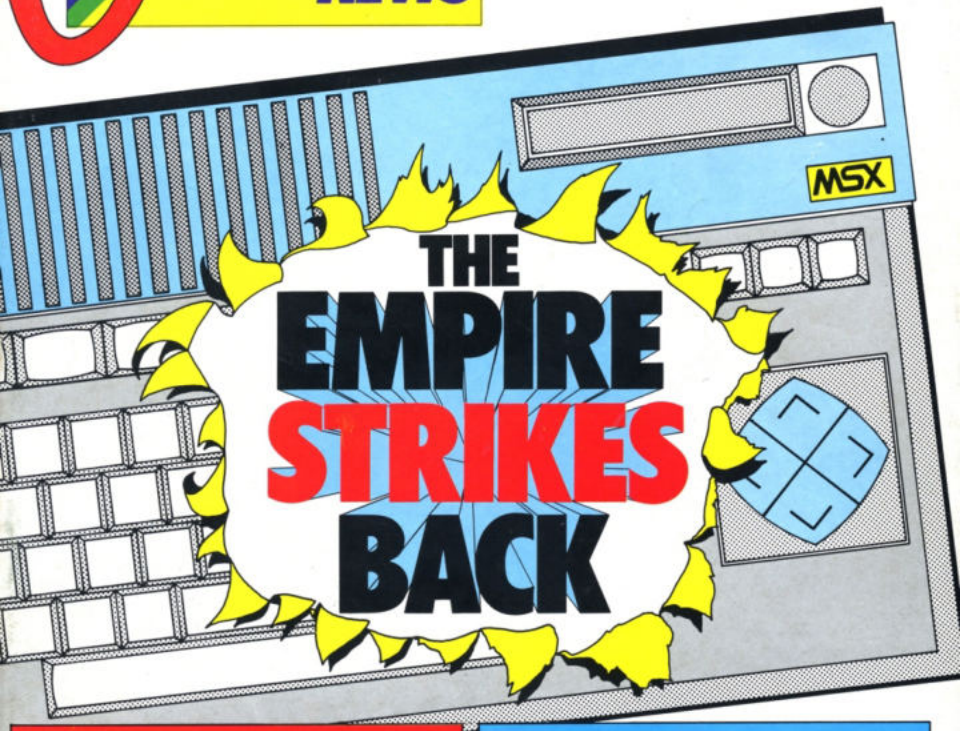
40p EVERY WEEK · No 105 · MAR 30 1985

PERSONAL Computer NEWS

DIY
New series: Build your own hardware

BRITAIN FIGHTS MSX CHALLENGE



THE EMPIRE STRIKES BACK

ZX COMMUNICATIONS

MUSICAL MACINTOSH

64 & AMSTRAD GAMES

HACKER'S HANDBOOK Pt 2

THE FORCES OF LIGHT & DARK BATTLE IT OUT IN

ARCHON

THE ULTIMATE ACTION & STRATEGY PROGRAM FOR YOUR CBM 64

NOMINATED FOR BRITISH MICRO COMPUTING AWARDS 1985

OUT NOW ON CASSETTE AND DISK

THE U.S. TOP 10 HIT THAT BECAME A CULT



STAR GAME

ARCHON is brilliant. There's something in it for all games addicts; arcade, adventure and strategy are all here. My only complaint is that it's best played against a human opponent – the computer's just too good and you can't give it a handicap.

Bryan Skinner
Personal Computer News

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Personal Computer News HIT!

Features ● Play the computer or a friend ● Computer player gets tougher as you do ● 64 Battle combinations ● Separate battleground screen ● Medieval pieces like the wizard and the sorceress – magic spells and a board that changes as you play ● Deluxe boxed package includes full instruction and hints manual ● Joystick controlled

ariola soft

HIGH PERFORMANCE PROGRAMS

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MENU

COVER STORY

UK v Japan Ltd 2

With the best of the Japanese MSX standard still to come, the UK manufacturers are moving to meet the threat. Shielded by the armour-plating of the Think Tank, a secret committee has been meeting since last September to work out Britain's response. Read about it first in *PCN*.



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Hacker's Handbook 20

Now you've got your modem, software and micro, what can you do with them? Part two of our extract from The Hacker's Handbook talks about which computers will talk to yours.

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Communications software takes your Spectrum a step up the ladder.

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MONITOR



IBM axes Jr as competitors quake

IBM's flirtation with home computing has come to an end with the sudden death of the ill-fated PC Jr.

The multinational computer supplier said last week that it will stop making Juniors in April. US analysts estimate that it has about 100,000 units in its warehouses and these will be steadily sold off. IBM has promised to carry on producing PC Jr add-ons — cartridge software, memory expansions, and peripherals.

But it has given no indication at all of what led it to pull out of the home market, dropping a machine that is barely 18 months old. Nor will it talk about developments to the PC line. Oddly enough, the passing of the PC Jr could spell even more trouble for IBM's hard-pressed rivals.

On the face of it, IBM's withdrawal of the Jr should help sales of the Apple II line; but reports from the US towards the end of last year and in the first months of 1985 showed that the re-vamped and re-priced Jr was damaging Apple's sales. With 100,000 or more Jrs about to hit the market, possibly even cheaper for a quick sale, the II series will be under more pressure. IBM may be pulling out of production but its guarantees of continued support should be worth more than the average micro manufacturer's.

The Jr had also begun to nibble at sales of the IBM PC itself. Its removal from the scene could herald a price cut to the PC as the prelude to the widely rumoured PC II. An IBM spokeswoman scoffed heartily at this speculation last week, but Apple with the Macintosh and Old Uncle Tom Cobbley and all with their PC lookalikes won't be reassured.

The straightforward explanation, that the Jr was a flop and IBM decided to cut its losses, cuts very little ice. IBM can stand a loss better than any other computer supplier and it can spot a strategic gain as well as most. It has also shown a marked reluctance in the past to admit to a flop.

But the Jr never came near to justifying the hysteria that its approach generated in the lead up to Christmas 1983. Peanut fever (Peanut was its code name) swept the US as otherwise sensible people waited with bated breath for the launch of IBM's home micro. But the actual system was a disappointment. Business users said it lacked power, typists hated the chiclets keyboard and everybody agreed that it was ludicrously over-priced.

When the price came down from $1,269 to $800 (with a real keyboard, a colour monitor, more memory, and $200 of software thrown in) the Jr at last began to make an impact. But this was only four months ago, and its days were already numbered.

The PC Jr never made it across the Atlantic to the UK and it will not be mourned here. Its death is one in the eye for IBM, but it could be worse news for everybody else trying for the same sort of market.

Psion patches up QL's speed problems

When is a document a long one? When it's over 32,767 characters, according to Psion.

That's about five and a half thousand words, and as much as version 2.0 of the Quill will let you save. Try saving a longer piece of text, *eg* merging documents, and you could end up with a hung QL.

Psion blames QDOS for not behaving as the manual states. Apparently the new, faster saving routine upsets SOS (Sinclair Operating System), but fear not, a patch is on its way. The patch restores Quill 2.0's slow saving speed, so when you most need speed you can't have it. Archive now suffers from similar problem.

Sinclair has little to say on the subject, other than that one shouldn't expect too much from a £100 word processor. 'It was not designed to be a mega word processor,' said a spokesman.

Sinclair's latest press release for Xchange ends: 'Version 2.0 programs reflect the style and functionality of the individual modules of Psion's business software.' Shouldn't that read 'small business'?

```
10 a=RESPR(55*1024)
20 b=15584+a
30 PRINT "Loading....";LBYTES mdv1_quill,a
40 IF PEEK_W (b)<>20154 OR PEEK_W (b+2)<>2192 THEN GOTO 90
50 POKE_W b+20091;POKE_W b+2,20081
60 PRINT "Saving...";:DELETE mdv1_quill:SEXEC mdv1_quill,a,
31760,1280
70 PRINT "Finished":STOP
80 PRINT "Wrong Version - This patch only works on QUILL 2.0"
```

Psion's patch — by kind permission of . . .

