 10 FOR N=1536 TO 1592: READ I : POKE N, I : NEXT N 20 A=USR(1536)
- 30 END
- 100 DATA 104.169
- 105 DATA 16 110 DATA 133,70,165,70,133,71,160,19,162,6,169,7,32,
- 92,228,96
- DATA 198,71,240,3,76,98,228
- DATA 169, 2, 205, 243, 2, 240, 12, 169, 2, 141, 243, 2, 165, 70,133,71,76,98,228 DATA 169,0,141,243,2,165,70,133,71,76,98,228

Spectrum halfway measure

If you want to save a program still under development and clear the computer's memory to test a subroutine or program lines before incorporating them, you may find this procedure useful:

1 Let a = PEEK 23637 +256* PEEK 23638; PRINT PEEK A: PRINT PEEK (a+1): STOP

Enter RUN 1 and note down the two Peeked numbers given. Now change the line to: 1 Let a = PEEK 23637 + 256 * PEEK

23638: POKE a,64: POKE (a+1),0: STOP

16K random access files

BBC owners can create random access files on disk using less than the 16K of disk space claimed by the OS.

The manuals mention that since any file can be accessed by the random access commands (OPENIN, OPENUP, PRINT £, etc), you can reserve disk space for files longer than 16K simply by using *SAVE "filename ssss+LLLL to save any block of code of the required length from anywhere in memory (ie, any garbage at all). You can then write to and read from the file using OPENUP ("filename") and OPENIN ("filename").

You can use the same techni-

and enter RUN 1. All the program lines after number 1 should vanish. Now any subroutines or other lines can be entered to be tested and even RUN, to get them right.

To return to the original program, it is essential to delete any temporary lines by using the edit key in the usual way. after which, enter RUN 1 (to reset Var a), and enter as a direct command: "POKE a, (the first number

noted): POKE (a+1), (the second number) and it will re-appear.

R Luxton,

Solihull, West Midlands.

que to create files on disk shorter than the default 16K. X = OPENOUT ("NAME"): CLOSEEX. This creates a file on the disk, while the operating system reserves the default 64 sectors, or 16K. *SAVE "NAME"0000+8000. This creates a file on the disk, 32K long, which can be accessed by OPE-

*SAVE "NAME" 0000+00FF. This creates a file on the disk only 255 bytes long, which can also be accessed in the usual way, by OPENUP and OPENIN. This is a very handy technique for storing small data files, without using large amounts of disk

NUP and OPENIN in the usual

Archibald McDonald, Glasgow.

way.

space.

10 REM . HIRES OVERLAY

20 POKE 48000,156 : REM PUT UP OVERLAY 30 POKE 704,3 : REM SET STATUS AS HIRES 40 CURSET 0,0,0

50 FILL 135.40.64 : REM CLEAR SCREEN OVERLAY

60 CURSET 100,60,1 70 FOR N=1 TO 50 STEP 5

80 CIRCLE N.1 : REM JUST A DEMO 90 NEXT N

100 CURSET 6.0.0 110 FILL 135,1,5 : REM INK CHANGE 120 END

Oric overlay delusions

You can usefully delude your Oric 1 or Atmos by exploiting the strange effect that pressing ESC and DEL together has. The program above overlays the Text screen with the Hires screen by poking 48000.156. It then overcomes the restriction of not being able to draw on this psuedo window when in Text mode by convincing the Oric that it is actually in Hires mode with a POKE 704,3.

If you have just switched on. poking location 48000 with 156 reveals the Hires screen filled with vertical lines. You can now move your cursor around the screen and it disappears under the overlay and re-emerges. Try typing some text when the

cursor is out of sight, then type Return a few times to bring back the cursor. Next, type POKE 48000,32 and you will find your text screen with all you previously typed.

The following listing is a demonstration. Remember that the Oric thinks it is in Hires, so TEXT OF POKE 704,2: POKE 48000, 32 returns things to normal.

Do not try to use a y-axis value greater than 135 and remember which mode you have poked 704 with as PRINT AT etc will not work in Hires (ie, 704 contains 3). Finally when in Text, POKE 704,1 provides a safeguard against selecting Hires if you wish to preserve this area of memory. K Heptinstall.

Blackpool, Lancs.

Error-free **BBC** programs

This program helps avoid mistakes when typing programs into a BBC micro. It gives a short bleep when lower case letters are entered

It differs from other programs of this type as it uses the keyboard vector OSRDCH leaving the 'events' vector free. With OS 1.2, *FX 214,1

shortens the bleep, while *FX 212.216 or 212.232 softens it. The rest of the listing works with all versions of the OS *FX210,1 turns all sounds off. H Hoffman, London E9

10 *K.10?&210=0:?&211=9:*FX214.1!M

20 VEC=! &210 AND &FFFF: IFVEC=&900 END 30 FOR P=0 TO 2 STEP 2

40 P%=&900: C OPTP 50 CMP#(ASC"a"):BCC E

60 CMP#(ASC"z"+1):BCS E

70 LDA#7: JSR&FFEE 80 .E JMP VEC

90 1: NEXTP 100 REM RUN then press BREAK

Golden tip for Memotech silence

Having tried the save/load screen routines for Memotech in the November 17 issue, I have discovered that the computer carries on making noises even after all the data | Chandlers Ford, Hants.

has been transferred to tape. To stop this try inserting the following lines of code after the CALL £AAE instructions: LD A. £9F

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Improve your programming skills with these toolkit listings from Stuart Nicholls.

his program is intended to help both Basic and machine language programmers to develop and produce their working programs. It has five routines to achieve this aim.

- 1. Renumber
- 2. Delete lines
- 3. Delete REMS
- 4. Create line 0 REM
- 5. Keep line 0 REM only To call the program enter as a direct

command: RANDOMIZE USR 63400

but note that there must be a Basic program in memory before the utility is used. An error report 'Sorry . . . no Basic' will be printed if an attempt is made to use it without a Basic program being present.

Renumber

This option, as its name implies, will renumber a Basic program from any line number to the end of the listing, and includes all the usual keywords, goto, GOSUB, RESTORE, LIST, LLIST and RUN.

It starts by asking you three ques-

tions: From old line no. — This can be any number from 0 to 9999 but defaults to 10 if Enter is pressed without entering a number. As with all inputs only numeric key presses are entered and after the entry of four figures only Delete or Enter is accepted. Numbers can be entered with or without leading zeros. The normal Break can be used at any time to return to the menu.

New line start no. — This again can be in

the range 0 to 9999 with a default value of 10.

Step between lines — This must be in the range 1 to 9999 and has a default value of

After all three inputs have been entered, a check is made on the validity of each. If an entry is not acceptable then one of the following error messages will be printed:

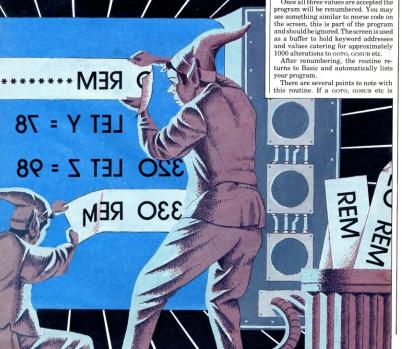
Old line no, too large - the old line number exceeds the last line number of the Basic program.

New no. not valid — the new number is less than the old number and will overwrite an unchanged line.

Start/step size will overrange - a combination of start and step will cause the last line to exceed the maximum allowed of 9999.

Zero steps not allowed — a zero step size was entered.

Once all three values are accepted the



calculated the routine cannot recalculate for you but will highlight that particular keyword by making it flash. This will indicate that it should be amended. Edit the line and delete the two hidden characters before and after the keyword.

If a GOTO, GOSUB etc referred to a line number that did not exist but was within the program, this will be corrected by the routine and in renumbering will refer to the next line. If a goto, gosub etc referred to a line number above the largest in the program then, because when renumbering it may refer to a renumbered line, this will be highlighted by removing the number and replacing it with a flashing OTT.

The program will ignore keywords in the after REM statements and also in

PRINT statements. Once you have used the renumber routine, scan the listing for any of the above points and amend as necessary before running your program. Renumbering from a specified line allows you to open holes in your listing for insertion of extra lines.

Delete lines

Should an area of a Basic listing require deleting, and if it is of such a size that it would be tedious to remove one line at a time, this option should be used. The input requirements are:

Delete from line no.

to line no. (inclusive).

You need a start and a finish line number, and the default is 10. It does not matter which number is entered first as the program sorts this out. However, an error message may be printed if the higher number exceeds the last Basic line number.

The lines deleted are inclusive, but note that if a line number is specified as the lower and that line does not exist then the next line will be taken, whereas a higher line number that does not exist will be taken as the previous line. So, for example, taking a program with a listing in steps of 10 from 100 to 1000 and

```
requiring deletion lines input as 875 to
359 will delete lines 360 to 870 inclusive.
```

This program is instantaneous and will list your remaining program on completion.

Delete REMs

Once this option is accepted it will automatically search your program and delete all REM statements whether in a multi statement line or on their own. REMS are helpful when producing programs but do slow down execution of Basic so it can sometimes be a benefit to remove them once a program is fully tested and working.

Create line 0 REM

This routine is of most use to machine code programmers who use an assembler which enters code directly into first line REM statements (the McGraw-Hill Assembler for example). If your code is several hundred bytes long it can take several minutes to set up the initial REM statement even using multi statement techniques.

Using this facility, all that is necessarv is to enter the number of bytes required (0 to 9999) and, providing there is sufficient memory available, you will get an instant line 0 REM statement set up and listed.

Keep line 0 REM only

Should you have an assembler of the McGraw-Hill type, or even a simple hexloader program, this routine can be used to remove all the Basic listing except the first line which, if it is a REM statement, will be renumbered line 0.

The machine code

To enter the hex dump into the Spectrum a Basic hexloader must be used, so first enter the dual purpose Basic program as in Listing 1.

GOTO 100 allows the input of hex numbers in blocks of eight, with a checksum number which is the sum of the previous eight numbers modulo 256, and will detect most errors in inputs and allow that line to be re-entered. To end the input of hex numbers enter zz after the last checksum number.

GOTO 1000 will print, either to the screen or the printer, a hex dump with checksums of any block of memory. It can be used to check memory locations should the program fail to function as described in the instructions.

Once this Basic program has been typed in we are able to enter the machine code. First enter as a direct command CLEAR 63399 to ensure that the code will be safely poked in above RAMtop, then enter the hex numbers as in the hex dump. These numbers should be entered in blocks of 18 characters, ie eight two-character numbers and the checksum characters.

Remember there must be no spaces between characters so the first block will be entered as:

C3ACF90000000000069 ENTER

Listing 1

```
DEF FN a()=INT (y/16)
                                         38Ø LET a$=b$
  20 DEF FN b()=y-FN a() *16
                                         390 IF y=FN h(a$) THEN GO TO 4
  3Ø DEF FN c()=INT (x/256)
  40 DEF FN d()=x-FN c() #256
  50 DEF FN e()=INT (t/256)
  60 DEF FN +()=t-FN e() #256
                                         400 PRINT "Checksum ";
                                         410 PRINT "error -re enter": BE
  70 DEF FN q(a$.b)=CODE a$(b)-4
                                       EP .25,5: BEEP .5,2: LET adr=st
8-7*(CODE a*(b) >57)
                                         420 GO TO 180
 80 DEF EN h(a$)=16*FN q(a$,1)
                                         43Ø BEEP .1,2Ø
FN g(a$,2)
                                         44Ø IF r$<>"ZZ" THEN GO TO 15Ø
  90 DEF FN c$()=CHR$ (FN a()+48
+7*(FN a())9))+CHR* (FN b()+48+7
                                         450 PRINT "PROGRAM TERMINATED"
                                         500
*(EN 5(1)91)
                                         600
 100 PAPER 7: INK Ø: CLS
                                        1000 PAPER 7: INK 0: CLS : LET P
 110 LET r$="0"
 120 PRINT AT 11,7; FLASH 1; "REM
                                        =0
                                        1010 INPUT *(S)creen OR (P)rinte
 SET CAPS LOCK"; AT 13,3; "HAVE YO
U CLEARED MEMORY ?"
                                        r ?": q$
                                        1020 IF qs="P" OR qs="p" THEN L
 130 INPUT "Start address (DECIM
                                        ET p=1: GO TO 1040
1030 IF q$(>"S" AND q$(>"s" THEN
AL) "jadr
 140 PAPER 7: INK Ø: CLS
                                          BEEP .5,2: GO TO 1010
 150 CLS : LET x=adr
                                        1949 INPUT "From address (DECIMA
 160 LET y=FN c(): PRINT FN c$()
                                        L) ":st
                                        1959 INPUT "To address (DECIMAL)
 170 LET y=FN d(): PRINT FN c$()
 180 INPUT "8 bytes + CHK. ";b$
190 IF b$="* THEN GO TO 180
                                          "!end
                                        1060 PAPER 7: INK 0: CLS
                                        1070 FOR x=st TO end STEP 8
 200 IF b#="ZZ" THEN GO TO 450
                                        1080 LET y=FN c(): IF p THEN LP
 210 LET st=adr
                                        RINT FN c#();: GO TO 1898
 220 LET len=LEN b#: IF (INT (le
                                         1085 PRINT FN c$();
n/2))*2<>len THEN PRINT "Odd no
of chrs. ";: GO TO 410
230 IF len=18 THEN GO TO 250
                                         1090 LET y=FN d(): IF p THEN LP
                                        RINT FN c$(): GO TO 1100
 24Ø IF b#(len-1 TO )<>*ZZ* THEN
                                         1895 PRINT FN c$()
  PRINT "No 'ZZ' marker ";: GO T
                                         1100 IFT t=0
                                         111Ø FOR z=Ø TO 7
0 410
                                         1120 IF x+z>end THEN LET z=8: G
 25Ø FOR a=1 TO len-2: IF b$(a) (
*0" OR b$(a))"F" THEN PRINT "In
valid chr. ";: GO TO 410
260 IF b$(a)("A" AND b$(a))"9"
                                         O TO 1150
                                         1130 LET y=PEEK (x+z): LET t=t+y
                                         1148 IF p THEN LPRINT FN c$()
                                          ";: GO TO 1150
THEN PRINT "Invald chr. ":: GO
                                         1145 PRINT FN c$();" ";
TO 418
                                         115Ø NEXT Z
 27Ø NEXT a
                                         1155 LET y=FN f()
 28Ø LET x=Ø
                                         1160 IF p THEN LPRINT "= ";FN c
 29Ø FOR k=1 TO 8
                                         $();: GO TO 1178
 300 LET a$=b$( TO 2): LET b$=b$
                                         1165 PRINT "= ";FN c$();
 (3 TO )
                                         1170 IF x+z>end THEN GO TO 1210
 310 IF bs="ZZ" THEN LET k=9: L
                                         1180 IF p THEN LPRINT : GO TO 1
ET rs=bs: LET bs=as: GO TO 360
                                         200
 320 PRINT a$; " ";
                                         1190 PRINT
  33Ø LET p=FN h(a$)
                                         1200 NEXT X
  34Ø LET x=x+p
                                         1210 IF p THEN LPRINT "ZZ": STO
  350 POKE adr,p: LET adr=adr+1
```

1220 PRINT "ZZ"

370 LET y=FN d(): PRINT "= ";FN

You'd better get the hang of this. One day you might be up here for real.



MEIN ISION

Space Shuttle. The flight simulation program that leaves others earthbound. Developed with NASA's assistance to turn your computer into Columbia's Flight Deck. £9.99 Commodore 64, £7.99 Sinclair Spectrum. Available soon for all popular systems.

SPACE SHUTTLE FROM



Once all the hex dump has been entered, save the code using:

413 SAVE "UTILITY" CODE 63400,1952

Then check that the code functions correctly as per the instructions. Enter RANDOMIZE USR 63400 and check it out. If a command does not work as described use | correct any mistakes.

the Basic program (GOTO 1000) to compare hex dumps (the quickest way is to look at the checksum numbers) and

FAST CLARA FP 00 00 00 00 00 00 00 00 00 00 00 00 00	SAVE "UTILITY" CODE 63400,1952	command does not work as described use	correct any mistakes.
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Figure 1.0 80 70 53 67 72 72 72 72 73 74 74 75 75 75 75 75 75	F7A8 C3 AC F9 ØØ ØØ ØØ ØØ ØØ = 68		FCC8 17 Ø3 CD 12 F9 3Ø D1 78 = 6B
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G UTPUT: QI

SMOOTH OPERATOR

Alan Turnbull outlines some machine code utilities which help make more of ODOS operations

the flow of information about QDOS, the QL operating system, has been only a trickle. As well as being handy utilities, the machine code routines given here show how to make the best use of the QDOS manual, which has done something to spread the knowledge.

The utilities fall into four categories:

• A new SuperBasic procedure called BOOT which, when called like other SuperBasic procedures, attempts to bootstrap' the QL from Microdrive 1 as normally happens upon power-up or reset. This procedure may be used in applications programs or as an abbreviated form of the direct command LRUN midyl boot

 A new SuperBasic procedure called RESET which, used in applications programs, provides the facility to simulate pressing the reset button (as used in the Psion software suite).

 A procedure SWITCH which allows the user to toggle between modes 4 and 8 and the QL screen from within a SuperBasic program. ♠ An interrupt server which scans the QL keyboard 50/60 times per second and tests if Function key F3 is pressed. If so, it calls the SWITCH routine to change the screen mode. When the routine is loaded, the key F3 acts in a similar manner to CAPS LOCK.

For full details, consult your QDOS

BOOT

This procedure tests whether the QLit's running on is an 'AH' or 'JM' version by reading the QDOS release number: 1.02 for 'AH'; 1.03 for lucky 'JM' owners. (Actually, there are only minor differences between releases 1.02 and 1.03 of QDOS, and they will not affect the execution of amplications software)

The routine loads the relevant 'booting' address and jumps to the ROM routine. While the QL searches Microdrive 1 for the file 'mdv1 boot', the QL screen is cleared down and the message "Attempting to boot off Microdrive 1" is displayed.

Note that what BOOT actually does is

an MRUN, so make sure any program currently in the memory is either deleted by NEW before BOOT is called or is effectively deleted by the overlaying file 'mvdl boot'.

RESET

This fairly simple routine took some time to work out. It is no use just calling the initialisation routine from Basic with something like Call 200 (or Call PERE-14.), for the pedantic). When you do this, the Motorola MC68008 is running in user mode. To do the reset correctly, the MC68008 must be in supervisor mode.

This can be arranged by doing a TRAP #0, which discards the special QDOS return address, and then load the MC68008 Processor Status Word with the correct bit-pattern.

This Processor Status Word is arranged as two bytes: the user byte and the system byte. The user byte holds the usual, application program-related flags such as zero, overflow, carry, etc. The system byte, however, holds flags

	Listing 1				
	00100	LEA	PROC_DEF(PC),A1	; [point to procedure table
1	00110	MOVE.W	\$110,A2	; (QDOS vector to link-in procedures
1	00120	JSR	(A2)		call link-in routine
	00130	BSR	INTS		set up 50/60 Hz interrupt server
	00140	RTS			return to SuperBASIC
1	00150 PROC_DEF:		3	: 1	number of procedures
1	00160	DC.W	B00T-*	; 0	offset of boot routine
	00170	DC.B	4, 'BOOT', 0	; ,	name of procedure
1	00180	DC.W	RESET-*		offset of reset routine
1	00190	DC.B	5, 'RESET'	; ,	name of procedure
ı	00200	DC.W	SW_MODE-*	1 0	offset of switch routine
ı	00210	DC.B	6, 'SWITCH', 0	1 1	name of switch procedure
l	00220	DC.W	0	; 6	end of procedure declarations
1	00230	DC.W	0	1 1	number of functions
1	00240	DC.W	0	; 6	end of function declarations
ı	00250 BOOT:	MOVEQ	#O,DO	: :	signal: get QDOS system info
ı	00260	TRAP	#1	, '	'manager' call
ı	00270	MOVE.L	#19392,A1	; :	set up boot address for VER\$ 'JM'
ı	00280	CMPI.L	#'1.03',D2	; 6	QDOS version 1.03 (QL VER\$ 'JM')?
1	00290	BEQ	DO_BOOT	; >	es: so do the boot
	00300	MOVE.L	#19328,A1	; 5	set up boot address for VER\$ 'AH'
	00310 DO_BOOT:	MOVE.L	#131072,A2	; 0	lear screen down
	00320	MOVE.L	#8192,DO	;	
	00330 FILL:	MOVE.L	#0,(A2)+	,	
	00340	DBRA	DO,FILL	,	
	00350	MOVE.L	A1,-(A7)	; :	save boot address
	00360	SUB.L	A0,A0	; 9	signal: use command channel
- 2	00370	LEA	MESSG (PC),A1) F	point to message
	00380	MOVE.W	\$D0,A2	: 6	DOS vector for message writing
1	00390	JSR	(A2)	; 0	all message printing routine
	00400	MOVE.L	(A7)+,A1	; r	etrieve boot address
	00410	JSR	(A1)	; d	to the boot!
	00420 MESSG:	DC.W	36	; "	message for booting
	00430	DC.B	'Attempting to boot	off	Microdrive 1',10
	00440 RESET:	TRAP	#0	; 9	o into supervisor mode
	00450	MOVE	#\$2700,SR		set up processor status word
	00460	MOVE.L	\$4,A0		2DOS system reset vector
	00470	JSR	(AO)		lo reset!
	00480 SW_MODE:	MOVEQ	#\$10,D0	; 0	DDOS vector for screen mode

Listing 1 cont				
00490	MOVE.B	#-1,D1		read 4/8 mode flag
00500	MOVE.B	#-1,D2		read RGB/UHF flag
00510	TRAP	#1		do the read
00520	EOR.B	#8,D1	,	toggle 4/8 mode flag
00530	MOVE.B	#-1,D2	,	leave RGB/UHF flag
00540	MOVEQ	#\$10,D0	;	set screen mode
00550	TRAP	#1	;	call QDOS routine
00560	RTS		,	return to caller
00570 INTS:	MOVEQ	#\$1C,D0	,	set up 50/60 Hz int server vector
00580	LEA	LINK (PC),AO	• ;	set up link
00590	LEA	INT (PC),A1	,	point to server
00600	MOVE.L	A1,4(A0)	;	save pointer in second long word
00620	TRAP	#1	,	link in server
00630	RTS		;	return to caller
00640 INT:	MOVEQ	#\$11,DO	,	Send command to i8049
00650	LEA	IPC_CMD(PC),A3	,	set up pointer to command
00660	TRAP	#1	,	do it!
00670	CMPI.B	#16,D1	,	is F3 pressed?
00680	BEQ	SW_MODE	,	yes: change screen mode
00690	RTS		,	otherwise no action
00700 IPC_CMD:	DC.B	9	,	command number: read keyboard row
00710	DC.B	1	,	number of parameters for command
00720	DC.L	0	,	amount of each byte significant
00730	DC.B	0	;	key row number
00740	DC.B	2	;	signal one byte reply
00750 LINK:	DS.L	2	;	reserve interrupt link space

for trace mode, supervisor/user mode and the interrupt masks.

In fact, the whole Processor Status Word is arranged as follows:

User byte (least significant)

Bit O: Carry; Bit 1: Overflow;

Bit 1: Overnow Bit 2: Zero;

Bit 3: Negative; Bit 4: Extend;

Bit 5-7: not used.

System byte (most significant)

Bits 0-2: Interrupt mask;

Bits 3-4: not used;

Bit 5: Supervisor/user mode select; Bit 6: not used:

Bit 7: Trace mode select.

For a proper system reset the user byte should be set to zero and the system byte to 00100111 (binary) in order to signal supervisor mode and enable all interrupts. This means that the 16-bit value placed in SR, the Processor Status Word, should be 0010011100000000 (binary) or 2700 (hex).

SWITCH

This routine simply reads the current screen mode (4- or 8- colour — stored as code 0 or 8) and toggles it by 'Exclusive-OR'ing the value read with 8. This new value is then sent back to set the new screen mode. The whole operation is carried out by using the same QDOS TRAP.

Interrupt Server

The addition of the 50/60 H3 interruptserver routine to the QL's operating system provides a screen mode toggle switch, similar in function to CAPS LOCK.

The interrupt server simply examines

the Function key F3 every time a screen frame is displayed to see if it is depressed. This is done by communication with the QL's secondary processor chip (IPC) — the Intel i8049. The QDOS Manual should be studied for the IPC communication command format.

Adding the new features

You have a choice of what to do. You could assemble the Motorola format assembly listing in Listing 1, save the code generated (position independant) to a Microdrive file, say, 'mdv2 listing1', reset the QL, and type in:

LET reserved address=RESPR(256) LBYTES mdv2 listing1, reserved

CALL reserved address
On the other hand you could type in, save to Microdrive, reset the QL, and LRUN the program in Listing 2.

Listing 2

```
100 REMark SuperBASIC program to add useful utilities to the Sinclair QL
110 REMark
                     COPYRIGHT (c) December 1984, Alan Turnbull
120 :
130 LET reserved_address=RESPR(256)
140 LET offset=0
150 REPeat read_data
     IF EOF THEN EXIT read_data
160
170
     READ data_byte
180
     POKE reserved_address+offset,data_byte
190
     LET offset=offset+1
200 END REPeat read data
210 CALL reserved_address
220 :
230 DATA 67,250,0,14,52,120,1,16,78,146,97,0,0,178,78,117,0,3,0,32,4,66,79,79,84
,0,0,126,5,82,69,83,69,84,0,130,6,83,87,73,84,67,72,0,0,0,0,0,0,0,112,0,78,65,34
,124,0,0,75,192,12,130,49,46,48,51,103,6,34,124,0,0,75,128,36,124,0,2,0,0,32,60,
0,0,32,0,36,252,0,0,0,0,81,200,255,248,47,9,145,200,67,250,0,12,52,120,0,208,78,
146,34,95,78,145,0,36,65,116,116,101,109,112,116,105,110,103,32,116,111,32,98,11
1,111,116,32,111,102,102,32,77,105,99,114,111,100,114,105,118,101,32,49,10,78,64
,70,252,39,0,32,120,0,4,78,144,112,16,18,60,0,255,20,60,0,255,78,65,10,1,0,8,20,
60,0,255,112,16,78,65,78,117,112,28,65,250,0,38,67,250,0,10,33,73,0,4,78,65,78,1
17,112,17,71,250,0,12,78,65,12,1,0,16,103,198,78,117,9,1,0,0,0,0,0,2,0,0,0,0,0
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GUTPUT: COMMODORE 64

SPRITE GYMNASTICS

Put an extra spring into the movement of your 64's sprites with this sprite handling program from Barry Thomas.

The Commodore 64 is famous for its sprites and although Commodore Basic has no commands to give you direct control over them, they are fairly simple to set up and use. Just make a design on a 24×21 grid, convert the binary patterns to decimal numbers, and they can be poked into position at a suitable place in memory, ready for use. So far, so fine and dandy, but these sprites can appear a little pedestrian if all they can be made to do is scuttle to and fro across the screen. What's needed is a little more athleticism.

The program shown here supplies that extra something. It enables you to: change sprite colours at the drop of a hat; toggle any of them on or off with a simple command; turn any sprite upside down or reverse it or even get a whole new block of data for a new sprite.

The bulk of the program comprises five Basic loaders, which poke machine ode instructions into a 4K block of memory high up in memory where they will be safe from Basic. Once there, they can be called by the sys command whenever needed.

whenever needed. So, the large subroutine between lines 1000 and 1610 contains these five loaders, all clearly labelled. If your particular application just needs sprites that can turn upside down, you can hijack the relevant section from that subroutine, the sprite inverter at lines 1360-1470. The subroutine from line 2000 onwards simply sets up a sprite to contain pictures of Glob and Blob.

This data is stored at addresses 832 to 894, block 13 in the memory map. (That is, 13 blocks of 64 bytes up from address 0, because 13×64=832). As this area of memory is used by the system only when loading from or saving to cassette, it's usually quite safe. However, if you are using the datasette during your program you must put your data somewhere else.

The rest of the program, between lines 10 and 150 sets up a menu on the screen and prompts you to select from six courses of action. These are the five machine code routines and the option to quit the program. All the routines run independently.

Using each routine

Choice 1 on the menu enables you to change the colour of a sprite. First, specify the sprite number, and the colour number, and the colour number. The sprite number in this program is always 0 since only one sprite is set up for action. The colours are from the usual Commodore selection where 0-Black, 1=White and so on. To use this machine code routine, we must type, or include in a program, the instruction: SYS 50268, SN, CN

where SN is the Sprite Number (from 0-7), and CN is the Colour Number (from 0-15).

The instruction may be typed in with real numbers for the SN and CN, or as above with variables. The commas must be included or the routine jumps to the error message table in ROM. The working of the routine is quite simple: it looks for the first comma, then checks that the sprite number is not greater than seven. This being so, the next comma is checked for. The colour number must be in the appropriate range, and provided all is in order, with the operands supplied along with the SYS address, the Colour Number is placed in the appropriate place in the registers of the VIC II tchi

Choice 2 on the menu is to reverse the sprite. This process just turns the data in the sprite about-face, so if your sprite contained, eg a train facing right, it would be facing left after the sprite had been reversed. Simple, innit?

The workings of this routine are a little more complex than the first. No sprite number is specified when you use the routine—instead, the address of the start of the data for the sprite to be reversed must be poked into two addresses in page 0 memory. These will act as a pointer which the routine can refer to.

So, in this program, the data for sprite 0 is located in addresses 832 onwards, and the low and high bytes of this numbermust be poked into locations 253 and 254 respectively. In hexadecimal, 832 is \$0340. The low byte, \$40, converts into decimal 64 and can be poked into locations 253. The high byte is \$03 which, of course, remains the same in decimal and can be poked into location 254. This occurs in the main program on line 110. Once this is done, the SYS instruction can be used thus: srys 49770

Listing

10 PRINT"[CLEAR]"

20 POKE 53249,170:POKE 53277,255:POKE 53 271,255:POKE 53248,255:POKE 2040,13 25 GOSUB 1000:GOSUB 2000:POKE 53269,255 30 PRINT PRINT" THIS IS GLOB AND BLOB. . 40 PRINT" THESE ARE THE CHOICES" 50 PRINT:PRINT" 1.CHOOSE A NEW COLOUR" 2.REVERSE THE SPRITE": 3.INVERT THE SPRITE":PRINT" :PRINT" 60 PRINT" 4.TOGGLE THE SPRITE ON OR OFF" 70 PRINT" 5.GET NEW SPRITE DATA":PRINT 6.QUIT" 80 PRINT: INPUT "WHICH OPERATION" : C 90 IF C<1 OR C>6 THEN GOTO 80 100 IF C=1 THEN INPUT"COLOUR NUMBER";CN: SYS 50265,0,CN:PRINT"[CLEAR]":GOTO 40 110 IF C=2 THEN POKE 253,64:POKE 254,3:S YS 49770:PRINT"[CLEAR]":GOTO 40 120 IF C=3 THEN POKE 253,64:POKE 254,3:S YS 49840:PRINT"[CLEAR]":GOTO 40 130 IF C=4 THEN SYS 50215,0:PRINT"[CLEAR 3":GOTO 40 140 IF C=5 THEN INPUT"START ADDRESS":SA: SYS 50315,SA,0:PRINT"[CLEAR]":GOTO 40 150 PRINT"[CLEAR]":END

```
900 END
1000 REM
1010 REM
              --NEW DATA LOADER----
1020 REM
1030 FOR X=50315 TO 50380
1040 READ A:POKE X,A:NEXT X
1050 DATA 32,253,174,32,138,173,32,247
1060 DATA 183,132,251,133,252,32,253
            174,32,138,173,32,247,183,201
0,208,34,133,253,133,254,192
1070 DATA
1080 DATA
1090 DATA
            8,176,26,185,248,7,240,24,133
            253,162,6,6,253,38,254,202
208,249,160,63,177,251,145
1100 DATA
1110 DATA
1120 DATA
            253,136,16,249,96,76,72,178
1130 DATA 76,69,178
1140 REM
1150 REM
             ---COLOUR SETTER LOADER----
1160 REM
1170 FOR X=50265 TO 50310
1180 READ A:POKE X.A:NEXT X
1190 DATA 32,253,174,32,138,173,32,247
1200 DATA 183,201,0,208,30,192,8,176,26
1210 DATA 132,251,32,253,174,32,138,173
1220 DATA 32,247,183,201,0,208,11,192
1230 DATA 16,176,7,152,164,251,153,39
```

1240 DATA 208,96,76,72,178



The sprites are, of course, three bytes wide, and the routine works by taking the first byte on a row and reversing it. This byte is then put into temporary storage on the stack in page 1 memory. The second byte on the row is then reversed in the same way, and put back just where it came from in the middle position in the row. Next, the third byte is reversed and placed in the position where the first byte was taken from. This leaves just the original byte 1 to be taken from the stack and put in the right most position on the row.

In fact, this ien't as complex as it sounds. Try it out with a pictorial view of three bytes in a row on a piece of paper. That's how each row of three bytes is treated, but there are 21 rows, and each must be done in turn. If that sounds like a lengthy number crunch, the routine does, in fact, work so fast it all seems to happen at once. Pretty effective it is too.

Number three on the menu is the matching pair to the last routine because it turns the contents of the sprite upside down. This one works by taking the top row of three bytes, putting them into storage, and replacing them with the three bytes that form the bottom row of the sprite. This done, the original three bytes can be put into position on the bottom row. The next step is to take the second row down and the second row up and swap them around in exactly the same way, and so on. When the middle row is reached, row 11, it is left exactly as it is.

The syntax for using the routine is simply sys 49840.

As with the last routine, the address of the start of the sprite data must be put into addresses 253 and 254 in page 0 to act as a pointer. Both routines use that pointer in a non-destructive way, ie when the routine has done its job, the pointer is still where you put it, so the routine can be used again without having to put the two numbers in position again.

The only problem is that since page 0 memory is at such a premium, due to the system using almost all of it, the other routines use the same two bytes as pointers too. So, if you put your pointer into page 0, use the reverser routine and then the colour change routine on a different sprite. Don't expect your pointer to be safe and sound later on — it won't.

The third item on our menu is the sprite toggler. This lets you switch a sprite on or off, without even knowing which state it is in when you start. If the sprite is off, it will be turned on, and vice versa. It operates on the sprite switch location in the VIC II chip in exactly the same way as can be done from Basic. The difference is that you must remember one address, that is the start of the routine, and know which sprite you want to toggle. To use the routine, just type: SYS 50215, SN. As usual, the comma must be present, and SN is either a real number or a variable designating the number of the sprite to be toggled.

Last on the list is a routine to grab 63 bytes of data from anywhere in memory and put them into the space allotted for any particular sprite. This comes in handy when your particular application means using several different sprites. As the VIC II chip can only 'see' 16K of memory at once, all eight sprites in use at any one time must be in the particular 16K bank of memory carrently in use.

Finding room for all these sprites can be a problem. It makes sense to put the sprite data out of the way in high memory, and just grab the data for a new sprite as and when it's needed. The sprite data can be stored safely in the 4K block of memory where I have put these five routines. (Between \$C000 and \$CFFF) That's enough storage space for another 64 sprites. The routine is accessed with the instruction: \$95 \$5015,8A,SN where SA is again a real number or a variable for the start address of the new data, wherever you have chosen to store it. SN is of course the sprite number.

As usual, the commas are checked for, and all the routine does is transfer a block of 63 bytes, one by one, from the address specified to the address allocated to contain the data for the selected sprite. Hence, a grand total of 271 bytes of machine code can give that extra bit of pizzazz to ordinary sprites.

These routines remain the copyright of Barry Thomas 1984. All, and more, feature in Barry's new book Supercharge Your Commodore 64 published at £6.95 by Melbourne House.

```
1258 REM
1268 REM----SPRITE TORGLER LOADER----
1270 REM
1260 FOR X-50215 TO 50257
1290 READ A:POKE X,A:NEXT X
1300 DATA 32,253,174,32,139,173,32,247
1310 DATA 183,201,0,200,27,179,7,176,23
```

1320 DATA 162,1,134,252,192,0,240,6,6 1330 DATA 252,136,24,144,246,173,21,208 1340 DATA 67,252,141,21,208,96,76,72,178 1350 REM

1360 REM-----SPRITE INVERTER LOADER----1370 REM 1380 FOR X=49840 TO 49891

1390 READ A:POKE X,A:NEXT X 1400 DATA 162,29,134,251,160,35,132,252 1410 DATA 169,3,133,2,164,251,177,253 1420 DATA 72,164,252,177,253,164,251,145

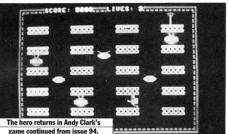
1430 DATA 253,104,164,252,145,253,198 1440 DATA 251,198,252,198,2,208,230,165 1450 DATA 251,48,9,165,252,24,105,6,133 1460 DATA 252,208,213,96

1470 REM 1480 REM-----SPRITE REVERSER LOADER----1490 REM

1490 REM 1500 FOR X=49770 TO 49836