IN BRIEF

Sinclair distributor Terry Blood (TBD) is trying to bring sanity back to micro prices by offering dealers a guarantee that they won't lose out if prices plummet. The idea is to encourage dealers to carry more stock — it will apply to Spectrum Plus and QL systems.

Other manufacturers might find it too late for such protection. According to the UK's Aladdin's Cave of facts and figures, the National Computing Centre, nearly one third of the current crop of micro suppliers in the UK will have pulled out, one way or the other, before the end of the year.

It isn't *PCN*'s style to write obituaries, but we send our sympathy to Firebird Software after the tragic death of James Scoular last week. James was doing great things at Firebird and he'll be sorely missed. But the company is makig sure the show goes on by releasing a new budget range, the Lead Range, with a compilation tape of five of the worst games it's ever seen. Called *Don't Buy This* it costs £2.50 for the 48K Spectrum. 'They are really awful,' said a spokesman, bravely.

Ocean is getting some familiar titles into the Amstrad format and the games should be ready to go into shops by the time you read this. The names to look out for are *Daley Thompson's Decathlon*, *Kong Strikes Back*, and *Hunchback II*. More are due to follow.

Saga Systems, supplier of add-on Spectrum keyboards, is taking the Spectrum Plus in its stride. 'The Plus is only credible as a business machine when used with our keyboard,' said director David White. Saga (04862-69527) has cut the price of its box to £49.95.

RAMpack veteran Stonechip Electronics (0252-333362) has managed to turn the Commodore 16 into the C32 with a plug-in unit called the Vixen 16. It is self-contained, requiring no additional connections or power supply, and is available now for £34.95.

Enterprise-starved citizens around the country may not believe it, but the machines are well on their way to full production, according to marketing manager Michael Shirley. Software is also coming out at the rate of eight titles a month, he added. The company still aims to grab 10 per cent of the market — more than 150,000 machines sold — by the end of the year.

UK industry moves to take on Japanese

The Government and the UK micro industry have joined forces to meet the threat of the Japanese MSX standard.

Under the wing of the National Economic Development Corporation (NEDC) a committee of UK manufacturers has been formed to create a home-grown alternative to MSX.

The committee was formed secretly last September and its meetings have taken place behind hermetically sealed door. The NEDC's co-ordinator refused to talk about it last week, and members were equally difficult to pin down. Incommunicado, in Cambridge, or inclined to maintain the cloak of secrecy, nobody involved would discuss the committee's work.

MSX at the moment is more of a nuisance than a menace and Government committees are usually a prelude to inaction, but the NEDC is taking MSX very seriously. The section of the NEDC playing host to the committee is the consumer electronics department, and it is certain that the committee is looking at MSX in the widest sense, beyond the existing home micro implementation.

MSX is intended eventually to go into domestic appliances of all kinds as a versatile controlling intelligence. It is in this context that it might threaten UK suppliers who, in home computers, show every sign of going on paddling their own canoes. In the best traditions of Cambridge, some of these canoes have already gone into the dolphin effect and others are finding barges littering their paths.

The involvement of Acorn's Chris Curry on the committee is crucial. Acorn is looking forward to a future for home computers in control applications, and Curry has been preaching this gospel for several months.

'Stories about home computers being a passing craze must be proved wrong,' he said to *PCN* in August last year. 'It is now time to start showing that where they can perform tasks . . . they will only become an essential part of the home if they do practical things.'

More to the immediate point, he was warning last summer that UK manufacturers had to work together to produce a standard interface for their home machines. 'One way to stop the growing interest in MSX is to make sure there is a level of compatibility between products,' he said.

Since then, interest in MSX has wavered and UK manufacturers have shown no inclination to work together. A standard interface of the kind produced formerly by ITL Kathmill is still a possibility, but compatibility at the more fundamental level of operating systems is out of the question.

The other option for the committee in theory concerns future systems — but the absence of Amstrad and Enterprise from the committee's ranks suggests strongly that it isn't talking about micros in the usual sense of home entertainment machines. The absence of Amstrad from the committee is odd in itself — Amstrad probably has more experience of consumer electronics than the rest of the UK micro industry put together. Alan Sugar, offered the opportunity to put the boot into the NEDC for this oversight, politely declined.

Another significant omission from the committee's membership roll is Digital Research. DR might be disqualified on the grounds that it is American — but Microsoft's nationality didn't deter the designers of MSX. DR's Gary Killdall is another long-time champion of the 'useful home micros' lobby and the company itself is very active in the UK — witness its developing association with ACT. It would form a useful counterbalance to Microsoft.

The committee's cloak-and-dagger approach is in marked contrast to the MSX cadre. The Japanese (and Microsoft) have been completely open about their business, publishing details and papers with the abandon of academics pursuing a professorship.

Invaders stumble at the first hurdle

The history of the original MSX could be viewed as a cautionary tale for British manufacturers trying to achieve standardisation.

MSX was announced nearly two years ago, but although the machines have been available in Japan for well over a year, the flower of Japan's electronics industry failed to achieve anything like the penetration of the UK market it aimed for.

The machines were intended to use standardisation to carve but a significant slice of the market last Christmas, but in the event only a few tens of thousand machines were sold, with Toshiba taking the lion's share. Many of the manufacturers failed to get more than a few hundred machines into the country.

But for all that, the Japanese companies aren't liable to go away. In the aftermath of Christmas '84 the companies were talking about Christmas '85 being the big one, with large quantities of MSX machines on sale for £150.

This would be MSX version one, but if the new Ataris appear as promised it's likely that an attempt will be made to leap-frog to the MSX version two standard. The next version of MSX could be a lot more dangerous.

It will be based around a 16 or 32-bit processor, probably a custom chip incorporating a Z80, and giving the new machines compatibility with the earlier versions. If the MSX companies do jump this way, and jump early, the battle will be fought by 16/32-bit machines.



MONITOR

Domino theory takes another victim

Fall-out from the Oric and Prism collapses has claimed another victim. OE Ltd (OEL) has gone into receivership and the chances of the company being saved look slim.

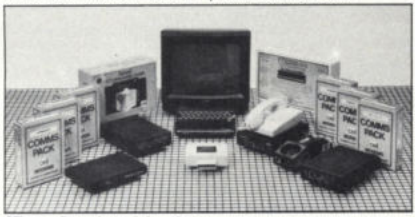
OEL first came to prominence as the designer and builder of Prism's VTX5000 modem, which won the Peripheral of the Year award last year. OEL also builds communications products for a variety of other micros, and recently produced units for the QL.

But the problems of other companies took their toll as the UK micro industry went into the doldrums earlier this year. 'We had a loss of revenue due to the Prism contract being withdrawn,' said OEL chief Martin Amsell, 'and there were bad debts from that and Oric. In January we were, as a company, insolvent.

'The company has a lot of potential but it has no time,' he said. 'If we had weeks rather than days we'd have a chance. There have been quite a few interested parties, but time is of the essence if somebody is to pick the company up whole.'

Modem House, which is on the verge of acquiring manufacturing rights to the Prism products from that company's receiver, is a possible purchaser. Sinclair could also have an interest in seeing OEL survive, as would Case, the big communications company for which OEL is producing a unit called the Hacker Cracker.

But in the long term, companies like OEL need financial backers who understand the industry. Its existing shareholders got the jitters at the crucial moment, Amsell said.



OEL — quality products, shaky outlets.