```
1510 READ A:POKE X,A:NEXT X
1520 DATA 160,0,177,253,32,143,194,72
1530 DATA
             200,177,253,32,143,194,145
1540 DATA 253,200,177,253,136,136,32
1550 DATA 143,194,145,253,200,200,104
1560 DATA
             145,253,200,192,63,208,222,96
1570 DATA 162,0,134,251,232,134,252,162
1580 DATA 8,24,10,144,9,72,24,165,252
1590 DATA 69,251,133,251,104,6,252,202
1600 DATA 208,238,165,251,96
1610 RETURN
2000 REM
2010 REM
                  --SPRITE SETUP-----
2020 REM
2030 FOR X=832 TO 894
2040 READ D:POKE X,D:NEXT X
2050 DATA 3,224,0,31,248,0,63,254,0,63
2060 DATA 255,128,115,231,128,115,231
2070 DATA 192,255,255,192,255,255,128
2000 DATA 252,159,128,112,134,56,124,30
2000 DATA 252,159,128,112,134,56,124,30
2000 DATA 124,127,252,124,31,252,254,31
2100 DATA 248,214,7,240,214,3,97,215,3
2110 DATA 97,255,3,97,255,3,97,255,7,113
2120 DATA 147,15,121,147:RETURN
```

PUT: COMMODORE 64



Listing (cont)

NIANOTHER GOZ"

2036 PRINT" (HOME) [DOWN] [DOWN] [DOWN] [DOWN [RIGHT][RIGHT][RIGHT][RIGHT][RIGHT][CYA

2038 PRINT"[RIGHT][RIGHT][RIGHT][RIGHT][RIGHTIPRESS [c 3]'FIRE'[CYAN] FOR [c 3]

2040 PRINT"[RIGHT][RIGHT][RIGHT][RIGHT][RIGHTICCYANIPRESS [c 31'N' [CYANIFOR [33ND

2042 GETA#:IFPEEK(56321)=239THENPOKEV+21 ,0:CLR:RESTORE:PRINT"[CLEAR]":RUNB

2844 IFA\$<>"N"THEN2042 2046 PRINT"[CLEAR]":POKEV+33.6:POKEV+32.

2999 END 20000 REM***SONG*******

20010 DATA6.6.0.7.9,11,9,9,0,-1 30000 REM*****BRUCE RIGHT 1 30000 ERH*******RFUCE FIGHT 1
30001 DATAG 0, 0, 0, 0, 0, 10, 10, 10
30001 DATAG 0, 0, 0, 0, 0, 10, 10
30002 DATAGE 1, 0, 0, 104, 0, 0, 10
30002 DATAGE 1, 140, 0, 25, 160, 0
30003 DATAGE 1, 140, 0, 25, 160, 10
30003 DATAGE 1, 160, 0, 121, 160
30003 DATAGE 0, 0, 122, 0, 0, 64
30003 DATAGE 0, 0, 0, 120, 0, 0, 4
30003 DATAGE 0, 0, 0, 120, 0, 0, 4
30003 DATAGE 0, 0, 0, 120, 0, 0, 0, 00
30010 RETHERSTRUCK RIGHT 2

30010 PATHA, 0, 0, 0, 84, 0, 0 30011 DATHA, 0, 0, 0, 184, 0, 0 30012 DATHAB, 0, 0, 104, 0, 0, 124 30013 DATHA, 21, 48, 0, 25, 168, 0 30014 DATHA, 21, 48, 0, 25, 184, 16, 25 30015 DATHA127, 248, 25, 85, 89, 21, 168 30015 DATHA127, 248, 25, 85, 89, 21, 168

30016 DATA0 4, 168,0, 21,84,0
30017 DATA0 (189,0, 166,0, 22,
30018 DATA128,0, 22,128,0, 16,0
30018 DATA128,0, 22,128,0, 16,0
30018 DATA128,0, 22,128,0, 16,0
30020 DATA0,0, 16,0, 16,0, 16,0
30022 DATA14,0, 0, 16,0, 16,0, 2,244
30022 DATA0,0, 0, 0, 0, 16,0, 144,0, 16
30022 DATA0,0, 0, 0, 0, 169, 144,0, 169
30022 DATA0,0, 0, 0, 169, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0, 18,0

REMARKS ARRUCE LEET 30030

30030 REM#####BRUCE LEFT 2 30031 DATAN,0,0,0,9,84,0,0 30031 DATAN,0,49,80,0,164,0,244 30032 DATAN,0,49,80,0,169,144 30034 DATAN,185,144,16,185,144,63 30035 DATAN,9,144,12,185,144,0,169

30036 DATABU,0,168,04,0,48,0,0 30037 DATABU,0,0,10,48,0,0 30038 DATABU,0,0,10,80,0,0 30039 DATABU,0,0,0,0,0,0 30040 REM*****BRUCE UP

Seeds REMINISTRUCE DOWN
SEEDS IDATES, e.g., e.g.

30062 DATA0,128,2,130,128,0,130

30062 DATA6,129,2,130,129,0,130
30063 DATA6,129,0,130,0,0,170,0
30063 DATA6,0,130,0,0,170,0
30063 DATA6,0,130,0,0,130,0,0,130,0
30065 DATA170,160,247,155,220,233,155
30065 DATA6,0,49,153,230,233,155
30065 DATA6,0,49,153,230,233,155
30065 DATA6,0,49,153,230,233,155
30065 DATA6,0,49,153,230,233,155
30065 DATA6,0,69,10,170,160,2,170

30091 DATA0,0,0,0,0,0,0 30091 DATA0,0,0,0,0,0,0 30092 DATA0,0,0,0,0,1,0 30093 DATA0,170,64,130,170,67,142 30094 DATA150,147,142,145,147,142,145

30075 DRIA147,142,130,147,142,170,147 30095 DRIA147,142,150,147,142,170,142 30097 DRIA154,67,142,154,67,142,150 30097 DRIA154,67,142,154,67,142,150 30098 DRIAC54,04,170,00,0

30100 REM***BRUCE NAME 3 30101 DATA0,0,0,0,0,0,0 30102 DATA0,0,0,0,0,63,0 30103 DATAB5,85,194,169,85,114,169

30128 DATA85,0,3,48,0,3,32 30129 DATA0,2,40,0,2,128,0 30130 REM***SWORD

30130 REM##\$SWORD 30131 DATAG3,32,0,2,170,0,10 30132 DATAG4,128,2,170,0,0,32 30133 DATAG,2,170,0,0,16,0 30134 DATAG,16,0,0,16,0,0

30135 DATA16,0,0,16,0,0,16 30135 DATA0,0,16,0,0,16,0 30137 DATA0,16,0,0,16,0 30137 DATA0,16,0,0,16,0,0 30139 DATA16,0,0,16,0,0,16,0 30139 DATA16,0,0,16,0,0,16,0 30140 REM####STAKE AND ROPES

30141 DATA168,0,0,168,0,0,168

30141 DATA168,0,0,168,0,0,168,0 30142 DATA0,0,168,0,0,168,0 30143 DATA0,168,0,0,85,64,0 30144 DATA168,0,0,85,88,0,168 30145 DATA0,0,85,88,0,168,0 30146 DATA0,85,80,0,168,0,0 30147 DATA85,64,0,168,0,0,85

30148 DATA0,0,168,0,0,85,0 30149 DATA0,168,0,0,168,0,1 30150 REM****DROID #1 30151 DATA0,0,0,0,0,0,0,3

30151 DATAW. 40, 40, 40, 40, 40, 30 30152 DATAY255, 192, 15, 2255, 64, 15, 235 30153 DATAY28, 15, 255, 64, 3, 225, 192 30154 DATAW, 48, 40, 48, 40, 42 30155 DATAW40, 40, 252, 40, 48, 40, 42 30155 DATAW0, 4, 252, 40, 42 30155 DATAW0, 252, 40, 425, 40, 48 30156 DATAW252, 40, 44, 50, 48

30159 DATA0,0,252,0,3,255,0 30160 REM****DROID #2

30161 DATA0,0,0,0,0,1 30162 DATA05,0,1,169,0,1,16 30163 DATA0,1,169,0,1,86 30164 DATA0,48,0,0,48,0,0 30165 DATA048,0,48,0,0,252 30166 DATA0,0,252,0,0,252,0,0 30166 DATA0,0,252,0,0,252,0,0 30167 DATA0,252,0,0,48,0,0,48 30169 DATA02,252,0,3,255,0 30169 DATA0,0,252,0,3,255,0

30170 REM###3DROID #3 30171 DATA40,0,0,0,0,0,15 30172 DATA255,0,7,255,192,11,255 30173 DATA192,7,255,192,15,255,0 30174 DATA0,48,0,0,48,0,0

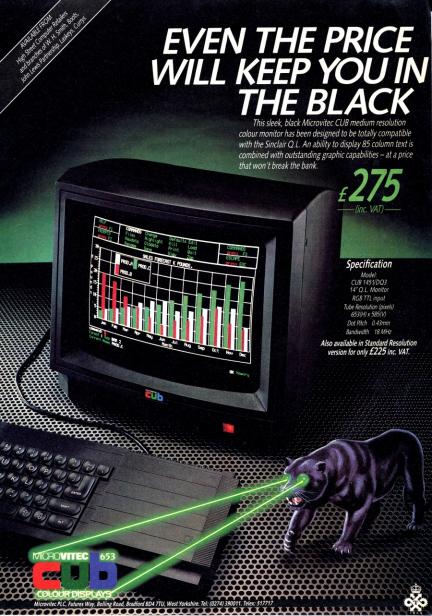
30175 DATA48,0,0,48,0,0,252 30175 DATA48,0,0,252 30176 DATA0,0,252,0,0,252,0 30177 DATA0,252,0,0,252,0 30178 DATA0,252,0,0,252,0 30178 DATA252,0,0,48,0,0,48 30179 DATA0,0,252,0,3,255,0

30181 DATA0,0,0,0,0,0,0 30182 DATA0,0,0,0,0,32,0 30183 DATA32,8,0,128,2,2,0 30184 DATA1,85,0,5,85,64,21 30185 DATA253,80,22,170,80,21,253 30186 DATA80,21,85,80,1,85,0 30187 DATA0,0,0,0,0,0

30188 DATA0,0,0,0,0,0,0,0 30189 DATA0,0,0,0,0,0,0 30190 REM****ALIEN SHIP 3

30197 DATAO,0,0,0,0,0,0,0 30198 DATAO,0,0,0,0,0,0 30199 DATAO,0,0,0,0,0,0 30200 REM****ALIEN SHIP 30201 DATA0,0,0,0,0,0,0 30202 DATA0,0,0,0,0,0 30203 DATA0,0,0,0,2,2,0 30204 DATA0,136,0,0,32,0,0 30205 DATA84,0,1,117,0,0,84

30206 DATA0,0,0,0,0,0,0,0 30206 DATA0,0,0,0,0,0,0 30207 DATA0,0,0,0,0,0,0 30208 DATA0,0,0,0,0,0,0 30209 DATA0,0,0,0,0,0,0 30210 REM####ALIEN SHIP 5 30211 DATAO,0,0,0,0,0,0 30212 DATAO,0,0,0,0,0,0 30213 DATAO,0,0,0,0,0,0 30214 DATAO,0,0,0,136,0,0



UTPUT: BBC

our expert skills as a docking pilot will certainly stand you in good stead, when you carefully guide your space shuttle on to the rugged terrain of an unknown planet.

This almost foolhardy mission is entirely in the interests of science. Two boffins have decided that they must alight and examine the area. Wary of dangerous chemical substances that may cover the planet's surface you intend to land on one of the two landing pads. This is easier said than done, especially as one is at the bottom of a very deep crevasse. If you choose to land on this pad instead of the one at ground-level you are awarded a bigger bonus. The risk is optional!

You cannot land at a speed greater than -5 or your ship disintegrates, so while aligning yourself with the base you must use your thrust to brake your descent, which uses up fuel. The contents of your fuel tank are therefore

displayed all the time, as is your speed. It seems that your arrival is not welcome and you are set upon by a series of missiles which are on course around the planet's surface. You are also bombed from above.

There are four levels of difficulty:

A spaceship pilot works hard for a living in Jason Holiday's game.



Listing 3

```
101F PAGE<>&D00 CLS:PRINT*PAGE SHOULD
   20
7ØREM*
    BØREM*
                J. Hollidau
    9ØREM*
  100REM* (c)1984 Hollisoft
  110REM**************
  120
     DIMSC(15),NAME$(15)
  140FORT=1T015:NAME#(T)="Hollisoft":NEX
  15Ø*FX200,1
  1AMONERROR PROCERR
  18ØREPEAT
  190MODE7
  200PROCINSTRUCT
  21@PROCINIT
  22ØRESTORE
  23ØM0DE2
  240VDU19,13,1;0;0;0;
250VDU19,8,5;0;
  250VDU19,9,4;0;
260VDU19,9,4;0;
270VDU19,12,1;0;
280VDU19,15,2;0;
290PROCDRAWSCREEN
300PROCSCORE
  310PROCEHTE
  32ØREPEAT
  330 VDU5
  350 PROCCAL C
  360FUEL%=FUEL%-1:PROCFUEL
370PROCSPEED
  380 PRO CONOFE
  3901FFUEL%<200 FUEL%=199
  400UNTIL DEAD
410IF EX PROCEXPLODE
420PROCHISCORE
  430UNTILEALSE
  440DEFPROCCALC
450IF JOY%=FALSE PROCMOVE:ELSE PROCJOY
```

460IF y%>600metx%=metx%-(LEVX+32):IFme tx%<00PROCCHANGE ELSE IFy%>6000PROCMETEOR:

570DATA0,500,200,600,220,650,230,500,0 ,0,250,300,270,250,300,240,0,0,350,200,3

4801Fbomy%<64 PROCCHANGE2 490ENDPROC 500DEF PROCDRAWSCREEN

550READX, Y: PLOTB5, X, Y

510RESTORE 570

520MOVED.0

530GCOL 0 - 1

890DEFPROCCHECK

1 DEAD=TRUE : ENDEROC

96@ENDPROC

9B0QX=P0INT(xX,yX-37):QWX=P0INT(xX+64, yX-32):QEX=P0INT(xX+64,yX-16):QRX=P0INT(

9101FQ%=10RQW%=1 ORQE%=1 ORQR%=10RQT%=

920IFQ%=4PROCTUNE:PROCPADS:IF DEAD=TRU

ENDPROC ELSEIFQ%=4 PROCScore(10):PROCS

930IFQ%=5PROCTUNE:PROCPADS:IF DEAD=TRU E ENDPROC ELSE IFQ%=5 PROCScore(2):PROCS

TX=2 DEAD=TRUE:ENDPROC 950IFQRX=6 OR QTX=6 OR QX=6 OR QWX=6 O RQEX=6 DEAD=TRUE:ENDPROC

948IFQ%=2 OR QW%=20R QE%=20R QR%=20R Q

```
00,120,0,0,100,50
                                                                 97@DEFPROCTHRUST
    580MOVE800.10:MOVE800.50
                                                                 980IF THRUST=TRUE:GCOL3,13:MOVExX,uX-2
    590FORT=0TO9
                                                              5:VDU225:SOUNDØ,-15,4,1
    600READX, Y:PLOTES, X, Y
                                                                 998D%=D%+INC
    61 PINEYT
                                                               1000SPEED%
620DATA600,50,500,200,650,450,800,50,8
00,500,750,610,1280,610,1280,10,800.10.8
                                                                1010ENDPROC
                                                               1020DEFPROCFUEL:MOVE150, FUEL%:GCOL0, 1:V
   630GCOL0,1:MOVEB50,650:PLOT85.750.600
                                                               1030DEFPROCONOFF
640MOVE1280,16:MOVE1280,0:PLOT85,0,0:M
OVE0,16:PLOT85,1280,16
                                                               104@IFINKEY(-17) THEN *FX21@,1
105@IFINKEY(-82) THEN*FX210
   65@COLOUR129:COLOUR@:PRINTTAR(11.31)"
                                                               1060IFINKEY(-66) PROCPAUSE
   660PRINTTAB(13,14)"x2"
                                                               1Ø8ØDEEPROCTUNE
   670PROCPADS
680PROCFue1
                                                               1090IFDEAD=TRUE ENDPROC
                                                               1100IF
                                                                        -SPEED%<=5 DEAD=FALSE ELSE IF-SP
   69ØENDPROC
                                                             EED%>5 DEAD=TRUE:ENDPROC
111@SOUND2,0,0,0
    700DEFPROCSHIP
    710GCOL2,0:MOVEx%,y%:VDU224:IF THRUST=
                                                               1120RESTORE 1250
TRUE MOVE×%, y%-25: VDU18, 3, 13, 225
720IF y%>1087 PROCZAP: DEAD=TRUE: ENDPRO
                                                               113@FORR=1T014
114@READ note%, dur%
C:ELSEx%=x%+NL%:y%=y%+D%:D%=-E%:IFx%<=0
THEN x%=0 ELSE IFx%>=1100 x%=1100
730GCoL3,4
                                                                15@SOUND1,-15, note%, dur%
                                                               117@INC=16
   74ØMOVEx%, y%:VDU224
75ØTHRUST=FALSE
                                                              1180GCOL0,2:VDU32,227:FORT=1T05000:NEXT
1190GCOL0,0:MOVEXX,uX:VDU226,226,226
   76ØPROCCHECK
                                                              1200×%=64:y%=800
1210PROCCHANGE
   778ENDPROC
780DEFPROCMOVE:IF FUEL%<=200 INC=INC-1
                                                               122MPROCSCORE
*ENDPROC
                                                                23@PROCERASEBOMB
   NDPMOC
790IF INKEY(-98)NLX=-DRIFX
800IF INKEY(-90)NLX=DRIFX
810IF INKEY(-74) INC=INC+2:THRUST=TRUE
                                                               124@ENDPROC
                                                             1250DATA5,1,21,1,33,1,53,5,33,1,21,1,5,
1,13,2,25,2,41,2,61,10,41,2,25,2,13,2,-1
:FUELX=FUELX-4:PROCTHRUST ELSE IF INC>-9
                                                              126@DEFPROCscore(sc%)
127@SQ%=ABS(sc%+D%)*3:SC%=SC%+SQ%:fuel%
 INC=INC-1:PROCTHRUST
B2@ENDPROC
                                                             =200+507+3
   830DEFPROCJOY: IFFUEL% <= 200 INC=INC-1:E
                                                               129@REPEAT:MOVE15@,FUEL%:VDU231:FUEL%=F
  840J0Y1%=ADVAL(1)DIV256:J0Y2%=ADVAL(0)
                                                             UELX+16:SOUND1,-10,FUELX,2:UNTIL FUELX>=
fue1% OR FUELX>=532
ANDE
  8501FJ0Y1%>150 NL%=-DRIF%
                                                              1300ENDPROC
  8601FJ0Y1X<50 NLX=DRIFX
8701FJ0Y2X=1 INC=INC+2:THRUST=TRUE:FUE
                                                                31@DEFPROCSCORE:IFSC%>HI%:HI%=SC%
                                                             1320NL%-0:LEV%-LEV%+4:IFLEV%>64 LEV%-64
:DRIF%-DRIF%+4:IFDRIF%>32 AND DRIF%<37
PROCBONUS:IF DRIF%>64 DRIF%=64:PROCBONUS
LX=FUELX-4:PROCTHRUST FLSE IF INC)-9 INC
=INC-1:PROCTHRUST
880ENDPROC
                                                              1338/DU4:VDU23;8202;0;0;0;c:COLOUR129:CO
.OUR4:PRINTTAB(9,23)*Score ";SC%;TAB(11,
```

25) "Hi ":HI%

137RENDEROC

142Ø#FX15

SAARNEYT

1380DEFPROCDEAD 139ØVDU22,7

1410SOUND2,0,0,0

134@PRINTTAB(11,27)*Level ";INT(LEV%/8) 135@PRINTTAB(11,29)*Drift *;INT(DRIF%/8

143@FORT=3T04:PRINTTAB(5,T)CHR#141CHR#1 32CHR#136":!:***D E A D***!!!"

1450FORT=8T09:PRINTTAB(2,T)CHR\$141CHR\$1

1400SOUND1,0,0,0:SOUND0,0,0,0

33"You scored"; CHR\$136; SC%: NEXT

Listing 1

80VDU23,224,24,102,129,255,66,60,66,1 98VDU23,225,60,60,24,20,32,0,0,0 100VDU23,226,255,255,255,255,255,255,2

11@VDU23,227,56,186,146,254,56,56,68,6

120VDU23, 228, 0,62,127,255,255,127,62,0 138VDU23,229,7,24,236,247,235,234,24,7 140VDU23,230,99,119,127,62,62,62,28,8 158VDU23,231,60,60,60,60,60,60,60,60,60

17@MODE7 I DOECORT - I TO LO

190PRINTTAB(3,2)CHR\$141CHR\$132CHR\$157C A TOPE TO THE STATE OF THE STAT

CHR#157CHR#132*LANDER *CHR\$156 210FORR=1T0100:NEXTR

228PRINTTAB(3,2) CHR\$141CHR\$133CHR\$157C HR\$132*LANDER "CHR\$157CHR\$133*LANDER " CHR\$157CHR\$132*LANDER "CHR\$156 238PRINTTAB(3,3)CHR\$141CHR\$132CHR\$157C \$133"LANDER "CHR\$157CHR\$132"LANDER " HR\$133"LANDER

CHR\$157CHR\$133"LANDER "CHR\$157CHR\$132" CHR\$157CHR\$133"LANDER "CHR\$156 24@SOUND1,-(T+5),1,1

SONEYT FORT=1T04:PRINT'CHR#154CHR#(146+T)T AB(5) 'k k 7k k k7 7

270PRINTCHR\$154CHR\$(146+T)TAB(5)"j,n 5 J J J5 -1 5J =# J5" 28@PRINTCHR#154CHR#(146+T)TAB(5)"z z u

jppjpp zu pz uz 5 290NEXT

290NEX1 38@VDU28,7,24,32,22 31@CLS:PRINTCHR#136CHR#129" LANDER IS

32@PRINTTAB(5)CHR\$132CHR\$136;:CHAIN"La nder2

Level 1 is relatively easy with less bombs and missiles than level 4. There are eight drift speeds (the speed at which you advance, and as you complete each stage you automatically move up a level till you reach the most difficult level.

Successful landings could result in your name being entered in the 15-name long hiscore table, Enter the program in order in three

parts (Lander 1-3), saving the program at each stage.

Listing 2

90PRINT"Do you want"'"Instructions"
100A\$=GET\$:IFA\$<>"Y"ANDA\$<>"N"ANDA\$<>" THENRUN 11@IFAs="y"OR As="Y" THENPROCINSTRUCTI

120CHAIN"Lander3' 130

130
140DEFPROCINSTRUCTIONS
150WDU22,7:PRINT''TAB:9)CHR*141CHR*129
187157CHR*134" MOWER ";CHR*156:PRIN
1AB:9)CHR*141CHR*129CHR*137CHR*134" MO CHR#157CHR#136" WER * CHR\$156

160FORT=7T08:PRINTTAB(9,T)CHR\$141"Bu. HOLLIDAY. ":NEXT

HOLLIDAY. ":NEXT 17@FORT=11T012:PRINTTAB(4,T)CHR\$141"FO HOLLISOFT PUBLICATIONS":NEXT 18@PRINTTAB(@,23)CHR\$129CHR\$157CHR\$135 CHR#136" PRESS < SPACE BAR > TO CONTINUE

1 DESPRICEPACE

200VDU22,7 210CLS:FORT=2T03:PRINTTAB(7,T)CHR\$129C \$157CHR\$141CHR\$131* INSTRUCTIONS "; CHR\$156:NEXT 220CLS:PRINTTAB(7,2)CHR\$141CHR\$129CH

157CHR\$135"* * L A N D E R * * ": CHR#15 23@PRINTTAB(7,3)CHR\$141CHR\$135CHR\$157C

230PRINTTAB107,3)CHR8141CHR8135CHR8157C HR8129** L A N D E R * * ;CHR8156 240PRINTTAB(2,5)" You are the pilot of a shuttle craft from the 'Enteprise'." 250PRINTTAB11,7)" Your task is to land

planet so some scienti 26@PRINTTAB(10, 11)CHR#141CHR#129"BEWAR 270PRINTTAB(10,12)CHR\$141CHR\$135*BEWAR

280PRINTTAB(1.14)* Enemy missiles patr the planet and bombs drop from the s oreater than

290PRINTTAB(1,19)*There a levels and 8 different speed and" 300PRINT"difficulty levels automatical ; increasewhen you land." 310PRINTTAB(4,24)CHR\$129CHR\$136"Press

<SPACE BAR> to continue*
320REPEAT UNTILGET\$=* "
330CLS:PRINTTAB(10,3)CHR\$141CHR\$129CHR

\$157CHR\$135*KEYS *CHR\$15A 34@PRINTTAB(10,4)CHR\$141CHR\$135CHR\$157

340PKINI JAR 10, 47CHR111 CHR135CHR137 CHR129'KEYS "CHR156 350PRINT'CHR139'Delete Right" 360PRINT'CHR130'Delete Right" 370PRINT'CHR131'Return Thrust" 380PRINT'CHR131'Return Sound of

390PRINT'CHR\$133"S Sound on" 41ØENDPROC

420 430DFFPROCSPACE: REPEAT UNTIL GET=32:EN DPROC

46@FORT=11T012:PRINTTAB(1,T)CHR\$141CHR \$135"Hi-score"; CHR\$136; HI%: NEXT

1478FORT=14T015:PRINTTAB(2,T)CHR#141CHR \$133"On level";CHR#136;INT(LEV%/8):NEXT 1480FORT=17T018:PRINTTAB(1,T)CHR\$141CHR \$132"With a drift of"; CHR\$136; INT(DRIF%/ B):NEXT

1490PRINTTAR(R. 20) CHR\$141 CHR\$134" Anothe 1500PRINTTAR(R.21)CHR\$141CHR\$135"Anothe

1510A\$=GET\$:IFA\$="Y" ENDPROC ELSEIFA\$: N"PROCKILL ELSEGOT01490 1520ENDPROC

153@DEFPROCINSTRUCT

155@PRINTTAB(4,T)CHR\$141+CHR\$129"Level 1 Easy - 4 hard)*:NEXT 1568LEVX=GET-48:IFLEVX<10RLEVX>4G0T0155 MIEL SELEVY I EVY+B

157@PRINTTAB(10,4)LEV%/8 1580FORT=6T07 1590PRINTTAB(0,T)CHR#141*Rate of drift(

Low Drift-BHigh drift) ":NEXT 16MMDRIFX=GET-48:IFDRIFX<10RDRIFX>8G0T0 1610PRINT' CHR#129CHR#157CHR#135" PRESS

<Space Bar> OR (Fire) TO START"

163@PROCKEYORJOY 64ØE%=16

165@ENDPROC 166@DEEPROCMETEOR

1670IF bomy%<1090 AND x%>400 PROCERASED

1A98MOUEmety%.metu%:VDU22B.229:GCOL0.0: MOVEmet x %+128, mety %: VDU226, 226 1700ENDPROC

171@DEEPROCCHANGE 172ØIFDEAD=TRUE ENDPROC

173@MOVEmetx%,mety%:GCoLØ,8:VDU226,226,

174@metx%=11@0:mety%=RND(3@0)+7@0 175@ENDPROC

76ØDEFPROCDOWN 177@IFbomu%>95@PROCIRASE

1780MOVEbom: X, bomy%:GCOL0,6:VDU230:GCOL 0,0:MOVEbom: X, bomy%:32:VDU226

1790ENDPROC 1980DEFPROCCHANGE2 1810GCOL0,0:MOVEbomxX,bomyX+32:VDU226 182@bomx%=RND(100)+325:bomy%=1000:ENDPR

183ØDEFPROCIRASE 184@MOVEmetx%,mety%:GCOLØ,@:VDU226,226, 226

1850ENDPROC 1860DEFPROCEXPLODE 1870SOUND2,0,0,0

1880FORT=-15 TO1 1890GCOL3, RND(16) 1980MOVEx%+32,y%-16 :MOVEx%+RND(100),y%

+RND (100) +RND(100) 1910PLOTES, x%+RND(800)-400, y%+RND(800)-400:SOUND0, T, 6,5:NEXT 1920FORT=170500:NEXT:ENDPROC 1930DEFPROCERASEBOMB:GCOL0, 0:MOVEbomx%,

u%+32:VDU226

195@ENDPROC 19ABDEEPROCEONUS

197@VDU4:COLOUR13:COLOUR128:PRINTTAB(@, ' BONUS!

1998FORT=1TOA: READA, B: SOUND1, -15, A, B: SO UND2,-10,A,B 2000NEX

2010DATA5.5.53.5.101.5.149.5.197.5.245. 2020FORT=1T01000:NEXT

2030PRINTTAB(0,6) : VDU5

20ABCCY-CCY+50 - ENDPROC Z0405CX=SCX+30:ENDFROC 2050DEFPROCSPEED: VDU4:PRINTTAB(9,21) "Theust = ":SPEED%: ":VDU5:ENDPROC

2060DEFPROCPADS 2070MOVE250,16:MOVE250,0:GCOL0,4:PLOTB5

,500,8:MOVE258,16:PLOTB5,500,16 2088GCOL8,5:MOVE800,610:MOVE800,580:PLO TB5,1000,580:MOVE1000,610:PLOTB5,800,610 2100DEFPROCZAP

211@VDU22.2 2120EX=FALSE

213ØVDU5

214@FORT=1T015:MOVERND(1280), RND(1023); PLOT85, RND(1280), RND(1023); COLOURRND(16) :GCOL3, RND(16) 215@SOUND0,-15,RND(3)+4,3:SOUND1,-10,RN D(50),3:PRINTTAB(RND(19),RND(23))**";:NE

216@VDU4: COLOUR15

217000U28,0,16,18,15:VDU4:COLOURS:PRINT YOU WENT TOO HIGH!!"; 218@FORT=1T02@@@:NEXT

219@ENDPROC 22@@DEFPROCKEYORJOY

2220A%=INKEY(0)

223@UNTIL A%=32 OR A%=69 OR ADVAL(@)AND

22481FA%=32 JOY%=FALSE:ENDPROC 22581FA%=69 PROCKILL 22ABJOYY=TRUE

228@DEFPROCPAUSE 2290*FX21,0 2300REPEAT 231BA#GET

2330ENDPROC 34@DEFPROCINIT

235@VDU23;82@2;@;@;@;:x%=64:y%=8@@:metx %=1100:mety%=800:b x%=375:bomy%=1000

236@NL%=@:SC%=@:INC=16:SPEED%=@ 2370THRUST=FALSE: DEAD=FALSE: EX=TRUE

2390FNDPROC 2400DEFPROCERR: VDU22, 7, 7: PRINT'': REPORT : PRINTCHR\$135 CHR\$137" at line" CHR\$136 CHR\$ 130:ERL:END

241ØDEFPROCHISCORE 2420IFSC%(=SC(10) PROCDEAD:ENDPROC 43Ø*FX21 2440VDU22,7:RESTORE2610:FORT=1T04:READA

B.C.D:SOUND1,-15, A. B*10:SOUND2,-10, C.D* 2450FORT=7TOB:PRINTTAB(5,T)CHR\$141CHR\$1 29CHR\$157CHR\$130°YOU HAVE A HIGH SCORE

:CHR\$156:NEXT 2470PRINTTAB(9,11)CHR\$129CHR\$157CHR\$131 CHR#156

248@PRINT" TAB(6) PLEASE ENTER YOUR NA ME"TAB(12, 11): 2490REPEAT

2500As=GETs:Qs=Qs+As:PRINTAs;:UNTILLEN(08)>14 OR A\$=CHR\$13:IFLEN(Q\$)>14 VDU7,12

251@N=0:REPEAT:N=N+1:UNTILSC(N) <SC% ORN 25201FSC(15)<SC% NN=16:REPEAT NN=NN-1:S C(NN)=SC(NN-1):NAME\$(NN)=NAME\$(NN-1):UNT

ILNN=N:SC(N)=SCX:NAME4(N)=Q4 253@CLS:FORT=@TO1:PRINTTAB(5,T)CHR\$141C HR\$129CHR\$157CHR\$130° LANDER HALL OF FAM

:CHR\$156:NEXT 2540PRINT

Z540PHINI Z550F0RP=1T015:PRINT:P:TAB(4):" ";SC(P):TAB(12):"....";TAB(19);NAME#(P):NEXT Z5600#=" Z570PRINT"CHR#135CHR#136CHR#157CHR#132"

PRESS (Space) OR (Fire) TO START* 2580PRINTCHR#135CHR#136CHR#157CHR#132* 'E' TO END* 2590PROCKEYOR TO

2A1@DATA1@1.1.117.1.89.1.1@1.1.1@1.1.11 ,1,117,1,137,1 2620DEFPROCKILL

263Ø#EX21 264Ø*KEY1Ø

245@CALL!&FFFC 266ØENDPRO 267ØDEFPROCfuel CARRUTHIS

2700FORT=200T0500STEP32:MOVE150,T:VDU23 271@NEXT 2720GC0L0-4 2730F0RT=200T0500STEP32:MOVE150,T:VDU23

2750ENDPROC

RDWARE PRO-TEST: CANON V-20

CANON'S SHOTAT MSX

The advent of vet another MSX machine is no longer big news. But how does Canon's venture into this area of the market measure up? Is MSX the answer to the computer industry's dreams? Kenn Garroch investigates.



The V-20 keyboard layout conforms to the MSX standard.

he MSX revolution is trying hard to | happen. This version from Canon is another of the surprisingly oldfashioned (new) machines.

First impressions

The first thing that strikes you about the Canon V-20 is, naturally enough, its close resemblance to the other MSX machines. It sports a similar keyboard, an identical Basic, the same interfaces, and the same good old Japanese engineering inside and out.

For £280 you get the Canon itself with internal power supply, a cassette lead with motor control, an aerial lead, and two manuals. It's all packed into a cardboard box just the right size for you to carry it easily out of the shop - more good Japanese engineering.

All that remains to be done is attach a mains plug, plug into the TV and mains, and off you go.

In use

Switch on and the Canon sits and thinks for three seconds or so as if in shock. Then up comes a message that this is MSX Basic and there are just over 28K bytes free. For a machine that is supposed to have 64K of RAM, this is a | little meagre.

On perusing the memory maps in the manual, I discovered that 32K of the RAM is not in fact available to Basic. Curiouser and curiouser. This memory is hidden beneath the Basic ROM, and appears to be used for the video RAM. Part of this is used to store the sprite data and with a maximum of 2568×8 sprites. this comes to 2K. The rest must be used for the video display itself, although from the resolutions available, there must be quite a lot spare. The Spectrum fits a 256×192 plus eight colours and three attributes into 7K of RAM. The V-20 and presumably all other MSX machines have 256×192 with 15 colours and one attribute.

What, we ask ourselves, happened to the other 23K of video RAM? Perhaps it will be used at a later date, running the mythical CP/M system, to give an 80-column screen and higher density graphics, although why they didn't do this as standard beats me.

The V-20 keyboard is of the standard defined by Microsoft, ie the same layout as the rest. The resemblance ends here as the function keys are larger and rattle more. I also think they are relatively poorly positioned, though they do come preprogrammed with a selection of useful functions such as RUN and LIST. They can, of course, be reprogrammed using the KEY command but accept only 16 bytes of data.

The other eight large keys are split into two groups. Four are used as cursor control keys allowing full on-screen editing as with the Commodore 64. Again, these are too large to be comfortable. The other four are the stop key, insert, delete, and home/cls. The stop key, when pressed, only pauses the



program; control stop actually breaks you out of Basic.

On the rear are the connections for the cassette, audio, video and RF outputs, and the printer port. The latter uses a bizarre plug that is apparently a 14-way Amphenol. This could cause some people problems with interfacing to printers but presumably, if MSX takes off to any extent, they will become more common.

On the front are the two joystick ports. These are the standard Atari/Commodore connections.

The cartridge slots are on the top and the side. The V-20 differs from some of the other machines in this respect as both these slots are cartridge connectors and not edge connectors. This is handy as the peripherals are designed to connect into the cartridge slot and this system should allow you to have both a cartridge and a peripheral connected at the same time without needing a special connector for one or the other.

In general, the machine is solidly built, although it would have been nice to be able to detach the power cable in transit.

The Basic

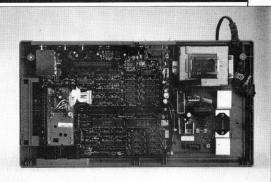
Most MSX machine reviews have covered the hardware in detail, so let's take a closer look at the Basic.

As its name implies, this is based on the good old standard as used by Dragon, Commodore, IBM, and CP/M MBasic. The extensions are a whole host of additional commands to allow control over the fancy bits of hardware, such as the sprite and screen controllers plus a few commands that appear to have been added because it seemed like a good idea at the time.

Altogether 150 commands and functions are available, covering everything from Binary, Hex, and Octal conversions to error handling, sprite, and I/O controls. Unfortunately, this vast array of commands is poorly documented in the Basic reference manual. One particular moan here is lack of details on the sprite handling. Simple things such as how to define them are demonstrated in the explanation of the DATA statement which means that you are sent rooting about all over the manual before you get anything done.

Overall, these extra commands appear to be handy and innovative particularly the interrupt facilities which were previously available only on the Amstrad. The trouble is, they are not implemented nearly as well as the Amstrad, though interrupts can be made to occur on a number of different events such as sprite collision, the joystick fire button being pressed, the timer hitting zero, or a function key being pressed. The commands for controlling them are ON event GOSUB line No., where an event can be any one of the above, and event can be ON/OFF or STOP.

When the event occurs, the program



The machine is made from readily available components.

jumps to the subroutine and begins executing it. When it finishes, the main program resumes from where it left off. The only thing to watch is that variable names do not become confused.

The problem with the interrupts is things are not as simple as initially appears. For instance, if you set up an interrupt to occur when a function key is pressed, holding the key down gives repeated interrupts. If, however, you then press another function key, the repeat stops working. This is downright annoying if it is one of the movement controls in a game. I suspect that this is a bug (oh, dreaded word) that will be corrected in a later version.

The question here is why not allow an interrupt for any key on the keyboard instead of one of the ten function keys, five of which need the shift key to access them and all of which are badly placed for rame controls?

Still on the subject of the interrupts, when two sprites collide, an interrupt occurs. This sounds great until you realise that the machine will not automatically tell you which sprites collided. You must work it out for yourself. What this boils down to is that if there are more than about four sprites on the screen at once, it's faster to detect collisions by keeping track of them in the program than use the interrupt, since you're going to have to do it anyway.

On the whole, these interrupts are a marvellous idea. It's just unfortunate that they are not better implemented.

One of the better features of the V-20 (or any MSX) is its sprite handling capabilities from Basic.

Sprites are constructed from a series of character code numbers stored in the psuedo array SPRITES. The numbers themselves are stored in part of the unused section of the video RAM. They can be in either of four sizes depending on the SCREEN mode selected, 8×8 or 16×16, normal or double size (enlarged). Since a limited amount of storage space is available, you get 256 in 8×8 and (obviously) 64 in 16×16 mode. Once defined, it is possible to select any 32 to be on the screen at once. This is a handy way of doing things as it allows easy animation effects to be created.

Unfortunately, there can be only four sprites on any horizontal line at one. If an extra one is put there, it rubs out the right-most one. This causes a problem when writing a space invaders-type game as only the launcher and the rocket can be sprites otherwise there are only three invaders per line which looks pretty silly.

Defining the sprites is simply a matter of setting up eight DATA statements, each with an 8-bit binary number in it. using the BIN commands. A short routine reads these, converts them into decimal and puts the CHR\$ numbers into a string array. The resulting eight character string is then placed into SPRITE\$(n) where n is the sprite to be defined. Placing the sprite on the screen is fairly straightforward, using the PUT SPRITE command, specifying the sprite number, whether the next position is relative or absolute, position, colour, and sprite image to use number. Obviously this sequence shows that the sprite handling is flexible.

The only real problem is in changing screen modes, as this deletes all previously stored sprite information. You can't have everything, it seems.

Where the MSX machines do score is in their wealth of high-resolution graphics commands including ciracia, Paint and a neat line command. This allows either point-to-point lines, relative to the last position or using absolute screen coordinates. An additional feature is obtained by using the B or BF

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PRO-TEST: CANON V-20

suffixes. The first draws an outline box, the second does the same but fills it in ie an implied PAINT command.

Even better is the DRAW command which allows drawing macros. This function allows a selection of commands to be placed within a string, such as U for up, D for down, rotate (A), scale (S) and colour (C). This gives you a simple turtle graphics system. Once the string is set up it is executed with DRAW string.

The screen size is a nice large, logical -32768 to 32767 of which points 0 to 191, vertically, and 0 to 255 horizontally, actually appear on the screen. So, points can be plotted off the screen without errors occurring (unless the logical limit is exceeded)

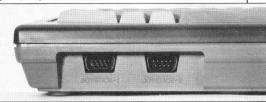
A total 15 colours are available plus a transparent option. These are obtained mainly with the COLOR command although what colours are available depends on the screen mode you're in. There are four of these, the first giving 40×24 characters, no graphics or sprites, no border, and only one colour. The second is the default, ie boot-up screen giving 32×24 characters with every eight pixels having their own colour, sprites are also allowed but no graphics.

The next mode allows graphics but no

macro facility again comes into its own with PLAY. This resembles the DRAW macros but instead of movement commands, you have the notes ABCDEFGA and the £ character for sharps. Once a tune is set up, the speed, volume and waveform shape can be changed. The sound normally comes from the TV speaker, but if you use a monitor, there is

a clue to some of its possibilities.

The standard access commands are there including FORMAT (none of those tricks that Acorn plays), DEL, COPY, and DIR. With the MSX DOS system disk you will get a separate disk Basic giving far more flexible filing with random access and field control. The DOS appears to be quite similar to the Basic A system on



The joystick ports are at the front of the machine, giving easy access.

a direct sound output socket.

MSX machines will, in future, allow an upgrade from cassette systems to disk and possible CP/M. The file handling is standard Basic for the cassette system. There are two save and load commands. CSAVE saves files in internal, tokenised format and SAVE does the same in ASCII machines but details in this section give the IBM, and it remains to be seen whether the commands given in the Canon manual are the real thing or not.