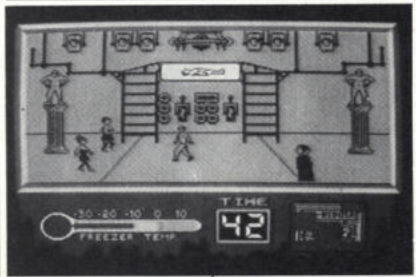
Byte Drive owners get salvation of sorts

Owners of ITL Byte Drive 500s need not despair, even though ITL has gone out of business (issue 104). Roland Beaumont (0634-713437) is taking over the back-up and maintenance of the machines.

As he is only doing the job part time, anyone with enquiries should phone him between 7 and 9 pm.

Owners who sent their machines to ITL for repair should have them back by now. John Melville, the ex-managing director, told *PCN*, everyone has either had their money back or their machines.

If you haven't, a receiver, Morris Dorrington (01-253 3266) has been appointed.



SHOCK HORROR — We've been less than kind about CRL's long-awaited Rocky Horror Show, mainly for lack of patience. But here at last is incontrovertible evidence that the show is on the road. CRL hopes to get the software into the shops in the next few days, but a spokeswoman admitted last week that there were still one or two adjustments to be made. It could be that the road will be a rocky one — watch this space.

HOMEFRONT



Chips famine — let them eat wafers

It looked different this time last year, but certainly chip famines would seem to be the least of the problems assailing British micro manufacturers. Aside from the silicon mountains in the machines in warehouses belonging to Sinclair, Acorn and sundry receivers, and the silicon mountains in the mountains (think about it), chip manufacturers are currently operating well below their full capacity.

For the record, the theory went something like this. British micro manufacturers led the world in terms of design, but the chips on which these designs were based were manufactured in Japan and the US. The Japanese were happy to sell chips to the British, but once the MSX machines cranked up production (cough) they'd suck up available capacity. The US already had volume micro production, so if the Japanese and the Americans turned up the juice a little the British micros would all die of chip starvation.

As you'll have noticed, it didn't happen, so the flower of Britain's micro industry can forget all about chip shortages, and concentrate on trying to get its surplus machines accepted for the Outer Mongolian Micros in Schools project, right? Wrong.

The crunch could come through a general chip shortage, or it could come through a shortfall of a specific grade of wonder chip. Say the next quantum leap arrives, Jack Tramiel and the MSX companies grab it with both hands (tentacles in Jack's case), and there's nothing left over for anybody else. Where will that leave Britain?

If previous track record is anything to go on we'll all be wondering where we left that Transputer prototype, whistling to keep our spirits up and polishing a dusty old Z80 to see if a genie pops out.

Fortunately, there is a bright side in the shape of monetarism's favourite knight. Viewed in a certain light Sir Clive's plans for a UK-built super-chip might seem to be taking him dangerously close to the territory now occupied by Sir Freddie Laker, who is no longer monetarism's favourite knight, for various and well-documented reasons.

The Americans, in the shape of Gene Amdahl and his Trilogy project, have tried to build a super computer based on wafer scale integration, and have failed. And if those devilishly cunning Japanese haven't cracked it yet, how can Clive and a mere £50 million reckon to do it? Is Sinclair Research doomed to founder on rocks consisting of microscopic, but unfortunately slightly flawed, pieces of silicon?

As far as doing it is concerned, we only have Sir Clive's word that he can, and he has a well-documented and vivid imagination. But as matters stand, there is no chance of the WSI project turning into a black hole into which Sinclair will vanish. Furthermore, whether he can do it or not isn't exactly the point.

Take another look at how the project is to be structured. Sinclair Research has invested £1million into research and development, squirreled away a number of patents, and produced (or is about to produce) a working, if rudimentary, prototype. But the money for the plant is being raised by ICL's Robb Wilmot, who is heading up a new company distinct from Sinclair Research. It needn't cost Sinclair anything.

Even if the plans for 7Mb of RAM on a 4in disk of silicon are overambitious, the plant could still be used to produce more cost-effective versions of the QL disk we'll see later this year and, more important, it will provide a sorely needed chip manufacturing facility in the UK, and under UK management. In the long term, the success of this needn't be tied to Wafer Scale Integration.

As far as Sir Clive is concerned, success will be exceedingly good news, and he'll make a bigger fortune. If it fails, he won't miss the odd million, and it won't have set back Sinclair Research appreciably.

Which brings us to our punch line. Sir Clive has a reputation as a risk taker, and the successful manufacture of cheap mass storage will no doubt enhance this reputation. But it's clear from the way the project is structured that the risk involved is, for him, minimal. Effectively he can have his cake and eat it.

So maybe it's not just the Japanese who are devilishly cunning . . .

John Lettice

MONITOR

Lynx leaps back into the computer arena

The Lynx is off the endangered species list and to judge from last week's Lynx User Show in Birmingham it's getting the most attentive of intensive care.

Owners of the 48K and 96K models of the ex-Camputers home micro have put their heads together to give all Lynx users something to look forward to, and the first results of this self-help movement were on view at the show.

There was a full RS423 interface, a sideways ROM unit, a trackerball, a prototype speech synthesiser, and a range of brand new software to run under CP/M.

This is only the beginning. In the pipeline are a re-hashed Basic ROM, a user-defined scroll routine, an advanced technical manual, and various graphics developments. Some may be seen in London in the summer — the User Group (contact RB Jones, 209 Kenton Lane, Kenton, Middlesex) plans another show later in the year.

'The main aim at the moment is to get everything on a very sound business footing,' said Jones. With Anston Technologies concentrating on the 128K model, his group has permission to develop the smaller Lynxes on a kind of co-operative basis and the approach is working well. 'By releasing circuit diagrams over the last three months we've got more interfaces and add-ons than Camputers ever produced,' he said.

Each member of the group is sent a questionnaire, so that Jones can pin-point their strengths in various areas. The most ambitious project involves the Lynx's graphics — 'the Lynx has enormous untapped potential buried in its depths,' Jones said. 'We're attacking the video side very heavily.'

Specialist side to Organiser revealed

Less than a year after its release, Psion's Organiser has found a home in the pockets of specialists. Software launched last week, makes the 'world's first practical pocket computer' less of an overblown calculator.

The new products include Medipak, a drug enquiry system for non-specialist staff, which holds data on 750 brand name drugs and can search for generic names and symptoms etc, with wild-card matching.

The Wessex Material Computer is a materals-costing package for the construction industry. Given dimensions, materials and prices, it calculates material overheads.

Peripherals for existing Organisers include bar-code and credit card readers, RS232 communication and 32K packs.

Psion has also produced a credit car validation scheme for Marks and Spencer, which has bought 3,700 modified Organisers. ROM cartridges will contain numbers of invalid or overdrawn cards.

For third parties, Psion is offering a Forth development system for IBM PCs, with training and technical back-up included in the £500 price tag.

Could Psion be moving away from Sinclair? A spokesman denied this, but the Organiser contracts announced totalled 'well in excess of £1m'; Psion claims to have sold 2,000 Organisers in the eight months following its release, and production is running at 3,000 units per month.



POSITIVE CHARGE — Faith in the Acorn Electron waxes strong in Cumana's breast — the disk specialist, which became an Electron distributor just before Acorn ran aground, has now released an alternative disk interface for the same machine. The unit plugs into an Electron Plus-One expansion module, and you can use it with either 5.25in or 3.5in disk drives and 40 or 80 track disks. There are utilities supplied with the device to let you copy files between Cumana and Acorn DFS systems, with other options available. The interface costs £149.

VIEW FROM THE US



Micro-builders go where eagles dare

Since the bald eagle fiasco at last summer's Olympics, birds of prey have been hiding out in the hills. But along Wall Street in the last couple of weeks the vultures have been gathering.

The wires from the West Coast have been humming with tales of woe. California, land of sun, sea and silicon, is feeling the chill, and its most famous garage proprietor, Apple Computer, plans to close its production plants for a week to compensate for slow-moving stock. Systems, that is; its stock on Wall Street has been moving far too fast for comfort.