While the Basic is a flexible programming tool, one or two drawbacks make it tricky. The lack of a good manual contributes to this, but it's likely that any number of helpful books will soon

Another problem is execution speed. It's slow compared with other machines that offer even more facilities. The interrupts should get round this speed problem a little, but as they have not been that well thought out, they are more trouble than it's worth.

Verdict

The Canon V-20 doesn't stand out in the MSX crowd. It just conforms to the standard in most senses. Initially, the Basic appears excellent, but closer acquaintance and poring over the manuals took off some of its lustre.

If the Japanese push hard enough, they may snaffle part of the British market. However, if this is their best home micro, Sinclair, Commodore and Acorn, to name but a few, are still winning hands down.



Most of the connections are at the rear of the machine

text and again only every eighth pixel may have its own colour. This mode gives the highest 255×192 resolution. For graphics where each pixel has its own colour, SCREEN 3 is used. Unfortunately, this only gives a medium resolution of 64×48.

Also defined by the SCREEN command are the sprite size, the key click (on/off), the tape speed, 1200/2400 baud, and printer type. The last specifies whether the printer can produce the MSX character set. If it can't, the printer produces spaces.

As for getting into the insides, MSX Basic is well-equipped. PEEK, POKE, and USR are available as well as INP, OUT, TIME and WAIT. Access to the video RAM is via the VDP command which allows you to go straight into the controller registers. VPEEK and VPOKE are also there giving even more direct access.

Easy sound output is via the BEEP command. More complex features are available with SOUND giving access to the programmable sound generator. The format. BLOAD and BSAVE allow sections of memory to be directly saved - all pretty standard stuff.

At the back of the MSX Basic reference manual is a brief summary of MSX DOS commands. No disk systems are currently available for MSX

SPECIFICATIONS

System Canon V-20 MSX

Price £280 Z80A running at 3.58MHz Processor

ROM 32K RAM

64K, only 28K for Basic Screen 40×25 characters Mode 0, 32×24 Mode 1

MSX Basic

8×8 or 16×16 normal or enlarged Sprites Graphics 256×192 Mode 2 64×48 Mode 3

15 plus transparent, less depending on screen mode 74 keys including ten function keys

terfaces Two cartridge ports, cassette port, two joystick ports, centronics printer, audio output, video output, RF output

Operating system Software included

None Distributor Most high street stores

PCN JANUARY 19 1985



SPINNING A WACKY WEB

Tiredoftrudging through damp caves and endless forests? Do you find it difficult to stifle a jaw-cracking yawn as you bash your umpteenth Orc? Are you just that teensiest bit jaded with the same old stock characters and situations being trotted out in adventures?

Well, just hurry on down to your nearest software store and take a long hard look up at the shelves: see the garish masked figure on the package? Is it a bird? Is it a plane? Is it sometwit who's got lost on his way to a fancy dress ball? That last guess was nearly right, for that lithe slab of muscle in the gorblimey garb is none other than Marvel Comics Superhero, Spider-Man, taking the starring role in Adventure International's follow up to the ternational's follow up to the successful Hulk adventure, being the second by Scott Adams in the Questprobe series. As with Hulk, Spider-Man combines text with attractive and instantaneous hi-res graphics of every location.

Spidey delivers a swift slice of knuckle pie to any idea you might have about meeting the standard set to wizards, goblins, and other overfamiliar foes. The wackiness of the adversaries in this adventure make your average troll seem as normal as Julie Andrews.

Sandbagged

Take Sandman for instance—a neat variation on those old Charles Atlas ads if ever I saw one. Sandman has the mild) disconcerting property of being able to transform himself from a small portion of beach into a sandstone strongman. And there's more where those weir-dosc came from Hydro-Man is a big drip—literally; he's made of water. Electro is not the best of people to greet with a hand-shake, as his body contains 100,000 volts of grade A electricity.

Ringmaster looks and acts like he's just escaped from the big top and now craves a bit of privacy — he throws you out of hiscomputer lab every time you enter. The Lizard is Doc Conners in one of his reptillian moods. The amazing Spider-Man, like his comic strip colleague the Hulk, has entered the realm of advantage games. Bob Chappell marvels at Spidey's progress.

FAILY SUPPLY OF HIM?

You are not completely without friends. Madame Web, though blind, is able to scan other people's thoughts and can sometimes predict the future. The Chief Examiner (remember him from Hulk? All the evidence points to the conclusion that the CE is none other than Scott Adams himself) may offer advice and a way of secape.

The basic plot is pretty much the same as in Hulk: find and storeall the gems. Since you can bet your suction-padded boots that some of the jewels are being protected by the oddballs above, the job is not going to be easy.

Doubletake

I began in a hall, way up in a high-rise building. Thinking to explore some of the other floors,

I made my way to the very obvious lift and pressed the even more obvious call button. You're right, that was too obvious. Think again, Spidey. At one point in my perambulations, I began to think that either my computer had gone on the blink or I was suffering from double vision.

Turned out that I had encountered another fiendish foe, Mysterio. His speciality is hypnotism and special effects. Goodjob I didn't ring the TV repair man or ontician.

It helps if you have read the comic that comes with the game, especially the potted biographies of the characters. The puzzles range on a scale from candy-from-a-baby to hurl-micro-through-window. The packaring describes the

difficulty level as moderate—a fair assessment. I foolishly believed I was doing brilliantly by finding eight of the gems (you shouldn't have too much hardship in finding where to store them), but my score showed that I still had a long way to go.

There is a much improved command analyser, allowing you to move away from the normal verb/noun input. Now you can enter compound orders and use a more English-like structure. I still found myself using two-word input (old habits die hard), but I particularly liked being able to "TAKE ALL' objects in a room, instead of picking them up (or dropping them) one by one. Response to your input is, as ever, immediate.

Spider-Man is good, zany fun and provides as wild a collection of characters as you could wish to meet, together with the usual teasing puzzles of Scott Adams, and walking on the ceiling certainly makes a change from battling with dragons.

Cloak doom

I do declare, an adventure for the Atari and a welcome rarity it is too. Cloak of Death (by Mind Games) is a text and graphics fromp through a haunted house where you've wagered to spend the night. I haven't made much progress yet, but what I've seen I've liked.

The game has a comprehensive vocabulary (67 verbs and 94 nouns), decent graphics for each location (you can turn them off), and a reasonable assortment of puzzles. It also displays a dry sense of humour (when I typed 'SCORE', I was told to give myself ten out of ten if I got out alive).

An enjoyable adventure versions are also available for the Spectrum and Commodore

Dungeonade

Returning to Questprobe, some Hulk fans cannot find anything in the dome by the small holes. Just DAMT EG. If ants are your problem, why not SEYE ESOL C. (Dungeon Master at your service.)















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ERALS PRO-TEST: SPECTRUM

The world of teletext has been reserved for BBC users — that is until this OEL adaptor for the Spectrum arrived, says lan Scales.

he company which brought Spectrum users the VTX 5000 Prestel adaptor has just released the TTX 2000 Teletext adaptor, also for the Spectrum. OEL's newest little gizmo allows Spectrum users to join the wonderful world of telesoftware and instant information, a place in the sun so far reserved for those with BBC micros and teletext TVs.

Teletext is the technology behind the Ceefax and Oracle services provided by the BBC and ITV respectively. You've probably already seen 'teaser' teletext pages going through a few predetermined accesses. You may even have seen a TV set with a teletext adaptor which enables teletext signals to be decoded and displayed at will. (See the box for more on teletext)

The TTX 2000 is supposed to sit under the Spectrum. Connection is simple the TV aerial goes into the teletext unit and the results are output from the Spectrum in the conventional way. The 2000 attaches via a ribbon cable from the edge connector and the cable has a male appendage for the further connection of printers and other peripherals.



Sporting results can be easily checked.

The unit has its own 18-volt adaptor which, unfortunately, has the same business end as the Spectrum power jack. A few fried Spectrums could be in the offing. Another minor quibble is the documentation. Teletext may be simple, but seven pages of meagre instruction is a little tight-fisted.

In use

Setting up is simplicity itself. Just tune in the decoder to the four channels and





The TTX2000 in all its glory. Tuning knobs, aerial socket and power supply are at the back.

settle down to use it. No need for passwords, baud rates, user ID numbers

The only problem is getting the

Teletext technology

Being digital, teletext seems an ideal technology for computer enthusiasts to hook into. But micro users in 1985 need to answer certain questions. Does teletext shape up as a useful service? Would a VTX 5000 or a multi-purpose hardwire modem be a better investment? Indeed, is it worth worrying about communications it all? The answer to the last question is probably 'yes', but the first? . . . well, I'm not sure

Unlike a service such as Prestel, teletext is non-interactive. You are a passive receiver of information so while you can be selective about the limited information available, you can't send information back to the service.

Teletext is broadcast on what is most easily described as spare bits of the bandwayes reserved for television transmission. Unlike TV it's not sent as an analog picture scan, but as digital information. The data is intercepted and decoded by the adaptor and the resulting text is modulated into videotext and put up on the TV screen.

The teletext service broadcasts its information as a series of pages in a loop. Page 300, say, is followed by page 100 then 102 then 103 right on through to page 300 again. The key is speed. Several pages are broadcast every second and all the user has to do is select a page number. The system waits till that page arrives, decodes it and sticks it on the screen.

When the information has been perused by the user, he selects another page number and the process repeats itself. Obviously, the more pages on the system, the greater the average waiting time between pages.

This limitation is evident on Ceefax and Oracle, especially once you've used service like Prestel. So the big limitation is the lack of information bulk, and the lack of interaction - you can't talk back.

reception just right. Teletext is pedantic about perfect reception and you may find you get either a full page of information or nothing. Be prepared to mount an external TV aerial if you don't already have one

There are only eight commands to remember plus few ENTERS where needed. Accessing a page involves pressing 'P' followed by a three-figure number — the pages start at 100 (depending on which system you use) and seem to go up to about 900 or so. You can change channels with a single command, save displays to Microdrive or send them to the ZX printer.

Teletext also has a 'wheels within wheels' function where information at a particular page number is rotated on each cycle, so by the time you've finished reading one page the next arrives. You suppress this feature with a Hold command.

R reveals a concealed line (where the page is concerned with a quiz for instance). You can also exit to Basic and use the Spectrum normally.

Nothing in computing is as simple to use as Teletext.

Its second big plus is that it doesn't cost you anything. Once you've bought the adaptor there are no uptime or user fees or telephone charges to feel guilty about.

Verdict

The prospect of access to Ceefax and Oracle via your computer is attractive. but there are some drawbacks. For instance, a limited amount of information is available, and it takes some time to access it.

If you can't afford Prestel but would like to take part in the information revolution, however, the TTX2000, even considering the limited amounts of information available may still be for you.

REPORT CARD: 1 Documentation Performance Overall value

Product OEL TTX2000 Price £143.75 Availability OE Limited 0768-66748

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SPECIFILM ABY

ERIPHERALS: BB

ROMS AWAY

Simon Williams looks at two ROMs for the Beeb that get over the problem of accessibility.

ntil recently, if you wanted to plug more than three extra ROMs into your BBC micro you had to buy a ROM expansion board. The trouble with these is that you usually have to wield a screwdriver and take the top off to get at the ROMs.

Systems from Viglen and Micro Pulse get around the problem of accessibility and have the added advantage that they draw no extra power from the computer's supply.

Setting up

In the Viglen system the extra ROMs are contained in cartridges, which are plugged into a socket attached to the BBC in the hole next to the keyboard. This hole, popularly known as the 'ashtray', was left by Acorn to house the ROM cartridges for its speech synthesis system.

The socket is connected to the BBC by a ribbon cable to one of the sideways ROM sockets. Your expansion ROMs fit into carriers that plug into the ashtray socket

The system comes in kit form consisting of socket with 28-way ribbon cable attached; one cartridge; cover for the socket; cover for the ROM carrier when not in use; and blanking plate to restore the Beeb if you want to take the system out.

The cartridge has two plastic mouldings which screw together to sandwich a small circuit board that contains the ROM of your choice. A notable omission from this otherwise comprehensive kit is a set of labels to stick in the cartridges to identify their components.

The edge-connector that plugs into the socket on the Beeb has one foreshortened contact to ensure that all connections are made before the power is applied to the ROM. Because of this, cartridges can be exchanged freely with the micro switchedon. Oncein, ROMs are called by pressing Break and then addressed in the normal way.

The Micro Pulse ROM box can hold up to eight integrated circuits (including one in a zero insertion force socket) housed in a metal case with a hinged perspex lid. The box is manufactured to high standard and uses good-quality components throughout.

Connection to the micro is via a length of ribbon cable with a DIL plug on one end that goes into one of the spare sideways ROM sockets on the Beeb's main board. Operating instructions come on two photocopied sheets and advise inserting the plug into the BBC with the cable facing left and the indexing red stripe to the rear — physically impossible. The cable actually runs out to the right of the machine and connects to the ROM box via a socket in its side.

Clamping the cable to the BBC is achieved by the Heath Robinsonish method of trapping it between the two halves of the case.

Once everything is set up, applying power to the BBC will illuminate one of the eight LEDs. These are used to indicate which of the ROMs is chosen: selection is made by turning the switch fitted to the box. As with the Viglen, the appropriate ROM is enabled by pressing Break, although the instructions on the box suggest the rather more radical CTRL Break sequence.

In use

Each approach to using ROMs external to the Beeb has its pros and cons. Both suffer from the disadvantage that the selected ROM cannot be called without using the Break key first. Using toolkit ROMs in this way could prove awkward, and from Basic you will have to remember to old the program under development.

Any software that uses more than one ROM (DataGem, Logo and ISO Pascal, for example) is unusable with both systems since only one ROM is accessible at a time.

Verdict

The Viglen system is more elegant as there are no trailing leads hanging from the side of the micro when it is not in use. The price quoted for the system includes only one cartridge and you will need one for each ROM.

The Micro Pulse ROM box holds a maximum of eight ROMs, all available at the twist of a switch. Because of its flying lead it is not as neat as the Viglen, and this could cause trouble if the micro is to be moved around. A better method of fixing the lead to the BBC should not be beyond the wit of Micro Pulse's designers. Otherwise, the box seems to be good value.

I will seriously consider getting a Viglen system for ROM software that gets used less frequently.



The Viglen is more elegant than the Rom box but the latter is easier to use.

REPORT C	ARD: 1 TO 5
Features	0000
Documentation	906
Performance	0000

Overall value

Performance Overall value

Product Sideways ROM cartridge system Price £19.95 (£6.95 per extra cartridge) Distributor Viglen, Unit 7, Trumpers Way, Hanwell, 01-843 9903

REPORT CARD: 1 TO 5 Features Documentation

Product ROM box Price £57.45 Distributor Micro Pulse, Churchfield Road, Frodsham, Cheshire, 0928 35110

FTWARE PRE-VIEW



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



Just when you thought Amstrad wasn't getting any-where, Amsoft bring out Pas-cal, Kuma produces a version

of Logo, and Arnor and Kuma release assemblers. The Pascal looks very good on paper at least, but the state of the Logo is less sure. Arnor's assembler is superior to Kuma's Zen, outperforming it but costing £8 less. We'll be comparing the assemblers in the near future.

Amsoft continues to release games for its machine, and it looks as if support from third party software houses is growing rapidly. Better still, software standards seem to be rising as well, as witnessed by Manic Miner from Software Projects.

The action boils down to the

last bit. It's largely a maze-type

game, the graphics are quite

well done and the action tricky.

more and more advanced. First

the BBC used a counter so you

could tell how long a game

would take to load. Then many

software houses wrote fast load-

ers for the Commodore 64, or

licensed Novaload or Pavloda.

cian Ted adds to the range with

an animated loading display.

Ten coloured figures march to

and fro and a counter indicates

form affair and a full review

T minus' units. The game is a difficult plat-

New Generation's Techni-

Loading routines are getting

Hisoft Pascal	£34.95	Amsoft 0277-230222
Fruit Machine	£8.95	Amsoft 0277-230222
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Manic Miner	£8.95	Amsoft 0277-230222
Logo	£19.95	Kuma 0735-4335
Assembler	£11.60	Arnor PO Box 169, London SE25
Wise and Fool	£6.50	Nemesis 0933-623967
Crystal Theft	£7.99	Wiccasoft 0625-72988

SPECTRUM



Gift From The Gods is Ocean's latest and it's rather better than the disappointing follow-upstoHunchbackand

Kong. You're in the role of Oristes, and if you think that's an odd name your mother's called Clytaemnestra.

But seriously, this graphic adventure is based on the Greek tragedy in which Orestes, aided by the Gods, must regain the Mycenae kingdom from his evil mother. To do this he has to find his sister Electra whom his mother has imprisoned in the

catacombs below the palace.	will be published soon.		
Gift From The Gods	£9.95 Oce	ean 061-832 6633	
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Beam Rider	£7.99 Act	ivision 0628-75171	
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Technician Ted	£7.95 Nev	v Generation 0273-693640	
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Hunchback II	£6.95 Oce	ean 061-832 6633	
Kong Strikes Back	£6.95 Oce	ean 061-832 6633	
Match Day	£7.95 Oce	ean 061-832 6633	
Buggy Blast	£5.95 Fire	ebird 01-375 6755	
Space Shuttle	£7.99 Act	ivision 0628-75171	

Th Th Μı Fm Но Th Fir Ma La Bla Во Go Th Qu

Some of Acornsoft's recent releases promising. there are a couple of decent games like Labyrinth, and

Acheton could easily become a very popular adventure despite its price. We'll be comparing soon, and it's interesting to note that neither version uses the full 19 x 19 board.

Sound synthesisers for the Beeb have enjoyed considerable attention recently, the latest is Fsoft's Music Maker. This offers some 16 preset tones, tone envelope editing, keyboard mode, colour display and much more. Given the price it's an

cornsoft's GO with ano	ther interesting product.
e Wizard Citadel	£6.95 Triffid 0425-616605
e Secret River	£6.95 Triffid 0425-616605
usic Maker	£9.00 Fsoft 0273-736042
non	£9.00 Fsoft 0273-736042
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COMMODORE 64



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Melbourne House showed Castle of Terrors at the PCW show in September, but it didn't

release it till just before Christmas. It's an illustrated adventure which features animated characters but this isn't exploited as much as it could and should have been.

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C AMEPLAY

SPECTRUM

THE BACKPACKERS GUIDE TO THE UNIVERSE. Pt I

Navigate caverns, avoid freefloating obstacles, collect items, decipher clues, and return triumphant to safety. It's a familiar recipe, but you may not have seen it served up as well as this for the Spectrum before.

The backpacker is Ziggy, faced not by the Universe but by the superbly designed Caverns of Exile. Ring wraiths patrol the caverns, where exotic creatures are exiled among the irridescent stalagmites and

corals. The scrolling is smooth and Ziggy's progress, whether on foot or through the air by jet-pack, is a treat to watch. His flame-thrower flickers like a lizard's tongue.

The game comes with more information than you can take in immediately. Coast through it a few times, rattling around the caverns like a pin-ball. Items go into Ziggy's backpack. Symbol Shife gives you a progress report on their status, but don't be dismayed by the news that the Googly Bird has died of a nervous breakdown. It's quite happy decaying slowly in the backpack. Later the status report will add Flook to news of the Googly Bird's demise, sug-

gesting that it was just hard luck that you picked up a

neurotic specimen.

Many of the game's best



features turn up through trial and error. Short-cuts, barrierbreaching combinations of backpacked items, and handlike rock formations all help you on your way. The time allowance is generous enough for you to take your time. The main point of frustration is that the flame-thrower doesn't settle the ring wraiths' hash for very long — next time you visit one of their screens, they're back on patrol intent on causing you even more trouble.

Keys and a talisman are the ultimate objects of the game, and the talisman is due to come in handy when Part II is published. Part I should keep you entertained until then.

David Guest