Then came the reports that Commodore might record a loss of $12-$15 million this quarter. Its shares responded by hitting a new all-time low.

There is even a note of uncertainty from Atari, where ebullience has been the order of the day since Jack Tramiel took over. Under normal conditions the news of alternative operating systems for its new ranges would be looked on as a sign Jack has all the angles covered — but with nerves frayed as they are at the moment it could indicate that TOS (Tramiel Operating System) isn't as complete as they'd like you to believe. One of the alternatives, incidentally, is called Jason — is that shorthand for Jack's son, or does it mean that Atari is about to perpetrate a Golden Fleece?

In the heavyweight division, the title fight matching Apple with IBM looks like going the distance, despite Apple's recent tendency to walk into haymakers. IBM, moving with its usual leaden footwork, has shocked everybody by pulling the plug on the PC Jr, while at the top of its range it still can't guarantee deliveries of the PC AT.

In a market where 'integration' is the key word, IBM's PC line looks in serious danger of disintegrating, but IBM should be able to tack back together.

Apple's problems have more to do with credibility than technology. It has to persuade corporate America that it is a serious contender, and it has to sell Macintoshes to people with IBM engraved in their memories. Last week brought news of two kinds for Apple to digest: on the plus side, it started shipping the communications products that will turn the Mac into the MacNode, a genuine component in the communicating office — but the sour note came from Lotus, which admitted that Jazz was going to be late.

Jazz, sometimes called MacSymphony (or MacPhony for short), will not be available for the Macintosh for another month or two. This hurts Apple in more ways than one — US software houses seem to be holding off launching products for the Mac until they've had a look at Jazz.

Commodore and Atari by comparison are in the middleweight division (Marvin Hagler and Jack Tramiel, now there would be a match) and they have reached a stand-off. Atari's STs are due to reach the stores inside two months; Commodore's Amiga could be there by June.

Until then they pace around the ropes, flexing what muscles they have left. Commodore's flab has become plain for all to see — it has to keep selling 64s without spoiling the market for the 128, launched at Las Vegas in January. It has to take the Amiga from the working prototype stage to full production in about two months.

Finally, it has to allay fears that the LCD, also launched at Vegas, won't turn into another bald eagle. The LCD has been 'temporarily' put on ice, and that isn't an unusual way of testing its performance in adverse environments.

Wall Street has responded to all this in the patient, tolerant fashion that marks most of its high tech dealings. Commodore shares fell to a new low. At the same time it was learned that the company had $450 million's worth of inventory at the end of last year, and that its long-term debt was swollen to $147.3 million.

So the stage is set once more for Jack Tramiel, who could easily be a symbol of US enterprise — and not only because he's predatory and lacks hair. Jack isn't likely to fluff his entrance or, worse, die in the first scenes.

The real interest, though, is what sort of shape the US micro builders will be in later in the year as the Christmas rush approaches, and what sort of systems high income America is buying. Atari and Commodore are both moving towards systems that will insulate them against the marked seasonal ups and downs of the old t-aditional business — but the signs are that nobody will be suffering from another common bald eagle ailment, vertigo.

Andy Kowalski

CHARTS

GAMES

TW	LW	TITLE	PUBLISHER	MACHINE	PRICE
1	1	Softaid	Softaid	SP, C64	£4.99
2	3	Alien 8	Ultimate	SP	£9.95
3	4	Raid over Moscow	US Gold	SP,C64,AT	£9.95
4	—	Bruce Lee	US Gold	SP,C64,AT	£9.95
5	2	Ghostbusters	Activision	SP,C64	£10.00
6	8	Emerald Isle	Level 9	Various	£6.95
7	6	Everyone's a Wally	Micro-Gen	SP	£9.95
8	10	Impossible Mission	CBS/Epyx	C64	£9.95
9	7	Castle Quest	Micropower	AC	£12.95
10	19	Monty is Innocent	Gremlin	SP	£6.95
11	15	Elite	Acornsoft	AC	£15.00
12	17	Football Manager	Adctive Games	Various	£5.95
13	—	Sorcery	Virgin	SP,C64,AM	£8.95
14	5	Technician Ted	Hewson	SP	£5.95
15	18	Pole Position	AtariSoft	SP,C64,AC	£9.95
16	16	Brian Bloodaxe	Edge	SP	£7.95
17	—	Airwolf	Elite	SP,C64,AM	£6.95
18	12	Zaxxon	US Gold	SP,C64,AT	£9.95
19	11	Match Day	Ocean	SP	£6.90
20	14	Knight Lore	Ultimate	SP	£9.95

SPECTRUM

TW	TITLE	PRICE
1	Softaid	£4.99
2	Alien 8	£9.95
3	Bruce Lee	£9.95
4	Everyone's a Wally	£9.95
5	Raid over Moscow	£9.95
6	Ghostbusters	£9.99
7	Monty is Innocent	£6.95
8	Technician Ted	£5.95
9	Brian Bloodaxe	£7.95
10	Match Day	£6.90

COMMODORE

TW	TITLE	PRICE
1	Softaid	£4.99
2	Impossible Mission	£9.95
3	Pole Position	£9.95
4	SlapShot	£8.95
5	Ghostbusters	£10.90
6	Buck Rogers	£9.95
7	Emerald Isle	£6.95
8	Super Huey	£9.95
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MICROS

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4	Amstrad	£349
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7	CBM16	£140
8	MSX (series)	£250
9	Memotech	£250
10	Einstein	£500

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4	Olivetti M24	£1,595
5	DEC Rainbow	£2,359
6	Ericcson PC	£2,095
7	Macintosh	£1,795
8	Wang Professional	£3,076
9	Televideo TS 1603	£2,640
10	Columbia PC	£2,065

These charts are compiled from both independent and multiple sources across the nation. They reflect what's happening in high streets during the week up to **March 21**. The games chart is updated every week. The prices quoted are for the no-frills model and include VAT. Information for the top-selling micros is culled from retailers and dealers throughout the country and is updated every month. PCN Charts are compiled exclusively for us by RAM/C, who can be contacted on 01-892 6596.

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RANDOM ACCESS



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

Amstrad owners — you've got it lucky

Several weeks ago in your magazine I read a letter from an Amstrad owner moaning about the lack of support from software houses for his machine. This really annoyed me — there are dozens of very good programs already available, and this level of support is many times greater than that for the Atari, Oric or Memotech micros.

As I recall, excepting English Software and Level 9, only one British software company has produced anything of quality for the Atari — Imagine with Leggit. I am still awaiting Ocean's Hunchback on Atari which was announced ages ago.

And another thing — why do Spectrum owners pay less than Commodore and Atari owners for US Gold conversions? Probably to compensate them for owning such an awful machine (I should know, I once owned one).

Chris Oakes,
Haywards Heath, W Sussex.

Minority micro user feels left out

I have been an avid reader of *PCN* since issue 1 and have read the various attacks on your own and other magazines, by owners of micros which have succumbed to the pressures of the market place. Until now I have been disinclined to enter the affray, even in defence of my beloved Dragon.

However I feel I must now interpose particularly on behalf of Dragon owners and other, especially British, micro owners, (eg Lynx, Oric, etc).

There are many hobby magazines which cater for those generally interested in the pastime without aligning themselves to one or two factions only. Take, for example, the sailing and fishing fraternities. The specialist groups all have their own magazines and the more popular have more specialist support, but the general interest periodicals still maintain impartiality, and provide support and interest for minority groups within the hobby.

So it should be with computing. The Spectrum has an enormous user base and therefore has more user magazines than the Dragon, but for you to answer all complaints such as mine, with 'We only print what we receive from readers and suppliers', is a cop-out, and a negation of your responsibility to the general computing public (made up of more non-Spectrum and non-C64 users than users of those two); otherwise change your name from Personal Computer News to Spectrum News.