Rating 8/10 Price £7.50 Publisher Fantasy Software 0242-583661

BBC

JET BOAT

If there's any justice in the world this game will find its way into many Christmas stockings. It is excellent, from its redefinable control keys to its detailed graphics, from its smoothly scrolling landscapes to its icon-inspired 'time-up' alarm clock at the end of the game.

The concept of Jet Boat is nothing new—controlling cars around tracks has been the staple diet of a lot of games writers since time immemorial (well, 1980 anyway). The neat twist of using a boat is well

COMMODORE 64

KAMI-KAZE

It's fairly safe to say that this

game is original — I'm sure I'd have remembered if I'd seen

another set in a public conveni-

ence in Cleethorpes; well,not actually in the convenience (it's

not that original), but the ac-

tion takes place in and around this loo with a view half-way

In fact it's not a loo at all,

could our human eves but tell.

it's the flag-ship Argon of the

Xenon battle fleet; but the men

along Cleethorpes Pier.

matched by the idea of holding it steady in the centre of the screen and scrolling the shoreline around it. The boat is



a good chunky sprite with at least 16 orientations and the archipelago around which you race against the clock (70 seconds a lap) is well populated with castles, villages, graveyards and so on.

on treating it as a convenience

and so are using up the ship's

vital battle plans in a most

are much more conventional in

design move about at the touch

of joystick or keyboard, and can

even with a keyboard control, though that's rather more tricky. The loo is, naturally enough, at the bottom-centre of

the screen, and men and beasts

walk towards it from either

side. You fly round above and

must pop them off before they go

about their business, otherwise

each time one of them reaches

rapid-fire in eight directions

The crafts that you control

undignified manner.

First time out you'll have to | get used to the controls. There are only three of them - left. right and accelerate. Unplug anything you might have in the analogue port, otherwise the keyboard controls may go crazy. You should try to remember the best route through the maze of islands, since the clear run you get on the first lap is not repeated until lap 16. Laps two to 15 involve negotiating an increasing number of obstacles, from boats to crocodiles, and ducks to sea monsters. A collision with any of these, or a bank, sets the screen flashing and slows you down to a crawl Rewards are small. Complete

bottom right of the screen starts

counting down.
Once they're inside there's



can still shoot them when they emerge again. You have to shoot the dogs, of course, as the counter ticks away like mad when they're running off with the paper, but the drawback to a lap and you are greeted with the first bar of the Sailor's Hornpipe and the chance to go round again. The game soon becomes compulsive, though. It has a very responsive 'feel' the boat decelerates smoothly as soon as you take your finger off the accelerate key, and turns corners promptly.

Jet Boat should acquire the kind of following that A&F's Chuckie Egg attracted.

Simon Williams
Rating 9/10
Price £9.95
Publisher Software



Price £9.95 Publisher Software Invasion, 50 Elborough Street London SW18 5DN

this is that the local RSPCA helicopter descends and starts firing at you. You've also got to watch out for low-flying aircraft and clouds — not to mention the choppers, of course. You also have four smart-bombs to aid you.

Kami-Kaze is a graphic delight, such as the way the dogs must jump up to reach the catch of the loo door, and the way the bodies topple over and splash into the sea beneath.

Mike Gerrard



Rating 8/10 Price £5.95 Publisher Supersoft 01-861 1166

and dogs of Cleethorpes insist

EWGEEBEZ

A maze by any other name.
But, when Spectrum and 64
games are expanding into
thousands of screens, it should at least be interesting to play
one on the Beeb with 80. But with the limited memory available, what are the chances of an
effective maze game? If
Ewgeebez is the best attempt,
not very high.

You play the part of Zelob the Melkon (whatever happened to John the Journalist or Roy the the loo the paper-counter at

Dynorod Man?) who has
foolishly got himself stuck in
the space station of the title. As



is the way with such artefacts, the station consists of a maze of little passages inhabited by various stationary nasties, as well as aliens from the neighbouring planet, who beam in on the chance of a good bust up. There is one ray of hope (sic)

however. If you can retrieve the twelve power crystals and find the teleport before being split into your constituent atoms, you can escape.

The whole epic is shot in Mode 1, meaning that it's a little short of colour, but Matthew Newman has made the most of what's there by mixing them to produce various patterns.

There are three types of aliens — the bent VHF aerial, the Software Projects logo and the gnashing teeth — and they appear in increasing numbers and are lethal to the touch. They don't shoot at you though, unlike the larger hostiles which send bolts bouncing around the corridors or extend long beams from their extremities.

The concept is not new, and although everything happens at a reasonable speed, there is neither the variety nor the challenge to keep you going. Simon Williams



Rating 6/10 Price £7.95 Publisher Software Projects 051-428 7990

COMMODORE 64

HENRY'S HOUSE

Another platform and ladders game this may be, but it features some of the best graphics and animation ever seen on the Commodore 64. The different high-resolution screens are a feast for the eyes.

Little Henry is about to take you on a romp through his amazing home. First stop is the clothes cupboard which contains an assortment of bags, gloves, hats and bow-ties. In order to progress to the next screen, Henry must collect all of these plus a key which appears only after he has grabbed a certain object in the room.

Some of the items are placed in really tricky positions and you have to plan the best way to get at them. Among the hazards in this bizarre closet are three giant boots that clump up and down and a whirling string of batty buttons.

Once Henry's gathered all the necessary objects, the screen changes to show him marching across an impressive hallway to the next room. One feature I particularly like was that on starting a new game you can opt to skip any previously conquered rooms.

The bathroom is really barmy and contains a huge grinning sponge, a squeezed tooth-

ledges. These gradually creep along the beams until they

reach a wall Against this wall may be an extinguisher or, worse, a can of petrol. Either will explode on contact. You must take the cans



to the safety of the cold water tank in the roof, and put the fires out with the extingnishers Your sights are at the centre

of your view through your cockpit, and sure enough

strange objects start to come out

of the screen towards you as you

hurtle along. The panel at the

bottom shows your shield strength, laser strength, skill

level, score and status, this last

moving from green through

simple wire-graphics techni-

altogether convincing to me,

but at least it means you can get

a bit more in. You rush head-

long through space for about

half a minute or so, and pro-

vided you survive (not too

difficult) you then rush head-

que, which never

The 3D effect is achieved by

vellow to red.

paste tube and the largest dripping tap and sink you're ever likely to see in a game. When you pull the plug out of



the sink, the water gurgles away and an enormous toothbrush starts scrubbing away at a nearby set of false gnashers. Objects to collect include rubber ducks and plastic scissors.

The kitchen is even kinkier.

Unfortunately, you can only carry one vessel at a time. And touching either the firebug or any of his fires knocks you to the ground floor. You can begin to see the difficulties involved in the game

Each petrol explosion adds ten degrees to the temperature and at 100C the whole building goes up. There are three different screens. Screen three features two firebugs, while the fourth starts with a higher temperature.

The game is well animated, with the large figures moving convincingly around screen. Sound effects are realistic rather than exciting, but since they're mainly bangs and squirts, this is reasonable.

what appear at first sight to be

goal-posts, but which turn out

to be shoe-box type buildings-

hit 15 of those for a bonus score.

Next comes the corridor sequ-

ence, with the same nasties to

fire at, but with the addition of

barriers across the corridor to

fly under or over. Then comes a

strange little sequence where

your sights are apparently lock-

ed on to the reactor pods you're

one, a character called Josh

about whom I was told absolute-

ly nothing. Any attempt to

examine an item was stone-

walled with 'Curiosity kil-

led the cat.' Take 'interesting

places'. If location graphics that

would shame a three-year-old

are exciting, my doodles should hang in the Tate. The 'difficult

Take 'exciting people'. I met

It includes a fearsome food mixer, a powerful pop-up toaster and a twisting tin-opener. If you're clever enough to conquer the kitchen, there's Henry's lounge, playroom (with a marvellously impressive teddy bear), nursery, dining room and finally the deadly dungeon.

The graphics and animation are absolutely superb. There's a wide variety of excellent sound effects and the different challenges make this a game not to **Bob Chappell** be missed.



Rating 9/10Price £8.95 Publisher English Software 061-835 1358

There are a couple of minor problems with the game, however, which make it less enjoyable. On occasions, particularly at the higher levels, the swapping of extinguisher for petrol can doesn't always work. This can be very frustrating when time is tight. Also the placing of the jump key is awkward. With up and down being * and ?, and extinguish being Return, why on earth choose Shift for jumping?

A good game, despite these little foibles. Simon Williams



Rating 8/10. Price £9.95 Publisher Acornsoft 0223-316039.

craft and also trying to shoot

after, so you fire furiously for a few seconds before it's back to the corridor to make your way out (which is much like making your way in).

After that I'm not sure as this was usually where my shields gave out and the game abruptly stops, showing you your score and giving you a chance to start again. There's no high score table, but that's no great loss as I can't see many people wanting to knock up high scores at this graphically limited game with poor sound and few thrills.

Mike Gerrard



Rating 4/10 Price £5.95 Publisher Realtime Software

0532-458948 adventure that, when fed with

the verb ZQX (or any real word it doesn't recognise), responds 'You can't do that . . . yet'. Yet? I placed Black Tower in the slot of my magical one-armed bandit and hit the jackpot -

Bob Chappell



three raspberries.

Rating 2/10 Price£6.50 Publisher Dollarsoft 0742-363246

BBC FIREBUG

Not another platform game, running up ladders and along Well, not really. ledges! Although those elements are present, the idea is original and its neat execution provides one of the most hair-tearing, frustrating games I've played in a long while

You act the part of a fireman who is desperately trying to deal with the chaos caused by a firebug. The young arsonist is doing his best to burn down the warehouse where the game is

He has an extended taper with which he lights fires on the

<u>SP</u>ECTRUM

3D STARSTRIKE

The title tells you a lot about this game - you're going to be either hurtling through space firing at missiles or hurtling along corridors. In fact you get to do both, though neither is a particularly thrilling experi-ence for the seasoned Spectrum space pilot.

The intention is to get a direct hit on an alien base's reactor systems; but first you have to fly through space to get there. Having set your controls for the heart of the Kempston, Sinclair or Cursor joystick, or even the keyboard (a sensibly wide range of choices), you choose from the four skill levels

SPECTRUM

BLACK TOWER If only Black Tower had been as

good as the cassette inlay said - I'd have had a great treat. Boredom, however was the main outcome Let me translate some of the

inlay's hyperbole for you. Take exciting'. If an excrutiatingly slow response coupled with the the most mundane text seen this side of a telephone direcTake 'magical lands'. If a wood,



pub and a hut are magical lands then welcome to Oz.

long just above the planet's surface, firing at more enemy tory is exciting, this is a thriller.

> problems' part, turned out to be true - the problems of keeping What can you say about an

awake.

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COMMODORE 64

IMPOSSIBLE MISSION

Every once in a while a game quietly appears which pushes the standards of excellence a little higher. Impossible Mission from Epyx (marketed in Britain by CBS) is one of these.

On the face of it, there's little remarkable about the game just another platform outing in the mould of dozens of others. What makes Impossible Mission different, and better, is the imagination, execution and attention to detail. Things like the brilliant animation and the superb use of software-generated speech.

The scenario is familiar mad scientist threatens to destroy the world. The secret agent (guess who?) has to penetrate underground complex, evading the security robots and collecting parts of the master password. Once you have all the pieces you must assemble the code and save civilisation as we know it.

The game begins with your agent in a lift. The bottom of the screen shows the display of your portable computer automatically maps the complex as you explore it. Passwords are hidden in items of furniture which are searched by positioning your agent in front of them. Search time is related to size, so a bookshelf takes longer to search than a table lamp.

Occasionally you will find parts of the master puzzle, or utility passwords. The latter allow you to turn off the robots for a while, or to reset the lifting platforms.

But there's more. The puzzle pieces are like graphic jigsaws. The master password is made up of nine smaller puzzles, the smaller puzzles require four pieces each. Using your portable computer you can fit the pieces together, rotating and flipping them or changing their colour



To help you, the portable computer has built-in communications with the master computer at your base. You can call it up to determine whether a solution for any given puzzle exists, or to flip the pieces to the correct orientation. When you complete the password you go to the main control room.

The outstanding feature of Impossible Mission is the speech software. On entering the room, Atombender com-mands, 'Destroy him, my robots,' in a voice that sounds remarkably like Boris Karloff. If you fall to your doom, your demise is greeted by fiendish laughter, but success brings a message of congratulations in a woman's voice. This is easily the best artificial speech vet heard on a micro.

Mission Impossible perhaps the best game released in 1984 for the Commodore 64. Other software houses will have to work to match it for sound, graphics and features.

Peter Worlock



Rating 9/10 Price £8.95 (£11.95 on disk) Publisher CBS 01-738 8181

BBC MAZE

I must admit that from the cover of the box. Maze looked to be about as inspiring as its title: the old 3D chase format where you run along corridors which look like partitioned-off offices, meanwhile being pursued by red meanies, blue meanies, or whatever colour is left over from the micro's palette. But while Maze is in fact little more than that, it does go to show that a simple idea that is wellimplemented can keep you enthralled.

The game begins with liftdoors opening and you stepping out into the first maze in a multi-level security system. each level being patrolled by robot guards. Pressing the V key gives you a bird's eye view of the maze, but only the portions of it that you've visited, so right | at the start all you'd see would be the symbol for the elevator doors, one or two walls, a couple of robots buzzing about, and a green arrow representing you and pointing the way you're facing.



Your lives are indicated by three green arrows at top right of screen, and these also serve as a compass, moving round as you move your view-point to left or right.

As you travel and re-view the maze, it slowly gets filled in, and what you're looking for are three coloured squares, representing identity tags. These are on the floor, and the T key takes one when you come across it. With all three in your possession, you must find the irridium box (or make your way back to it if you've already passed it), and drop the tags. This opens the box to give you a key, allowing you to return to the elevator and ascend to the next floor . . which is naturally even worse than the one you just left.

This would all be fairly straightforward, were it not for the robots. They're not superintelligent, but you have to keep a constant watch on their movements otherwise they can sneak up and blast you from behind. You also have to keep an eye on the number of bullets you have - you start with three and must replenish your stocks by passing over a power-point, represented by pentangles on

the floor of the maze - again, they're not shown on the plan until you've located them

The keyboard controls are a little clumsy, all being grouped together in a huddle - many a time I wasted a bullet when I merely wanted to check the map. You can use a joystick too, but the game is made by the speed with which you move through the maze, the warning noise you get for a robot's approach, and the all-round convincing nature of the excellent action.

Like a mini-adventure in graphics, Maze had the old heart pounding nearly as much as the fingers. Who needs Elite?

Mike Gerrard



Rating 9/10 Price £9.95 Publisher Acornsoft 0223-316039

SPECTRUM MATCH DAY No-one has yet managed to produce a piece of Spectrum software to rival Commodore's International Soccer cartridge. but here's Ocean's attempt at blistering 3D action with Match There is a bewildering array

of options available, making you wonder how there's room left for the program itself, so let's deal with those first. It supports a Kempston joystick. and you can support any team you like by changing the eight available names. For keyboard control you can select your own keys, this being done by a lovely routine displaying the Spectrum keyboard on screen, and you can have each half of your chosen match lasting five, 15 or

There are three skill levels, you can have a one-player or two-player game, or even an eight-player knock-out tournament (though if the result here is a draw then a winner is picked randomly). Finally, you can change the team's colours, as well as the background, by running through the Spectrum's palette. Short of an action replay and Jimmy Hill's pontifications, there's not much missing from this extensive list of options.

On the whole, though, I'd rather have seen fewer options and better action

The opening's a little tedious do you really want to sit through the sight of all 22 players running out every time you start the game, to an inaccurate rendering of the Match of the Day theme?

In the top right-hand corner a clock ticks away, while across

the back bob the heads of the crowd in the stand. Control is always with the player nearest the ball, this switching automatically as the ball moves about



If you have 20/20 vision and a very quick eye you might be able to spot the player you're controlling as his socks change colour to match the rest of his outfit. However, by the time you've spotted the change of hue he's probably lost the ball anyway.

A great number of features are taken care of automatically. such as kick-offs, corners, and goal-kicks. Iftaking a throw-in, there is a good deal of control you can exercise over the player you've

selected to make it (or the goal-kick, etc) There are three strengths of shot or throw, and three directions to choose from

The action is a little slow, the choices almost overwhelming, and while this probably just has the edge on Artic's World Cup, I can only end where I began: no-one has yet managed to produce a piece of Spectrum soccer software that is a serious rival to Commodore's International Soccer.

Mike Gerrard



Rating 7/10 Price £7.95 Publisher Ocean Software 061-832 6633

Day.

OFTWARE PRO-TEST: BBC

TIMS GETS A SPIN Make your musical dreams come true with The Music System. Simon Williams says this music generator beats the competition hands down.

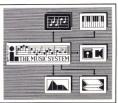
the 1984 prize for software package design goes to The Music System TMS by my reckoning. Not only is it the most comprehensive synthesiser software for a home computer, but it beats most of the competition with its intelligent use of graphic symbols (icons) and the way it groups and sub-divides its functions.

TMS is available either on two cassettes, or on a 40/80 track disk, with a further library disk of jolly tunes. It comes with an excellent 76-page manual and a function key strip.

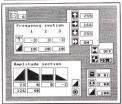
In use

I used the disk version of TMS but differences between the two systems will be pointed out where appropriate. On booting up the main disk, the 'control screen' appears. This is your first look at the style of display adopted throughout. It consists of five large icons indicating the various modules of the system, a strip showing the title and a piece of music manuscript across which notes scroll smoothly from right to left, echoing the display used by the Editor module. The five icons represent the Editor, the Keyboard, the Linker, the Printer and the Synthesiser. The space bar highlights each icon in turn in reverse video and the Return key will make the selection. This technique is repeated within each module for selection of items from a given menu.

The Editor is essentially used for entering music note by note on a conventional pair of treble and bass staves. The initial menu covers system parameters such as the name of the current music file, key signature, tempo and number of bars entered in each voice. There are four voices, corresponding to the Beeb's sound channels, with the fourth being used for percussive sounds (not available on cassette). A composition previously entered, or any of the library pieces (of which there are many) may be played in up to four parts from this menu. Once the main editor



Starting point: the control system.



Complex settings of the Synthesiser.

has been entered only the selected voice is heard on playback.

An interesting feature which can be called from this menu allows you to tranpose a piece of music automatically. This can be done from any key to any other, assuming none of the transposed notes falls outside the pitch range of the system. The manuscript display is updated accordingly. The main Editor allows entry of individual notes by positioning an arrow cursor, and using the up and down cursor keys to shift the note's pitch and the Q and W keys to change its duration. This proved very easy, since it is possible to play the music back at any stage. The volume and envelope of each note and the time signature and tempo may be altered as you wish.