After this week's copy of *PCN* (issue 103), I can find no justification in continuing to buy your magazine.

I think that the loss to both your circulation figures and the hobby as a whole is far greater than you imagine. I trust that future issues will correct the current imbalance, and that I and other disheartened computer afficionados will not have to abandon your otherwise excellent magazine.

C B Goldman,
Welwyn, Herts.
Like it or not, computing — unlike sailing or fishing — is a machine-specific hobby. As to issue 103, only six pages of the magazine featured Commodore 64 and Spectrum — the rest covered Apple, Atari, Amstrad, BBC and Electron — Ed.

BT rates don't fit Prestel bill

I wish to issue a warning to future modem owners who are interested in subscribing to Prestel. You may be in an area which cannot get Prestel at local call rate. It was only after I had subscribed that I found out that the whole country was not a local call rate.

I am now going to start a battle to fight for more local call access points because having contacted my telephone area office I was told that as British Telecom had been privatised it might now have trouble making remote areas local to Prestel.

If any other Prestel users who do not get the service at local call rate would like to contact me over Mailbox to exchange views on this, my Mailbox number is 0824 22531.

Robert Evans,
Ruthin, Clwyd.
While most of the country enjoys local call rates, some areas don't. Potential subscribers should check in advance — Ed.

Enterprise wins unlucky label

After following the progress of the Enterprise since its initial announcement, I am nominating Enterprise Computers as the most unlucky up-and-coming computer company ever.

Many things have contributed to a year-long delay: name changes rendering early advertising useless; the custom graphics chip which was very difficult to debug; and just when distribution had started, more problems.

The new distributors are Zappo Computers (??!!). A friendly Zappo lady, in a burst of helpfulness, offered to send me an Enterprise in three days, on receipt of a cheque. What worries me is that Enterprise has not yet launched an extensive advertising campaign, even though the machine is in the hands of the distributors — this caution may lead to low sales.

Zappo can be contacted on 05432-57817. They will probably be able to tell you where you can buy an Enterprise.

Andrew Ballingall,
Newcastle-upon-Tyne.
How much of the Enterprise saga was bad luck, and how much was blundering, is open to question. However, advertising has now started. Of more concern is the number of software houses working on Enterprise material — Ed.



Well at least *my* computer manufacturer is still in business!

The final word on the STZ

Let's sort out this STZ/R65C02 thing once and for all (R Brooksby, issue 99; various correspondents, issue 102).

1 The STZ opcode is termed an 'undocumented opcode', which means that the opcode has been left out of the official documentation because it was not 100 per cent reliable when the 6502 was launched. However, the bugs may well have been fixed and the opcode made reliable in later versions of the processor.

2 The CMOS 6502 (the R65C02) does have a STZ instruction along with a number of others. The processor is available as a drop-in replacement, and Mr Brooksby or anyone else with a 6502 based machine, should be able to change their processors for an R65C02 and use these new instructions. Anyone interested should contact:

Solidisk Technology,
17 Sweyne Avenue,
Southend-on-Sea,
Essex SS2 6JQ
(Tel: 0702-354674)

Solidisk sells the R65C02 for £12, including VAT, postage and packing.

Solidisk also does some software on disk which adds the new opcodes into the assembler on the BBC Micro.

I hope this clears up any discrepancies which may have come up over the past few weeks.

Simon N Taylor,
RCS Microsystems.

ROUTINE ENQUIRIES



Suffering from circuit crunch or data dyslexia? Want some sound advice on speech synthesis or the best type of printer? Then consult the experts. But remember, no SAEs, 'cos we can't reply personally. Address your queries to Routine Enquiries, *PCN*, Evelyn House, 62 Oxford Street, London W1A 2HG.

Going 'on line' with Interface 1

Q I own a 48K Spectrum, Interface 1 and Microdrives, and would like to go 'on line', but am told that the RS232 output from Interface 1 can't be used for communication via a modem, and most other RS232 interfaces won't work with Interface 1 connected.

I own a 300 baud modem but would like to be able to upgrade to a multi-mode modem in the future. Can you recommend an RS232 interface that will work with Interface 1 and communications software to drive it.

Keith Claydon, Wickford, Essex

A We don't know of any way to get Interface 1 going with a modem, basically because Interface 1 doesn't include a buffer, so you lose most of your data in comms. However, while Interface 1 can interfere with other peripherals, the Spectrum doesn't normally recognise its presence until you access it. You should therefore be able to use most RS232 interfaces provided you haven't accessed Interface 1 since switching on. Check this with your dealer first.

As far as specific interfaces are concerned we'd suggest you look at the Demon modem (see page 28), which will have a Spectrum interface developed for it shortly.

Handy address for Commodore tape user

Q One of your recent correspondents mentioned a product from Interceptor Micros called the azimuth head alignment tape for use with Commodore cassette units. Can you let me have the address of the firm?

A Gill, Bodmin, Cornwall.

A Sure thing: Interceptor inhabits Lindon House, The Green, Tadley, Hants.

Why is my program a bad driver?

Q As the owner of a Spectrum 48K I have just purchased a Wafadrive. Could you please tell me why a program should load and run perfectly well in drive A, but comes up with a 'bad sector' error every time on drive B?

K Sanby, Lincoln, Lincs

A Your problem sounds as if it's related to the heads of one of the drives being out of alignment or — less likely — speed variations between the two drives. Try saving a program on drive A then reloading it from drive B, then vice versa. If you can save a program on B and load it from drive B, and save one on A and load it from A, but can't switch between the two, it's almost certainly an alignment problem.

If this is the case you should be able to get the drive exchanged by your dealer.

Compiling a Pascal list for the 64

Q I want to program in Pascal on my Commodore 64 but I only know of two compilers — Oxford Pascal and Zoom Pascal. Are there any other Pascal compilers for the 64 and which is the best implementation?

B Short, Bailrigg, Lancaster

A We reviewed Oxford Pascal back in issue 68 in July last year. You can order a copy from *PCN* Back Issues, 53 Frith Street, London W1A 2HG.

There are two other Pascals available for the 64, from Orpheus and from 1st Publishing. We'll be carrying reviews of these two within the next few weeks.

One line gets Bruce on the road again

Q I have a problem with your Commodore 64 program, Bruce, published in issue 94. I get a syntax error in line 1 which reads:

TO 10: READ B: NEXT

This is obviously wrong but I'm not sure why.

G Donaldson, Westcliff-on-Sea, Essex.

A We published a correction for this in issue 96, but for those who missed it, line 1 should read:

FOR W = 1 TO 10: READ B: NEXT

Making a connection with an Atari printer

Q I wish to buy a low cost printer for my Atari 800XL. Unfortunately I have seen no reviews of Atari's own printers. How do they compare with other makes?

If I want a non-Atari printer, such as the Brother M-1009, how would I interface this to my computer and at what extra cost? Also, do you think that the current Atari printer range is likely to be subject to similar price reductions as the XL series of computers?

James Turner, Braunstone, Leicester.

A There is a slight problem involved in attaching a printer to an Atari computer. At the moment, there are basically three main printers for Atari machines: the 1020 colour printer plotter, the 1025 80-column dot matrix, and the 1027 letter quality printer.

The first is almost identical to Microperipherals' CCP-40, and the Tandy printer plotter — in fact all are the same machine with different cases.

The 1025 is a bog standard dot matrix printer. It is rather slow at 40 characters per second and only has a 5 by 7 dot matrix with no descenders. It will, however print all of the Atari characters and connects directly to the computer, with no interface required.

The 1027 provides the best quality print using a barrel similar to the golfball but with a cylinder instead). The print speed is slow, at 20cps, but faster than most daisy wheels. Again, connection is direct to the computer.

The most common second choice printer for Atari users is the Epson, or an Epson lookalike (such as the Brother M-1009). Unfortunately, you will need an interface and cable costing around £150. The advantages can outweigh the extra cost, as it gives increased flexibility with faster speed and better quality and the printer can be used with other machines if you ever decide to get rid of your Atari.