The Synthesiser is the most complex of the five modules as it deals with the enveloping system of the BBC micro. TMS struggles bravely to sort it all out and provides three levels of display. The first level, like that on the Editor, allows system parameters to be altered. Two sets of 15 envelopes may be maintained in the system at any time and individual envelopes may be copied or swapped between the two sets, which allows great flexibility. Files of envelopes may be saved in either 'music' or 'BBC' format. The former is for use within the system. but the latter allows the envelopes to be saved in a form that may be accessed straight from Basic - useful if you want to use TMS envelopes in your own programs.

The second screen display shows all the envelope parameters divided into the appropriate frequency, amplitude and timing sections. Any parameter may be altered by selecting it and using the Q and W keys (good to see consistent use of the same keys throughout the system). Switching from one section to the next (space bar again) puts the cursor onto the parameter within the section that was last altered. This allows easy alteration of a pair of parameters easy alteration of a pair of parameters

within different sections to see how their varying combination affects the overall sound. The third level of display shows the actual frequency and amplitude graphs. The parameters may be altered from this screen too.

The Keyboard module allows you to use the QWERTY keys on the BBC to play and record music 'from the source'. To this extent it is a better executed version of previous music processor programs. Here, though, there is an on-screen animated metronome, a keyboard display which shows you the notes as you hit them and a full digital recorder which copies your magnum opus as it all flows out. The current volume and envelope are displayed, as are bar graphs of the number of notes played in each voice.

The Printer module reproduces manuscript on an Epson compatible printer. It produces draft or manuscript quality printout at different speeds.

The Linker module attempts to overcome the only shortcoming of *TMS*, the rapid use of available space. By switching to a Mode 7 display and loading and linking several files, long pieces can be



Keyboard 'play' display.

played from their component parts. Indeed, the library file named 'Longest' lasted well over five minutes and wasn't a protracted funeral march.

Verdict

I haven't yet explored the whole system. Although the possibilities of obtaining music from the BBC may have been 'limited only by your imagination', the advent of TMS brings this computer cliché much closer to the truth.

REPORT CARD: 1 TO 5 Features Documentation Performance Description

Name The Music System Application Music Generator Price Cassette £12.95, disk £24.95 Publisher Island Logic 01-741 1511 Outlets Retail.

S OFTWARE PRO-TEST: IBM PC

WORD-PERFECT

The word processor that claims to have everything is checked out by Geof Wheelwright

with all the Wordstars, Microsoft WORDs and Easywriters in the world, you might wonder if anything else could be added to the electronic wordsmith's toolbox. However, a US company has done just that.

Rather than taking the popular route of developing a minimalist word processor and selling it cheaply or adding it to a group of other minimalist applications in the form of an integrated suite, Samna has tried to putevery conceivable word processing feature in one package, Samna Word III.

Features

Features include full footnote and indexing facilities, multiple documents displayed on screen, print spooling, software selectable international character sets, keyboard-generated box and line drawing, newspaper-style printout in parallel columns, a built-in-calculator', unlimited horizontal scroll display, spell-checking from an abridged version of Webster's New Collegiate Dictionary and a direct typing mode.

The inclusion of several international keyboard configurations indicates a cultural appreciation often lacking in American packages — although a few of the configurations look doubtful to me. The French, Spanish, German and Greek keyboards all seemed straightforward — but the inclusion of English (UK), English (American) and Canadian keyboard allows you to generate all the characters needed in both French and English).

Not everyone needs all Sanna Word III's features—or wants to pay the whole £485. So, the company is offering two other versions: Sanna I at £260 and Sanna II at £395—each of which strips some of the features off the Sanna III configuration.

Documentation

The documentation is thick and comprehensive. It comes in the standard ring binder and divides into seven section; a 'road map', visual guide, introduction, alphabetic function description, appendices, index and 'tips and tricks' section. The size is a bit intimidating, but assimilating the documentation is eased by the use of the unique 'road map' and visual guide.

Although I didn't make much of the 'road map' — a series of sample texts showing ordinary printer's editing marks and where information on them

could be found — they would be helpful to the novice. Much more help was the 'visual' guide, which uses a combination of screen shots and symbols to provide an alternative to the standard table of contents or index.

The other plus was the existence of flow-to' boxes, which step you key-stroke-by-keystroke through what you must do. This doesn't make much difference on simple commands readily accessed with a keystroke or two — but on something like mailmerging, it is a boon.

initially disconcerting. (Most IBM packages put Help on F1 and Undo or Cancel on the Escape key). Once settled in, however, Samna Word III started to impress. For a start it is incredibly quick.

Experimenting with some of the unique features proved equally satisfying. To make boxes and enclosures on screen, for example, you only need hold down the Control key and one of the cursor keys. Carriage returns are moved about as needed to make the boxes



Samna Word III - in a crowded word processing market, it sets out to do better than the rest.

In use

The first thing you notice is that it takes a minimum of 256K RAM and two disks to get started. The first hints that a meaty package is at hand.

Not only do you need two disks to get started, but the printer drivers, dictionary and tutorial also have disks to themselves.

Once booted up, the program presents itself as a blank screen with column, page, left and right margin and tabbing details along the top and something resembling wallpaper on either side. This entry-mode is known as the 'scratch-pad' area, which means you're working in memory and don't have to immediately give a file name to your work. Once you start to type enough text to approach the limits of that memory—or you request to save the file—you are prompted for a filename and come out of 'scratch-pad' mode.

Operation is much the same as on most IBM word processors, although I found the placement of Help on the Escape key and Cancel on the PRTSC * key to be 'whole' without disturbing any text

The other notable plus was the extensivedictionary—but that plus was marred by the fact that it requires lots of memory to use (more than the 256K in my little machine) and resides on a separate disk from the program. It's one of those trade-offs between power and accessibility.

Verdict

Samna Word III is impressive, with many more features than there's room to mention. It lacks a word-count facility, but then considering how much else is in the package, I won't quibble.

REPORT CARD: 1 TO 5 Features Documentation Performance Overall value

Name Samna III Price £485 Application Word processor System IBM PC/AT or compatible +256K RAM Other versions None Outlets CBIS Intl 01-930 6083.

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Commodore 64 Software Sale: Football

Manager, Chinese Juggler, etc. Also Pixstick lightpen with paintbox prog-ram + 3 games for £25. Tel: 0823 74410 ask for Steve!!

Commodore 64 Software. Swap Lazy Jones, Star Commando, UGH! Music 64, Gridtrap, Skramble, Kong Galaxy, Hunchback and more. Steve, 2 Ash-over St, Gorsehill, Stretford, Manchester M32 0HG.

CBM 64 swaps. Jammin', Metro Blitz, Bath Time, Exchange for Chuckie Egg. Sheep in Space. Ancipital. Tel: outhampton 0703 847168

Pet 3032, lots of programs, C2N cassette recorder, manual and books etc. perfect condition, looks new! Guarantee until spring 1985. Bargain at £195! Tel: 0244 675717.

at £1951 Tel: 0244 675717. CBM 64 + 1520 Printer/Plotter + C2N cassette + joystick + 5 books (includ-ing CBM 64 reference guide). Games: Skramble, Snooker, Qbett (cost new £400+). Will sell — £330 ono. Tel: Birmingham 270 2102.

5400+). Will sell — £330 ono. Tel: Birmingham 378 3137. CBM 64 Easyscript '0' Level History, Revelation Pyramid, Flight Path 737, Cosmic Cruiser, all as new £40 the lot. Tel: 051-423 5493 after 7pm.

CBM 64 Cassette Recorder software + Commodore 64 Exposed book + mags Commodore 64 Exposed DOOR THINGS in folders. Teach yourself Computing in various computer languages. Worth £100, will take £60 ono. Quick sale. Tel: 01-743 3619

Tel: 01-743 3619.

Commodore 64 disk software for sale.

High flyer, deadline, Jumpman, Zork High flyer, deadline, Jumpman, Zork I, Fort Apocalypse, Dungeonquest. Cost £115, sell for £70 ono. Tel: Andrew on 01-868 7526. Programs — Exchange CBM 64 disk.

Have over 1,000 programs, will send complete list in return for yours if extensive. Per Nilsson, PL5281, S-

44193 Alingsas, Sweden.

Wanted CBM 64 software tapes — intro to basic — games — what have you — books etc for beginner. Write Moffat, 42 Pennine Rd. Woodley, Stockport,

42 Pennine Rd, Woodley, Stockport, Cheshire SK6 1JS. Vic-20 + tape unit Forch language Gof cartridges. 8K + three slot mother-board, tapes, mags etc. Bargain at £100 ono. Tel: Stephen on Halesworth

Oric

48K Oric-1 Software for sale. All originals which include Hunchback, Quack a Jack, Xeaon II, Zorgon. Over 16 titles. Will sell £1 each or £14 the lot. Tel:

Printer/plotter Oric MCP40 Printer (unused) £85 one. Oric software, Tansoft CAD (£7), Author (£10). Various

graphics, character generator and database software. Tel: Walsall 26969. Oric software swaps Dinky Kong, Killer Caverns, Oric Flight, Quark Flight, Simulator, Mulicipan, Carlotter, Marchand Caverns, Oric Flight, Quark Flight, Simulator, Multigames One, Home Finance, Teach Yourself Basic. Tel: after 7pm Lancing 762361. Oric Basic V1.1 PROM for your Oric-1. I

use a customised EPROM and offer you the V1.1 PROM for £10. Contact: A. Borg, Sonnegg Str, 84 8006 Zurich, Switzerland

Switzerland.

Oric 1 48K plus quality professional keyboard, £30 worth books and original software. £105 the lot or will split. Tel: Leicester 0533 303586 eves. ed Oric 1 software. Buy or swi

oric books, will pay half price, also copies of Oric Owner required. Tel: Stephen, Wigton 0965 42247.

Oric 484, 7 games, cassette recorder, Quickshot joysticks + Interface, 2

books, Excellent condition, worth £200+. Bargain £100 or swap for Spectrum 48K. Tel: Michael 01-671

2135, 4-9 m.

Oric 148K VGC. Hobbit, Galaxians, Ice
Giant, M.A.R.K., Trek, Probe 3 Fantasy, Toad, Ultra Chess. All original. Offers? Stereo radio loads any game at 2400. Tel: 804 9858.

48K Oric-1 with six games including, Xenon 1, H. Attack, Flight. Worth £215 approx. Sell for £120 ono. In-cludes cassette lead. Contact Ian on 0628 31706

0628 31706.

Oric 1 48K, cassette recorder, games, including Hobbit, Hunchback, books and mags. £100 one or swap for Commodore 1520 printer plotter. Tel: edford 0234 42361

Oric software for sale. Selling all my originals, over 50 at near half price as have sold my Oric. Please ring! Tel:

01-400 0390.

Oric 48K, 7 games, cassette recorder, joystick & interface, 2 books, excellent condition. Total value £200+. Bargain £100 or swap for 48K Spectrum. Tel: Michael 01-671 2135, 4-9pm.

Spectrum

Spectrum software £100s worth includ-ing Sabre Wulf, Beaky, Games Desig-ner, Scrabble, Kempston conversion tapes. All originals £49 the lot ono. Tel: eter 01-422 7583 evenings.

Spectrum 48K DK Tronics keyboard Microdrive Interface 1, Zxprinter In-Microdrive interface I, Exprinter in-terface II, 4 × Microdrive cartridges, quickshot II £150, software books, courses mags. Sell for £280. Tel: Sandwich (0304) 613424.

Spectrum software Atic Atac, Penetrator Pimania Groucho, and many more all originals £3 each. Tel: 061-775

Spectrum software all Ultimate incl. Sabre Wulf, Kokotoni Wilf, Pyjamarama, Manic Miner, Stonkers + others (originals). Sell or swap. All half price.

Spectrum games to swap or sell. Valhal-la £5, Kong Galaxians, Pogo, Atic Atac, Fred, £2.50 each. Tel: Nigel on 01-643 8226

software, other extras, £165, or the £200 of software only £90. Latest games included. Tel: Rochdale 353915.

ZX-printer, good condition, plus five rolls of paper, £25 ono. Tel: Ash Green 873 185 evenings or weekends and ask for Mark

for Mark.

Spectrum 48K one year old. Cassette recorder, sound box, Fuller FD42 keyboard, Tasword Two program + many others £150 ono. Tel: David Guildford (0483) 576233.

Spectrum 48K good as new over £80 worth of software, Kempston Interface with Quickshot 1 joystick and data recorder. Price £140 ono. Tel: Lan-reath (0503) 20398.

48K Spectrum + Com-Com joystick interface + Quickshot II + tape deck + er £600 worth of software + mags. £190 ono or swap for Commodore 64 with C2N cassette recorder. Tel: Halifax 67827.

Wanted Spectrum 48K - £70 offered, working order. Also some peripherals Tel: Dave on 051-424 5558.

Tel: Dave on 051-424 pdg.
48K Spectrum, 100% reliable, cassette recorder, Currah Speech, £100 software, £50 books, mags etc. Boxed with 1 months guarantee. Perfect condition 1 months guarantee. Perfect condition £140 ono. Tel: 01-863 5113. 48K Spectrum ZX printer, interface 1,

Microdrive, five cartridges, tape recor-der, RS232 printer interface board and cable, case, £120 worth software, £200. Tel: Keith on 091 264 3439 after 6pm. Spectrum programmable joystick inter-face, made by Stonechip, boxed and

face, made by Stonechip, boxed and with instructions, must sell, yours for only £16. Tel: Fyfield 291 after 5. ZX Spectrum games, over 60, all origin-als, includes Ultimate, Quicksilva, Imagine etc, all as new, offers over £60 for all. Tel: Reading (0734) 712255 evenings

evenings.

Eighteen Spectrum software tapes £3
each. All originals, also The Hobbit,
Games Designer, £7 each. Pyston £5.
Magazines and books. Tel: 021-474

Wanted 16K ZX81 and printer. Have to be in perfect condition, will pay up to £75. Ask for Richard. Tel: 24025 (West Spectrum, only six months old. two 48K

RAM packs and dust cover. All manuals and leads supplied. Quick sale £120. Tel: 01-891 0496.

2120. Tel: 01-891 0496.
ZK81 164+ £200 software. Boxed, manuals, leads, magazines £50 ono. QS sound and characters boards £30 ono. ZX printer £20, J. Millott, 50 Sydenham Road, Croydon, Surrey.
ZK81 Forth ROM with all manuals. Hardly used £25. Tel: 01-733 7188 after 5mm.

Spectrum software: Scrabble £8. Ga Designer £7. Match Point £4. JSW, Visions Snooker, Trashman, Bugaboo £3.50. Jetpac, Cookie, CDS Pool £3. £3.50. Jetpac, Coc Tel: 021 453 8876

Spectrum 48K only six months old VGC. Some software, cassette recor-der £120 ono. Tel: 01-590 4849. Write T. Holloway 32B Belgrave Road, Spectrum 48K ZX printer, data recorder

transform keyboard (needs repair) software, books, magazines, £150 Feguson IX TV £140. Tel: 01-8864797 Feguson IA IV.140. 161:01-0004791.
Spectrum 48K + Turbo interface with ROM cartridge port + Quickshot 2 joystick + £50 original games. All worth over £200 with original boxes. £150 ono. Tel: 031 337 0200 after 4pm. Spectrum Software Sabre Wulf £5. Lords Spectrum Sorware Sabre wulfz. Lords of Midnight £5. Jet Set Willy £2.50, Atic Atac £2.50, or swap any for Amstrad software. Tel: 0294 56010. Spectrum 48K in good condition, com-plete with power supply, manual and leads. £90, Must collect. Tel: 01-994

leads, 290. Must collect. 1et: 01-994 4172 evenings. Spectrum 48K, in good condition, com-plete with power supply and leads. Manual and some software too, £90. Must collect. Tel: 01-994 4172 even-

48K Spectrum, Interface 1, microdrive, manuals, books, magazines, car-tridges and tapes. Software includes Hobbit, Finance Manager, £165. Tel: Bill on Stamford Bridge 0759 72005 evenings.

evenings.

Spectrum software for sale £90 ono. £185

worth of software. 27 titles including

Trashman, Jasper, JSW, Atic Atac,
and many more. Tel: (evenings) Chetan 01-805 9196

tan 01-805 9190. Spectrum Software half price including Knightlore Underwurlde, Sherlock, Lords of Midnight, Pyjamarama, Cyc-lone, Strangeloop, Avalon, Zombie Zombie. Also Kempston joystick inter-face 25. Tel: after 7pm 0723 667608. face 25. Tel: atter 7pm 0723 667608. Spectrum Games to swop. Travel with Trashman, Chequered Flag, Chess. Exchange for Matchpoint, Trashman, Micro Olympics. Write to Andrew Watton, 73 Whitehorse Hill, Chisle-

Burst, Rent.
Spectrum Pylamarama swap for American Football or Battlecars. Also Valalla and Wild Bunch for Eureka (other games considered). Tel: Sandback 7054.

Spectrum 48K Software for sale. originals, half list price, including Manic Miner, Sabre Wulf, Cyrus Cuess, etc. Tel: Holywell 0352 712444. Sinclair Interface 1, 2 Microdrives, 8 cartridges, manual + all leads. As new (boxed). Worth £155, sell for £100. Tel: Romford 42574.

Acorn

Electron + Tape (Acorn) plus many games (including Aveacor, Chucky Egg) plus 2 extra books and mags, £220 quick sale. Tel: 0642551049 after

£220 quick sale. Tel: 0642 b3 1049 after 4pm. Ask for Peter Scott. BBC Model A for sale. Also several books. Total price £100. Tel: 01-981 1578. I Buy and Sell original games for the Acorn Electron. Must be originals. Phone Jason on 061-224-6462 or Prestel Mailbox me on 612246462.

rrester Mainox me on 612246462.
Acom Electron good condition, must sell.
Offer includes a good range of expensive games software. Only £189 ono.
Tel: Mr N Relevy 01-203 0608.
BBC B wanted. Exchange for CBM 64,
C2N, 2 joysticks + ass/diss/mon, C2N, 2 joysticks + ass/diss/mon, books, games. Value £430. D. Fovston,

79 Bewholme Grove, Marfleet Lane, Hull, N. Humberside. BBC B O/S 1.2, Wordwise ROM, two data recorders, joysticks (3), cables for printer software, Elite etc, plus books, mags. Swap for Commodore 64 sys-tem. Tel: (0900) 65614.

BBC Software for sale. Mostly games and adventures, some serious, including Mail Merge for £10; also Acorn Z80 software. Fel: 0788 £12940 after 6pm. Wanted: BBC (disk) owners to ex-change programs and ideas. Many titles available including, Jet Boat, Sabre Wulf, Elite, Manic Miner, and more. Tel: (05827) 69152.

more. Tel: (05827) 69152. BBC Ette £10, Castle of Riddles, Carousel, Starship Command, all £5 each or £12 the lot. With Elite you get competent file which has 100,000 credits, plus every weapon. Tel: 551-2947 (Fazz)

2947 (Essex). BBC B, + DFS + 100K disk drive Wordwise + Exmon. £399. Seikosha GP80 printer + 4000 sheets paper, GP80 printer + 4000 £89 Tel: (0223) 277236.

sided disk drive, own PSU only £300; FX80 printer only £290, both vgc, boxed and with all leads, had light use. Tel: Colin, Uxbridge (0895) 35129.

BBC Wordwise. ROM + manual, only £25; DDT MASS ROM manual, only £20; advance user guide (hard cover) only £10. All vgc. Tel: Colin, Uxbridge 35129 BBC software many original titles less

than ½ price, including Aviator, Countdown to Doom, French Mistress, Spitfire Command. Also Basic book. Tel: Cambs. 240622 Tel: Cambs. 240638.

BBC £100 one for 200K 80 trks disk

drive, cables, utility disk and manual supplied. Tel: Benny on 01-439 0192 (Mon-Fri) between 6.30pm and

7.30pm.
For BBC genuine Watford Beebfont £25 complete. GCC ROM expansion board £25. Tel: 0604-844130 or write with s.a.e., Emmerson, 71 Falcutt Way, Northampton, NN2 8PH.

Electron + tape (Acorn) + many games (inc. Aviator + Twin Kingdom Valley) (inc. Aviator + Twin Kingdom Valley) + 2 extra books + many mags, £220. Tel: 0642 551049 after 4pm, ask for Peter.

BBC software. All original. Snowball, Hobbit, Fortress, Graphics Composer games education 4-8 years, Viglen games education 4-8 years, Viglen sideways ROM system. Tel: Basing-

Atari

Atari VCS plus 13 cartridges including, Jungle Hunt, Popeye and Asteroids, good condition. Bargain at £130 ono. Tel: (Sheffield) 873785, weekdays

Tel: (Sheffield) 878785, weekdays after 4pm.
For sale Le Stick £10, Caveranner £5, Miner 2049er Cart £10, Popeye Cart £10, Astro Chase £5, Savage Pond £5. Tel: Fleet 25532, Darren.
Atari 400/800 software. All originals, mostly cartridges (Pole Position etc) £5 each or 10 for £45 or 20 for £80. Tel:

021-749 4603 tari 810 for sale. Brand new, only £75. Atso Tanktics disk£7, Star Raiders £8, Defender £8, Preppie cassette£10. Tel: 60078 (Harrogate), ask for Richard. Atsrl VCS plus two games, £40 ono. Tel:

Sandback 7054 Atari prister, 1027 letter quality. Nearly new. No interface needed £180. Tel: Chesham 0494 784409 after 6.30pm.

PCN Rillboard

Atari VCS cartridges — Haunted House £5. Basic programming and control-lers £10. Star Raiders and touch pad £10. Superman (special edition) £10. Tel: Ian, Yapton 553069. Atari 400, 16K + basic and manuals +

magazines and software £65. All offers considered. Tel: John 01-684 3775,

after 8.30 evenings.

Atari 2600 games for sale, Championship Soccer, Crossforce and Asterioids each costing over £20, only £6 each. Tel: Andrew or Richard 0484

Atari 822 Thermal Printer 40cps; £80 one, Mac/65 (advanced 6502 assemb-ler) ROM £45. Amac 48K assembler sk £10, various books, analdisk £10, various books, analog and original games from £1 to £2.50. Tel: Buckley 547323. Atar 400, 16K with basic cart program

guide, + joystick all lead's etc £50 ono Tel: York 25016.

Atari software swap or sell also wanted disk drive. Tel: 0904 791067. Atari 400 + recorder + basic + manuals

+ joystick all boxed and in mint condition plus over £200 of tapes sell for only £130. Tel: 467 8854. Atari 400, cassette recorder, joystick, 5 cartridges, cassette software, manu-als, mags, good condition, £125 ono. Tel: Paul (0533) 775456.

Atari software Dig-Dug, Missile Com-mand, Chicken, Pilot, ROMs £5 each Leggit, Galactic Chase, Up, Up and Away, cassettes £3 each, also many more on cassette and disk. Tel: 01-550

0931 d: Atari magazines and b including Antic and Your Atari Com-puter, also cartridges and disks to swap. Tel: Peter, Middlesbrough (0642) 823882.

Atari disk and cassette software for sale of swap, and ROMS for swap only. Tel: M'bro (0642) 823882.

Atari disk and cassette software for sale or swap and ROMS for swap only. Tel: Middlesbrough (0642) 823882. Atard disk and cassette soft ware for sale or swap and ROMS for swap only. Tel: Middlesbrough (0642) 823882.

Atari 600XL as new and still under guarantee. BFR5000 ono. Tel: Brus-sels 235-3228 (office), 12 Opemstraat B3, 1980-Tervuren.

Atari 400/800 software for sale, all nev (including Pole Position etc). £5 each or £45 for 10 or £80 for 20. Tel: 021 749 4603.

For a quick sale. Atari VCS, 12 car tridges, joysticks, paddles, touchpad, keyboards, video games cases. Good condition, £130 ono. Tel: Paignton 0803 524448. Buyer must coll

Atari software for sale or swap. Zaxxon, Preppie, Encounter, ACE, Diamonds, Mutant Camels, Dimension X, Zep-plin. Tel: 0904 791067 after 6pm. Atari software (originals), Visicale £35, Atari software (originals), Visicalc £35, Filemanager 800+ £25, Macro Assembler £12, Time Wise £9, Plus games. Tel: Slough 71392, after 8pm,

(anytime weekends).

Games to swap, and sell. Deadline,
Dungeon, Adventure, Star Raiders,
Snowball, Caverns of Khafka plus
more. Tel: 051-327 1780 after 5pm

please. **Wanted Atari 1050** disk drive. Tel: Notts Atari disk drive wanted. Any make but must be in very good condition. Tel:

0207 503777

0207 503777.

Original Atari software, ROM assembler editor £15, Pacman £10, disk, Summer Games £10. Many cassettes, too many to list, Zepplin, etc. Tel: Mansfield 0623 556432. Original Atari software, disks, Zaxxon, Caverns, Mission Impossible, Strip