The prices of the current Atari printers could be forced down by the new range of cheap printers being launched with Atari's new machines.

The new XT, XM and XD will be a great deal cheaper and include dot matrix and daisy wheel models. The prices should range from £50 to £100.

Limited use for Amstrad monitor

Q Being thoroughly hooked on computers I now have a Spectrum Plus, Commodore 64 and an Amstrad with colour monitor. Is there any way I can use the Amstrad monitor with the other two computers? This would obviously be of great benefit but I have no idea of how to go about it.

Colin Smith, Boscombe, Dorset.

A Practically speaking, no you can't hook up the monitor with the Spectrum or the 64. Amstrad's monitor is an RGB model which neither of your other machines supports. They provide a different output signal called composite video.

One possible solution would be to buy a Commodore 1701 monitor and you should be able to make up a cable that will work with your Spectrum too.

Another alternative would be to invest in a small, cheap colour television. Although there is a noticable difference in quality between TVs and monitors, nether the 64 nor the Spectrum support sufficiently high resolution for the use of a TV to be a real problem.

Please SIR — my Osborne 1 won't work

Q Having purchased an Osborne 1 (single density) recently, I have been dismayed to find that SIR Computers, from whom I purchased it with a three months guarantee, has gone out of business.

The problem is that the format and copying program 'COPY' will not load and gives the error message 'BDOS error on A'. Second, the main Wordstar file WS. COM has disappeared from the disk, leaving all the overlays behind.

David Barlon, Nuneaton, Warks.

A This sounds more like a problem for either a disk head cleaner, or a service. Unless you have left your disks somewhere where they may have become corrupted, they are unlikely to be dead. It sounds as if they're not being read correctly.

Try reading the disks in drive B and if they work, copy them fast. If they don't, the disk are more than likely bust.

If you haven't got any backups, Micropro may replace your Wordstar disk free of charge (or at least a nominal charge), if you can provide proof of where, when, how, and why you bought it (it's always worth a try). The same may well apply to Digital Research who supply the CP/M system disks.

MICROWAVES



Send your hints and tips to Microwaves, *PCN* 62 Oxford Street, London W1A 2HG.

Highlight definitions on the Beeb

It can be difficult, when debugging programs, to find procedure and function definitions. My program gets around the problem by highlighting anything following a DEF command in Basic.

It works by intercepting the OSWRCH vector at &20E and redirecting it to the routine at &A00. The check for a DEF is performed in line 150 where the token &DD is looked for. If the word is DEF, a green colour code is printed before it. Note that this works only in Mode 7.

Once run, the program can be NEWed; programs can be listed with the f9 key.

Jonathan Temple, Beeston, Nottingham.

```
  5 MODE 7
 10FORCODE%=&A00TO&A2BE:[OPT2:LDA#&20:STA&20E:LDA#&0D:STA&20F:LDA#&A0:STA&210:LDA#&7E:STA&211:RTS
 30END
 40:
 50DEFPROCASSEMBLE
 60FOR PASS=0 TO 3 STEP 3
 70P%=&A00:FLAG=&74:COUNTER=&75
 80[OPT PASS
 90.THA
100LDA FLAG:BEQ CONTINUE
110LDA #0:STA FLAG
120LDA #130:JSR &FFEE
130RNE R
140.CONTINUE
150LDA &37:CMP #&DD:BNE R
160INC COUNTER:LDA COUNTER
170CMP#3:BNE R
180STA FLAG
190LDA #2:STA COUNTER
195 .R
200PLA:JMP (&70)
210]:NEXT
220ENDPROC
1000 DEFFNTEST=1
1010 DEFPROCHI
1020 PRINT"HI"
1030 ENDPROC
```

Amstrad characters double up

This Amstrad routine gives double height characters in any mode and is relocatable as long as line 110 is maintained.

X$ should contain the string to be printed in double height and the text cursor be positioned with the LOCATE command beforehand.

James Marshallsea, Oldham, Lancs.

```
10 MEMORY HIMEM-50:AD=HIMEM+1
20 FOR I=AD TO AD+49
30 READ A$:POKE I,VAL("&"+A$)
40 NEXT
50 DATA CD,06,B9,F5,3E,00,CD,A5,BB,DD,21,32
60 DATA 90,06,00,7E,DD,77,00,DD,77,01,23,DD,23,DD
70 DATA 23,10,F2,F1,CD,0C,B9,3E,FE,21,32,90,CD
80 DATA A0,BB,3E,FF,21,3A,90,CD,A0,BB,C9
90 X$="*MESSAGE*:LOCATE 7,18
100 FOR I=1 TO LEN(X$)
110 POKE AD+5,ASC(MID$(X$,I,1)):CALL AD
120 PRINT CHR$(254);CHR$(10);CHR$(8);CHR$(255);
CHR$(11);CHR$(9);
130 NEXT
```

Hearing an echo on your Atmos

This following short program produces some interesting sound effects. Changing the values before and after STEP in line 30 either lengthens or shortens the echo. Changing the value taken from X, in line 60, will increase or decrease the number of echoes.

P Brown, Bexley, Kent.

```
10 X=15
20 P=RND(1)*300
30 FOR N=P TO P+100 STEP 5
40 SOUND 1,N,X
50 NEXT N
60 X=X-2
70 IF X<2 THEN 10 ELSE 30
```

Pokes to put a ping into Atmos

Atmos owners may be interested in the following pokes: **DOKE #1B,#FA9F** gets rid of the ready sign and pings instead; **POKE #1B,#CCB0** replaces the ping with the ready sign; **POKE #247,#40** disables the reset under the computer, and **POKE #247, #4C** enables the reset.

T Warburton, Lancaster, Lancs.

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STORAGE SPACE

Gavin Monk's program — started last week — puts more method in to your Microdrives. Final section next week.