Poker, £10 each, the lot £30. Snooke Finance Manager, cassettes, £5 each. Tel: Mansfield 0623 556432. Atari disk drive wanted. Pay up to £120. Tel: 0207 503777.

Wanted Star Wars for the Atari 800XL.
Will pay a good price. Tel: Wendover
0296 623423 after 4.30pm, ask for

Alistair.

Atari 400 with Basic and Manual still guaranteed, £50. Also tapes to swap,

Fort Apocalypse etc. Tel: Wrexham Atari 810 disk drive for sale. With home filing manager disk, £170 ono. Plus some software, only one year old. Tel: (0792) 898363 (eves only).

Commodore

Zork I (infocom) for Commodore 64 (disk). Sell £7 or swap. A superb adventure. Tel: David (0783) 227262 (after 6pm).

(atter 6pm).

CBM 64 games, for sale or for swap, games include: Practical £15; Frogger 64 £3; Hustler £3; Ceasar the Cat £4; Crazy Kong £4. Write to: Neil Crazy Kong £4. Write to: Neil Reynolds, 55 Leam Crescent, Solihull, West Midlands B92 8PB

West Midlands B92 SPB. Vic 20 software Trax £3, Jetpack £3, Mission Mercury £4, Vixen RAM (switchable) £20, Super Expander £22, Alien Cartridge £3, Wacky Wai-ters £2. Tel: 0302 845025.

ters £2. Tel: 0302 845025.

Vic 20, C2N, 8K ram, super expander, joystick and over £180 Software.

Programmers Reference Guide and other books. £150 ono. Tel: Evesham

0386 41135, after 6pm. Vic 20 games Trax £3, Jetpack £3, Blitz £1, Wacky Waiters £2, Catcha Snatcha £2, Super Expander £22, Vixen Switchable 16K. £20 vgc. Tel:

PeT 4000 series 32K 12" screen computer, cassette type 2CN, printer type 4022 IEEE cable. £495 ono in as new condition, suit business. Tel: Portsmouth 827276

Commodore MPS-801 printer for sale. Excellent condition. With paper and ribbon £150. Tel: Portsmouth (0705) 750595

Vic 20 plus C2N and games £80 ono. Tel: Wigan 48999, good condition, calls after 5pm.

CBM64 software to Swap: Ghostbusters: Matchpoint, Raid Over Moscow etc. Send list to: G. Woods, 201 Fallsbrook Road, Streatham, London SW16 6DF. Road, Streatman, London's W16 JDT. Commodere 64 with data recorder and crackshot joyatick and over £100 worth of software and guarantee extended. Sell for £290 ono. Tel: 061-881-1144.

061-881-1144.

32K Pet (Basic 2 AMD 4) £300. Epson printer MX100 £200 MX80 £180. Koala pad (C64) £40. Tel: Tunbridge Wells 0892 26016.

Weiis 0892 20016.

Commodore 64 with data recorder and crackshot joystick and over £100 worth of software and guarantee extended. Sell for £310 ono. Tel: 061-881-1144. Wanted Commodore 64 with no extras. Will pay up to £95. Tel: Graham, Potters Bar 50336.

Potters Bar 50336.
CEMB 64 games half price. Ghostbusters,
Football Manager, Decathlon, Natocommander, Heathrow, Rustler,
Backgammon, Stockmarket. All originals. Tel: Bristol 837617.
Commodere 64 with data recorder and

crackshot joystick and over £100 worth of software and guarantee extended. Sell for £300 ono. Tel: 061-881 1144.

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Dragon 32, excellent condition, new Dragon 32, excellent condition, new joysticks, dustcover, books, over £100 software, Ferguson tape recorder. Many user magazines. All only £150 ono. Tel: Harrogate 503125 (after

Dragon 32, £150 of software, two joysticks, cassette recorder, all leads, manual, users books. Sell for £130 ono. Tel: Swanley 68339. Dragon 32 for sale plus £52 s/w, ca

Dragon 32 for sale plus 2523 w, classette recorder mags worth over £287. Sell £100 one or swap for CBM64 and C2N. Tel: Chris 01-387 2553.
Dragon 32 with books, games and cassette recorder. Also Dragon user magazines, and as much advice as you need. £69 ono. Tel: 0272 40872. Dragon 32, bargain. Joysticks, books, bragon 34, pargain. Joysticks, books, user magazines, including copies of Dragon User, software including Ring of Darkness, Gridrunner and more. Everything boxed; worth £280; sell £60 ono. Tel: 01-903 1770.

Dragon 32, over £100 software. All leads, magazines included, boxed, in excellent condition. Sell for £75. Tel: Romford 24508 after 7pm.

For Dragon 32 one Sprite graphic board from Premier. Gives 16 colours plus sprites. Hardly used, £75. Tel: Honing-

ton 03596 218.

Dragon 32 plus cassette recorder plus joysticks and software inclusive. The King Chess (cart) and magazines and book. Boxed as new, £150 ono. Tel: 01-366 6736.

Lvnx

Lynx 48K CW joystick and interface Serial printer interface, software and manual, all as new. Cost £280, will accept £140 ono. Tel: Macclesfield 20055.

Lynx 96K leads, manuals, intro cassette. Serial interface, Machine code monitor inbuilt. Unwanted gift. £160 ono, or swap 48K Spectrum plus extra's. Tel: Mark, 01-864 7953 (Greenford).

Lynx 48K complete with cassette player, games and utility programs, books and user magazines. £100 ono. Tel: Leeds (05.32) 770772 after 6pm. Lynx 50ftware for sale. Sea Harrier, Sub-Chase and Invaders, plus free demo tape and manual. £6 the lot. Tel:

Treorchy 0443 775691. Lynx 48K. Hardly used, cassette deck, 4 software tapes, manuals and 2 books. £120 or near offer. Tel: 01-661 0744. 2120 or near offer. Tel: 01-661 0744. 48K Lynx with manual, leads, etc and including book, newsletters, demonstration tape and 3 games. Price £80 ono. Tel: Sellindge 3217.

Oric

Oric Atmos 48K, tape recorder, £100-worth of software — all the best games, worth of software — all the best games, plus Oric mags. Will sell for £150 ono. Tel: Great Missenden 6127.

rer: Great Missenden 6127.

Oric 1 Software, surplus to requirement;
Onchase, Probe 3, Vanquisher, Paragram, Painter, Gobbler, Xenon 1,
Zorgon, Ultra, Oncmon, Oricade etc.,
(originals) £2-£7. Tel: Steve, (Sandy)
0767-292119

Wanted. Oric (Atmos) Software. Games and/or utilities, especially Basic ex-tensions, Assemblers and The Hobbit.

Tel: Oxford (0865) 512091. Ask for Oric 1 16K, with software, books and magazines, worth over £130. Sell f only £35 ono. Tel: Leicester 897878.

Tandy

TRS-80 Model Two, £2,000. Needs repair. Buyer sends me repair bill. Used nine months 1981. David Pratt, 9 Larkins Lane, Stoke Poges, Bucks, SL2 4JU

SL2 4JU.

Tandy TRS-80 16K colour computer.
Hardly used, Basic manuals, joysticks and over £150 of software. Accept £250. Tel: 01-337 4592 (eves). Tandy TRS-80 Model 1, Level II 48K, internal, lower case, joystick, printer interface. Boxed. Manuals. Some software. Bargain: £150 ono. Tel: Simon, 05827 68663 after 7.30pm please.

16K Tandy colour computer with ex-tended Basic, joysticks, manuals, books, Project Nebula games cartridge and all leads. £140 ono. Tel: Sheffield

365599.

Tandy TRS-80 Model 1, interface, 32K.
Offers? Various books Basic graphics, Offers? Various books Basic graphics, excellent condition, ½ price, CAT 62-2069, 26-2107, 62-1002, 62-2073, 62-2087, 26-2116, 62-2063, 62-2064. Tel: 0324 812470.

Free Tandy 32K colour computer plus £400 Proff software with purchase of dual disks for £400. Tel: 0525 714488. TRS-80 Model 1, level 2, 16K including monitor and software. Needs attention, £75 ono. Tel: Woking 67454 (eves).

Apple

Apple II+ Look-a-like Never used, some software on disks and cassette, includ-Visicalc, data recorder all 12 mths old. Genuine reason £350 ono. Runorn 77140. Bargain

Wanted Apple software. Send list of prices to Ayo Lawani, Downside School, Stratton on the Fosse, Bath BA3 4RJ. Please include phone number

Peripherals

Alphacom 32. printer for Spectrum, £50 ono. Also DK'tronics double joystick interface £10 and large collection of Spectrum software. Tel: 01-203 0324

(after 6pm) (after 6pm).

Spike speaking Vectrex cartridge £10.
Also Acetronic cartridges Shoot-Out,
Tank/Plane Battle £8.50. Soccer, Air/
Sea Attack £5. Excellent condition packaging. Everything includes post-

age. Tel: 01-802 8724 Prestel adaptor and Colelo vision TV game. Sale or swap. Poss Spectrum WHY. Tel: 01-2235491, (day or night).

sion for sale with cartridge £55. also Astromash, Armourbattle, Lock-'n'Chase, Subhunt, Golf + Advanced Dungeons And Dragons, £10 each. Excellent condition. Tel: 01-802 8724

vgc. Will swap for portable colour or any Spectrum hardware. vgc. Will swap for portable colour TV
or any Spectrum hardware. Mr.
Rooney, 7 Redhill Ave., Southdene,
Kirkby, Liverpool.
Swap excellent Honda 250cc, T-reg. bike
for dual 80 track drives for BBC. Will

also sell for £250. Tel: 01-961 1655 (after 5pm — Derrick).

VTX 5000 Modem for Spectrum. Cost £99, sell for £60 ono. Connector included. Tel: (Bodfari) 0745 75425

after 6pm). Colecovision cartridge Qbert £10. Intel-Colecowision cartridge Qbert £10. Intel-livision cartridges Tutankham, Su-percobra, Novablast, White Water, Safecracker £10 each. Eight others from £8 each. Full details. Tel: 01-764

Epson MX80 type 3 printer £150 ono. Also parallel interface for Apple. Tel: Anthony 01-578 7704 (after 7pm). Epson HX20 16K portable with printer and micro cassette unit. As new £320. Tel: 0904 760351 (after 6pm).

Wanted, Polymorphic system 8813 boards, expecially 16k RAM. Would like to ar from users of 8813 or system 88. 0602-506101 ext 3136, 0602-251920 (aves

Brother HR-5 RS232 printer, with mains adaptor £150. Tel: Glasgow 041-959 6125 (ask for Gregor).

Selling electron A/D converter, flashgun sunlamp, darkroom exposure meter, telescope, vintage records, Spectrum I/O port, racing bicycle. Sell or swap for n organiser hardware. Tel: 0408-

For sale Electron A/D converter flashgun sunlamp, Zoom telescope 40 approx. vintage records, darkroom exposure meter, Spectrum I/O port, racing bicycle, Sinclair P.S.U. Tel: 0408-

Prism VTX 5000, modem as new — unwanted gift. £75. Tel: (Bradford) 0274 81440 (eyes — ask for Brian)

'N Billboard

American Dragon/Tandy tridges not available in UK. Megabug, Castle Guard, Poltergeist etc. £10 each. Tel: (South Benfleet) 03745

Spectrum RS232 interface, connect your Spectrum to modems or other compu-ters etc. Adjustable baud rate between

300 to 2400. £25. Tel: Oxted 5835.

Microvitec Cub monitor for BBC model 1451 as new cost £310 in July. Selling for £260. Tel: Basinstoke 51623.

MPI disk drive, 501B SS/DD bare drive No case or p/s, perfect condition. Used less than 2 mo. £80. Tel: Chesham 0494 784409 (after 6pm).

Epson MX-80, type 3 dot-matrix printer. Very good condition. Upgrade forces sale £150 ono. Also Apple parallel interface. £30 ono. Tel: Anthony 01-578 7704 (after 7pm).

Casio FX700P with printer and cassette interface as new: £75 ono. Tel: (Leic) 0533 671228 — Charles.

Epson MX-80 type III printer £150 or also Apple parallel interface card £30 ono. Tel: 01-578 7704 — Anthony. Silver Reed I/F44 printer interface and cable. Connects your electronic type-writer to the BBC/B computer £60. Fel: 01-462 1379 (eves).

Acoustic couplers — pair of AV 311's. Suitable for PTN comms. Reasonable offers considered. Tel: 0884 259392 ishi 40/80 track 400K disk drive for BBC, with disc doctor and over £1,000 of software, only £230. Tel: 05827 69152

ner HR5 printer with RS232, many features, as new, including main adaptor. All for only £130. Tel: 0325

312417.

Shinwa CP80 for sale, 6 months old, boxed, as new. Excellent condition £150. Tel: 01-9078661 (after 5pm).

Microvitec Cub monitor for BBC model. 1451, as new. Cost £310 in July, £250 or near offer. Tel: Basinstoke 51623. BBC 'B' Quickshot joystick, cost £20, sell for £10. Complete conversion, still boxed as new. Tel: Mark on 0472

695906 Watford DFS ROM for sale, complete Watford DFS ROM for sale, complete with Watford disk filing system manual, 2:22. Tel: 041-636 1239 — Tony.
Brother HRS printer with RS232, many features, and including mains adaptor. Ideal for BBC, QL. Spectrum etc. Only £120 ono. Tel: 0325-312417.
EPROMS—2764 (8K). Ten unused, only £65. Suitable for BBC. Tel: Julian on 427-28393.

0423 68383. Wanted: about six "Disk bank" Inmac "Floppy Manager" 5.25in disk boxes. Tel: Keith on 021-328 6853. Video Genie expander EG 3014. Gives full 48K user RAM. Also printer and

full 48K user RAM. Also printer and disk interface. S100 bus. £85. Tel: Winchester 0962 880312. Swap Cheetah R.A.T. infra-red joystick and interface for Quickshot II or Wild

joystick + interface. Tel: 01-341 3355

Box of ten unused 5.25in blank disks. Single sided, double density. Un-wanted gift, accept £12.75 the lot. Could post if necessary. Tel: 0244 Epson MX-80 Type III printer, £150 o Also Apple parallel interface card £30. Tel: Tony 01-578 7704 (after 7pm). CT-90R semi-professional cassette deck ost £469. Boxed, perfect condition. Offered £215 by dealer, so swap for

computer + extras worth £250 or sell £250. Tel: 01-863 5113. Microvitec Cub monitor, model 1451 MS for BBC, cost £310 in July, medium resolution, as new. £240. Tel: Basingetoke 51623

Juki 6100 daisy wheel printer. Immacu-late condition with BBC cable, boxed. £295 ono. Prism 1000 modem software and BBC cable, £50 ono. Tel: 0227

and BBC cable. £50 ono. Tel: 0227 75110 (Kent). Solidisc 32K for sale, complete with manual and software £45. Cheetah Sweet Talker speech upgrade for the BBC £18. Tel: 041-636 1239 — Tony.

Sinclair ZX81 16K, plus full travel D.K. Tronics

keyboard and two software titles. Good condition, £45 ono. Tel: 01-854 0129 evenings.

ZX Spectrum 6 months guarantee £75.

Also six games tapes £20. Tel: 01-205

6919 Swap Spectrum 48K, Interface 1. Microd-

Swap Spectrum 488, Internace 1, anterou-rive, 4 cartridges, software, dust cover; (Spectrum under guarantee). For Commodore 64 with c2n unit. Tel: 01-907 1204 (Douglas). 488 Spectrum, £750 software, books, magazines and cassette recorder sell for £350 ono. Write to S. Reyal, 33

Ealing Park Mansions, South Ealing Road, London W5 4QH. Sinclair Spectrum 48K with nine original games. As new. With magazines and

tape recorder. £140 ono Steve. 12 Church Street, Tranent, East Lothian, Scotland Wanted. Private buyer requires cheap

48K Spectrum would consider a dam aged one. Tel: 01-855 5585. A Spectrum programmable joystick inter-face for only £16? impossible but true! Stonechip programmable joystick in-terface, boxed and full instructions, excellent condition. Tel: 027-785 291

after 5pm. 48K Spectrum + £180 software + £50 books + reliable cassette deck + j/stick Here to the control of the control o

48K Spectrum and software with Interface one and Microdrive including two

lace one and Microdrive including two cartridges. Might split. £180 Tel: Warefield 255894 after 6pm. 48K Spectrum with Fuller FDS keyboard Currah Speech joystick with Kempston interface and sound amp software £250. Flat 7, 18 Victoria Park, Dover, Kent.

Spectrum 48K wanted: and/or interface one and/or Microdrive, half price offered. Tel: (daytime) 051 424 5558. Wanted Spectrum faulty or broken, no guarantee needed, for educational eriment Sensible price. Tel: 01-250 experiment Sens 1930 ask for Joe.

Sinclair Spectrum 48K with tape deck and Kempston interface and joystick £70 of software, books manuals, leads £140 ono. Tel: 061 881 1144

Spectrum software large selection sell or swap. Send s.a.e. for list. Wanted any Spectrum hardware. Mr Rooney, 7 Redhill Ave, Southdene, Kirkby, Liverpool Lancs.

Liverpool Lancs.

Spectrum games: Colditz, Apocalypse,
Voice Chess, P1-eyed, Olympimania, I
Ching, Firetop Mountain, £3 each or
swap for CBM64 software. Tel: 0946-

Spectrum 48K data recorder joystick interface and joystick, over £70 worth of software, swap for Atari 600XL or 800XL and recorder with games joy-stick. Tel: 061-881 1144.

Spectrum 48K two months old complete with its own guarantee and many games including Fighter Pilot, Hobbit, £100 the lot. Tel: 01-733 6827.

48K Spectrum, interface I. Microdrive and 2 cartridges, Printer, Currah Speech, Interface II, joystick, 2 roms, 12 original games, cassette recorder, plus all leads and manual. Tel: (0803) 215163 worth £500 + sell £350. ono.

QL. Swap (latest version plus 12 cartridges, leads, manual, Psion chess) swap for B.B.C. Model B and disk drive — C. Richardson 32 Abbeydale Oval, Leeds. Tel: (0532) 590101.

Spectrum 48K software Valhalla £4, ZZOOM £3, 4D Terror-Daktyll £2. Psst £3, Tank Trax £1.50 The lot for £10. Tel: Ing 352661 ZX81, 16K, good condition with manual.

mastering machine code, softwares includes chess, 3-D Monster, Star trail etc. £40 ono. Tel: 01-993 6026 evening after 8pm and weekend. um 48K with full-size keyboard,

all in metal case, video monitor output, books, software, manuals, leads, customised case, superb. £140. Tel: Howard, Margate 0843 295284, anytime.

ectrum software 350 titles send your list of games and adventures solved to: Allan Hern, 19 Alum Chine Road, Westbourne, Bournemouth, 16K Spectrum 32K Rampack, Dustcov

er, original software, machine code book, and magazines, must sell, good offer over £100. Tel: Mark Asteris on Emsworth 5897 Spectrum 48K. Lo-Profile keyboard, 53

keys. As new/original package — £40. L.A. Davies, 44 Daventry Close, Mick-leover, Derby DE3 5QT.

Others

Employer Wanted, graduate business studies. Diploma in computing. Also Dip. office management seeks re-levant vacancy. Also possess 3-yr. Book-keeping experience. Tel: 01-686 2041 Mik

Unwanted Prize: Memorey turin-pack IS2D-40 Flexi-disks Welcome offer from someone who uses?? Postal replies only: sae's appreciated Charles Trager, 7, Grantley Street, Glasgow G4I 3PT.

G413PT.

E62000 colour Genie 32K plus cassette recorder with leads and manuals, users group mags and books, plus software Kong, Skramble etc. £130.

Tel: Leeds 497840, after 5pm.

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completed form to: Billboard, Personal Computer News, 62 Oxford Street, London W1A 2HG.
Note that we cannot guarantee that your ad appears in any specific issue, and that we cannot accept ads from commercial organisations of any sort. Your name.
Address:
Telephone:



Sinclair delivery promises have always been good for a laugh (as long as you aren't on the receiving end), and the official Spectrum upgrade is no exception. There are two possibilities: either you perform the upgrade yourself from a kit, or you send your Spectrum to Sinclair and let the experts deal with it. If you do the job yourself you're asked to allow 28 days for delivery; but if you opt for the full upgrade service you'll get the machine back in 10 days.

This is almost inexplicable why should it take 2.8 times as long to put a box of components into the post as it does to put them together in an upgraded machine? PCN's team of experts has the answer. To get your kit of parts Sinclair's

by Mollusc

I'm having a love affair over the

O 000000

experts have to dismantle a | completed Spectrum Plus.

Commodore Arch-rival avoids this kind of trouble by producing totally incompati-ble, non-upgradable machines; but that's on the home side.

The company is a little overexcited about its new PC-compatible machine. This, it announces, is 'the first stage in its declared offensive on the UK business systems market'. Taken literally, this is non-sense, of course; but is it possible that the 'declared' refers to something else? Our Cricket Correspondent Christopher

Martin-Bormann reports: On a day full of early promise and a wicket as even as an executive desktop, the Commodore innings opened smoothly with the 4032 and 4096 seeing off the new balls. After steady but unspectacular progress, during which the 4032 was dropped several times in the gulley, it was replaced at the

crease by the 8000 series. But disaster struck the Commodore middle order. The first 8000 was dismissed after many deliveries but few runs, the 500 broke down during the drinks interval, and the 700 retired hurt after blow upon blow to its Porsche-style box.

'The incoming 8096 stopped the rot, and the 700 pluckily came back, but had to retire again after a particularly unpleasant delivery. The Commodore captain finally declared the innings closed, to spare the gritty 700 further punishment.

LAUGHLINE — The response to the

HRH Princess Anne Laughline com-

petition was muted but respectful.

Nobody mentioned corgis, horses, or importunate journalists, but there

was a touch of topicality about the

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SYNTAX ERRORS

Sometimes it takes a while to get the hang of the yearly change-over, so we hope you'll excuse our lapse in last week's View from the US. Where we said that there should be 1.5 million computer-related jobs by 1955, it should have read

Anyone who tried the BBC double size characters routine in Microwaves, issue 93, will have come across the problem that the machine tends to turn the display off in line 20. This is due to the two-colour limitation of Mode 0. Change the line to: PROCdouble (23,1,1,"DOUBLE HEIGHT IN MODE o") and you should be in the pink.

Memotech owners will have noticed that our Output article (issue 87) promised more than it could deliver. Due to circumstances beyond our control, the listing to produce the logo mentioned in the text was not printed. Normal service will be resumed in a future issue, when we faithfully undertake to publish the missing listing.

Two weeks ago, we printed' the wrong telephone number for Thurnall Electronics. The correct number is 061-775 7922, or alternatively you could try 061-775 4461.

winner. We discounted Tony Mayne's 'Might One's fingernails get caught between the keys . . . ' on the grounds that it went on too long, and settled instead on Donald Grant of Edinburgh's terse, economical: 'When is the christening?' Donald wins £20. Who the computer at with

NEXT WEEK

Sharp patrol Can Sharp make the breakthrough into British businesses with its MZ5600? We find out how much of an edge it has.

Karma Koala Transform your Koala graphics tablet into a handy extra func-

			tions unit.
		PCN DATELINES	
Event	Dates	Venue	Organisers
What is artificial intelligence? Ten weekly meetings.	From Jan 15	City University, London	B Zanditon, 01-253 4399 ext 3268/9
Which Computer? Show	Jan 15-18	NEC, Birmingham	Clapp & Poliak 01-891 5051
High Technology & Computers Education	Jan 23-26	Barbican, London	Computer Marketplace Exhibitions, 01-930 1612
Intl Microcomputer Fair	Jan 29-Feb 3	Frankfurt, Germany	Collins & Endres, 01-734 0543
Apricot & Sirius Computer Show	Feb 5-7	Kensington Town Hall, London	Paradox Group, 01-241 2354
ZX Microfair	Feb 9	Alexandra Palace, London	Mike Johnston, 01-801 9172
Intl trade show for home comps, software, etc — LET	Feb 17-19	Olympia, London	Turret-Wheatland, 0923-777000
Intl Computer Graphics User	Feb 19-21	Barbican, London	Mountbuild, 01-486 1951 Show and Conference.
MEXCOM	Feb 25-28	Mexico City, Mexico	AESI Ltd, 01-379 7628
PC Trade Show	Feb 26-28	Barbican, London	EMAP Intl. Exhibitions, 01-837 3699
Computer Conference and Exhibition — INTERFACE	March 4-7	Atlanta, USA	Interface Group, 300 First Avenue, Needham Mass 02194

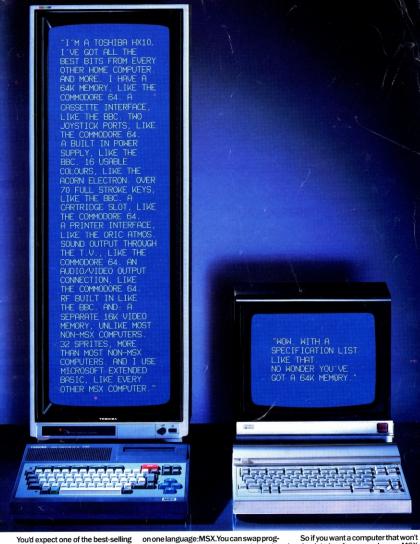
EMBOURD — INVESTA ALE

MASS 02/194

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You'd expect one of the best-selling home computers in Japan to have a specification list as big as its memory. But the Toshiba HX10 doesn't just

limit itself to that. It was developed along with other Japanese home computers to operate on one language: MSX. You can swap programs, games, cassettes, even peripherals like disk drives, printers, and joysticks: they're all compatible with every other MSX computer.

All of which makes MSX the system of the future.

so if you want a computer that won't be obsolete in a few years, buy an MSX. If you want one of the best-selling MSX computers in Japan, buy aToshiba HX10.

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MAY WICO BE WITH YOU



arcade quality goes into the Wicos you take home.

Wico* joysticks work directly with the Commodore 64,™ Vic 20,™ all Atari® Home Computers and Atari® Video Games.

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Ask your dealer to let you handle a Wico.* Quality (you'll find) costs money.

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IN THE KNOWN UNIVERSE