Listing (cont)

```
files$(i)
26250        END IF
26260        IF NOT miss:COPY 'mdv'&from_
drive&'_'&files$(i) TO 'mdv'&to_drive&'_
'&files$(i)
26270      END IF
26280    END FOR i
26290 END DEFine back_up
26300 DEFine PROCedure select_files(mode
$)
26310    LOCal xpos,ypos,old_xpos,old_ypo
s,key_code
26320    display_files
26330    DIM selected$(51)
26340    xpos=2:ypos=2:old_xpos=2:old_ypo
s=2:file_group$=''
26350    selected$=FILL$(' ',51)
26360    REPeat select_by_position
26370      AT ypos,xpos:PRINT'?':AT old_y
pos,old_xpos:PRINT selected$((old_xpos-2
)/24+(old_ypos-2)*3+1)
26380      old_xpos=xpos:old_ypos=ypos
26390      key_code=CODE(INKEY$(0))
26400      SELect ON key_code
26410        ON key_code=32:selected$((xp
os-2)/24+(ypos-2)*3+1)=' '
26420        ON key_code=CODE(mode$)+32:s
elected$((xpos-2)/24+(ypos-2)*3+1)=mode$
:IF mode$='L' OR mode$='M':EXIT select_b
y_position
26430        ON key_code=216:ypos=ypos+1:
IF ypos=19:ypos=2:REMark cursor down
26440        ON key_code=208:ypos=ypos-1:
IF ypos=1:ypos=18:REMark cursor up
26450        ON key_code=200:xpos=xpos+24
:IF xpos=74:xpos=2:REMark cursor right
26460        ON key_code=192:xpos=xpos-24
:IF xpos=-22:xpos=50:REMark cursor left
26470        ON key_code=10:EXIT select_b
y_position
26480        ON key_code=236
26490          IF mode$<>'L' AND mode$<>'
M'
26500            AT 19,0:PRINT FILL$(' ',
73):INK 4
26510            AT 19,6:INPUT'All files
containing:-'!file_group$:INK 7
26520            IF LEN(file_group$)=0
26530              AT 19,0:INK 4:PRINT pr
ompt$:INK 7
26540            ELSE
26550              FOR i=1 TO no_of_files
26560                IF file_group$ INSTR
 files$(i):selected$(i)=mode$
26570              END FOR i
26580              EXIT select_by_positio
n
26590            END IF
26600          END IF
26610        ON key_code=REMAINDER
26620      END SELect
26630    END REPeat select_by_position
26640    MODE 8:title:BORDER 2,6:PAPER 1:
INK 7
26650 END DEFine select_files
26660 DEFine PROCedure display_files
26670    MODE 4:BORDER 2,7
26680    title
26690    CLS:CSIZE 2,0:UNDER 1:AT 0,10:PR
INT 'Files on drive '!drive_no:UNDER 0:A
T 0,28:INK 2:PRINT'MODE'!mode$:CSIZE 0,0
:INK 7
26700    UNDER 1:PRINT TO 11'Cartridge Na
me: '!:UNDER 0:PRINT cart_name$
26710    FOR i=1 TO no_of_files STEP 3
26720      FOR j=1 TO 3:IF files$(i+j)=''
:files$(i+j)=FILL$(' ',20)
26730      PRINT TO 4;files$(i,1 TO 20);
TO 28;files$(i+1,1 TO 20);' TO 52;files$(
i+2,1 TO 20)
26740    END FOR i
26750    prompt$='Press F2 to select a fi
le group or select from above with the c
ursor keys'
26760    IF mode$='L' OR mode$='M':prompt
$='Use the cursor keys to select a file
from above and press "'&mode$&'" to load
it.'
26770    AT 19,0:INK 4:PRINT prompt$:INK
7
26780 END DEFine display_files
26790 DEFine PROCedure backup_cart(from_
drive,to_drive,overwrite)
26800    UNDER 1:CLS:AT 1,9:PRINT'BACKUP
A CARTRIDGE':UNDER 0
26810    RESTORE 32765:READ no_of_items
26820    PRINT\
26830    FOR item=1 TO no_of_items
26840      READ menu$
26850      PRINT TO 6;item!'.'; TO 8;menu
$\\
26860    END FOR item
26870    PAPER 2
26880    AT 17,6:PRINT 'Select Option (1
to 'ino_of_items!')'
26890    PAPER 1:AT 19,5:PRINT 'ESC to re
turn to Main Menu'
26900    AT 7,24:IF overwrite=1:PRINT'OFF
':ELSE PRINT 'ON'
26910    AT 9,30:PRINT '('!from_drive!'-'
!to_drive!')'
26920    REPeat option
26930      key$=INKEY$
26940      IF key$=CHR$(27):CLS:RETurn
26950      IF key$)'0' AND key$<'5':EXIT
option
26960    END REPeat option
26970    key=key$
26980    SELect ON key
26990      ON key=1:back_up 1
27000      ON key=2:back_up 0
27010      ON key=3:overwrite=overwrite^^
1:IF overwrite=1:backup_cart from_drive,
to_drive,1:ELSE backup_cart from_drive,t
o_drive,0
27020      ON key=4:get_drives:backup_car
t from_drive,to_drive,overwrite
27030    END SELect
27040 END DEFine backup_cart
27050 DEFine PROCedure get_drives
27060    CLS:UNDER 1:AT 1,9:PRINT 'BACKUP
 A CARTRIDGE':UNDER 0
27070    REPeat drives_loop
27080    AT 2,0:PRINT 'From:       ':get_d
rive_no:from_drive=drive_no:AT 2,5:PRINT
 from_drive
27090    AT 2,7:PRINT 'To:':get_drive_no:
```

```
to_drive=drive_no
27100   IF from_drive()to_drive: EXIT dr
ives_loop
27110   BEEP 10000,70:AT 14,8:PRINT 'Equ
al drive numbers'
27120   END REPeat drives_loop
27130 END DEFine get_drives
27140 DEFine FuNction check_date(new_dte
$)
27150   LOCal month,month_limit(12),date
_limit$(2,6),err_dte,dte_index
27160   err_dte=1
27170   date_limit$(1)='000080'
27180   date_limit$(2)='391999'
27190   IF LEN(new_dte$)()6:RETurn 0
27200   RESTORE 32766
27210   FOR month=1 TO 12:READ month_lim
it(month)
27220   FOR dte_index=1 TO 6
27230     IF new_dte$(dte_index)(date_li
mit$(1,dte_index) OR new_dte$(dte_index)
>date_limit$(2,dte_index):err_dte=0:EXIT
 dte_index
27240   END FOR dte_index
27250   IF err_dte=0:RETurn 0
27260   IF new_dte$(1 TO 2)=0 OR new_dte
$(1 TO 2))31:RETurn 0
27270   IF new_dte$(5 TO 6)MOD 4=0:month
_limit(2)=29
27280   IF new_dte$(1 TO 2))month_limit(
new_dte$(3 TO 4)):err_dte=0
27290   RETurn err_dte
27300 END DEFine check_date
27310 DEFine FuNction check_time(time$)
27320   LOCal err_time,time_index
27330   err_time=1
27340   IF LEN(time$)()6:RETurn 0
27350   FOR time_index=1 TO 6
27360     IF time$(time_index)('0' OR ti
me$(time_index))'9':err_time=0:EXIT time
_index
27370   END FOR time_index
27380   IF err_time=0:RETurn 0
27390   IF time$(1 TO 2))23 OR time$(3 T
O 4))59 OR time$(5 TO 6))59:RETurn 0
27400   RETurn err_time
27410 END DEFine check_time
27420 DEFine PROCedure set_up_date
27430   LOCal new_date$
27440   title
27450   WINDOW 448,204,32,52
27460   PAPER 1:INK 7:CLS
27470   BORDER 2,6
27480   new_date$=DATE$
27490   IF new_date$(1 TO 4)=1961
27500     IF file_on_drive (1,'last_date
_dat')
27510       OPEN_IN£5,mdv1_last_date_dat
27520       INPUT£5,new_date$
27530       CLOSE£5
27540     ELSE
27550       OPEN_NEW£5,mdv1_last_date_da
t
27560       PRINT£5,new_date$
27570       CLOSE£5
27580     END IF
27590     get_new_date
27600   END IF
27610 END DEFine set_up_date
27620 DEFine PROCedure get_new_date
27630   LOCal err_date,err_time,month$,m
onths$,dte$,new_dte$,new_time$,time$
27640   err_date=1:err_time=1
27650   months$='JanFebMarAprMayJunJulAu
gSepOctNovDec'
27660   month$=((new_date$(6 TO 8) INSTR
 months$)+2)/3:IF LEN(month$)=1:month$='
0'&month$
27670   time$=new_date$(13 TO 14)&new_da
te$(16 TO 17)&'00'
27680   dte$=new_date$(10 TO 11)&month$&
new_date$(3 TO 4)
27690   REPeat date_time
27700     UNDER 1:INK 6:CLS:AT 1,10:PRIN
T'SET UP THE DATE':UNDER 0
27710     IF NOT err_date:AT 13,4:PRINT'
Date of'!new_dte$!'was invalid.'
27720     IF NOT err_time:AT 14,4:PRINT'
Time of'!new_time$!'was invalid.'
27730     AT 5,6:PRINT 'Date...'!dte$!!!
:INPUT new_dte$
27740     IF new_dte$='': new_dte$=dte$
27750     err_date=check_date(new_dte$)
27760     AT 9,6:PRINT 'Time...'!time$!!
!:INPUT new_time$
27770     IF new_time$='':new_time$=time
$
27780     err_time=check_time(new_time$)
27790     IF err_date:dte$=new_dte$
27800     IF err_time:time$=new_time$
27810     IF err_time AND err_date:EXIT
date_time
27820     BEEP 10000,70
27830   END REPeat date_time
27840   SDATE 19&dte$(5 TO 6),dte$(3 TO
4),dte$(1 TO 2),time$(1 TO 2),time$(3 TO
 4),time$(5 TO 6)
27850   DELETE mdv1_last_date_dat
27860   OPEN_NEW£5,mdv1_last_date_dat
27870   PRINT£5,DATE$
27880   CLOSE£5
27890 END DEFine get_new_date
27900 DEFine PROCedure title
27910   OPEN£6,scr_448x36a32x16
27920   CSIZE£6,2,0
27930   PAPER£6,6
27940   BORDER£6,2,2
27950   INK£6,1
27960   CLS£6
27970   UNDER£6,1: AT£6,0,5:PRINT£6,'QL
MICRODRIVE MASTER  V1.0'
27980   AT£6,2,3:PRINT£6,'COPYRIGHT (c)
 GAVIN MONK 1984'
27990   CLOSE£6
28000 END DEFine title
28010 DEFine PROCedure menu
28020   REPeat main_loop
28030     MODE 8:title
28040     WINDOW 448,204,32,52
28050     PAPER 1: INK 7
28060     CLS
28070     BORDER 2,6
28080     CSIZE 3,1:AT 0,8:UNDER 1:PRINT
 'MAIN  MENU':UNDER 0:CSIZE 2,0
28090     RESTORE 32767:READ no_of_items
28100     FOR item=1 TO no_of_items
28110       READ menu$
28120       PRINT TO 6!item!'.'! TO 8!me
nu$\\
28130     END FOR item
28140     PAPER 2
28150     AT 17,6: PRINT 'Select Option
(1-8)'
28160     PAPER 1:AT 19,4:PRINT'ESC to r
eturn to SuperBasic'
28170     REPeat option
28180       key$=INKEY$
28190       IF key$=CHR$(27):CLS:call_ty
pe=1:RETurn
28200       IF key$)'0' AND key$('9': EX
IT option
28210     END REPeat option
28220     LET key=key$
28230     SELect ON key
28240       ON key=1: format_cart
```

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THE GRID

It's hip to be square in this simple but satisfying game from Richard Garrad's cubist period.

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Banded about

The idea is very straightforward. The computer takes a square grid comprising four to seven bands of colour, scrambles the bands and leaves you to sort out the resulting mess into its original state — a little like the dreaded cube or Spillikins but in two dimensions.

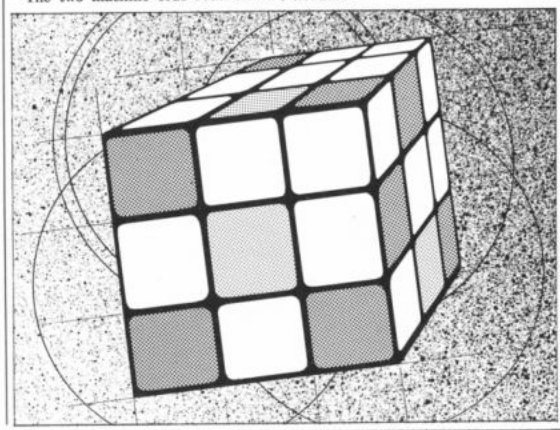
To begin, just enter the grid size you wish to play on and then the level of difficulty (0 is easy, 9 is hard). There is a pause as the grid is rearranged, after which it is displayed. You are then asked to input your move.

As you move each row or column, it wraps around the grid.

The two machine code routines at addresses 32001 and 32031 allow the variables to be saved and loaded as DATA Z$ () and are relocatable. To use these routines in your own programs you must have, as your first line:

`1 LET Z$ = "": rest of program . . .`

The routines can then be called using a subroutine similar to that at line 1000 onwards.



Listing

```
   0 R.GARRAD 6/84
  20 CLEAR 32000: LET z$="": GO
SUB 950
  30 POKE 23658,8: BORDER 7: INK
 0: CLS
  40 REM  GRID SIZE
  50 PRINT '"" THE VALUE INPUT
WILL DETERMINE      THE SIZE OF
THE GRID""      E.G. AN INPUT OF
""4"" WILL""      PRODUCE A 4 X
4 GRID"
  60 INPUT "INPUT SIZE (4 TO 7)"
;l: IF l<4 OR l>7 THEN GO TO 60
  70 REM  INITIALISE ARRAYS
  80 CLS : DIM a$(l,l): DIM b$((
,l): DIM v$(l,l): LET t=0
  90 GO SUB 750
 100 REM  SET BOARD
 110 FOR a=1 TO l: FOR b=1 TO l:
 LET a$(a,b)=STR$ a: LET v$(a,b)
=a$(a,b): NEXT b: NEXT a
 120 REM  DIFFICULTY

 130 CLS : INPUT "DIFFICULTY ?(0
 TO 9)";dif: IF dif<0 OR dif>9 T
HEN GO TO 130
 140 LET d=(dif+1)*10
 150 GO SUB 600
 160 REM  PRINT GRID
 170 FOR a=1 TO l: PRINT AT 0,a+
2;CHR$ (64+a):
 PRINT AT a+2,0;CHR$ (64+a):
 NEXT a
 180 FOR a=15 TO 15+(16+l) STEP
 16: PLOT a,160: DRAU 0,(l*16):
PLOT 15,175-a: DRAU ((l*16),0: NE
XT a
 190 PRINT PAPER 5;AT 0,20;"LEVE
L ";dif: PRINT AT 0,26;dif
 200 PRINT PAPER 6;AT 2,20;"MOVE
 :"
 210 PLOT 159,144: DRAU 73,0: DR
AU 0,-41: DRAU -73,0: DRAU 0,41
 220 FOR a=175 TO 175+(8*l) STEP
 8: PLOT a,96: DRAU 0,-(8*l): NE
XT a

 230 FOR a=96 TO 96-(8*l) STEP -
8: PLOT 175,a: DRAU 8*l,0: NEXT
a
 240 FOR a=1 TO l: PRINT OVER 1;
PAPER a; BRIGHT 1;AT a+9,22;"
     "( TO l): NEXT a
 250 GO SUB 270: GO TO 300
 260 REM  PRINT COLOURS
 270 OVER 1: FOR a=1 TO l: FOR b
=1 TO l: PRINT BRIGHT 1; PAPER V
AL a$(a,b);AT a+2,b+2;" ";AT a
+2+1,b+2;" ": NEXT b: NEXT a
 280 OVER 0: RETURN
 290 REM  INPUT ROUTINE
 300 GO SUB 890
 320 LET t=t+1: PRINT AT 2,26;t
 330 PRINT AT 4,20;"
                   ";AT 6,20;"
                   "
 335 INPUT BRIGHT 1; PAPER 6;"CO
LUMN(1 TO ";(l);") ";"OR ROU(A T
O ";(CHR$ (64+l));") "'"   LLL TO
 LOAD  "'"   SSS TO SAVE  "; LINE
 c$
 340 IF c$="SSS" THEN GO SUB 103
0: GO TO 170
 350 IF c$="LLL" THEN GO TO 1060
 360 IF c$="" OR LEN c$<>1 OR c$
<"1" OR c$>STR$ l AND c$<"A" OR
 c$>CHR$ (64+l) THEN GO SUB 460:
GO TO 330
 370 PRINT BRIGHT 1; PAPER 6;AT
4,20;"COL/ROU:";c$
 380 IF c$>="1" AND c$<=STR$ l T
HEN INPUT PAPER 5; BRIGHT 1;"UP
OR DOUN ?"; LINE d$: IF d$<>"U"
AND d$<>"D" THEN GO SUB 460: GO
TO 330
 390 IF c$>="A" AND c$<=CHR$ (l+
64) THEN INPUT PAPER 5; BRIGHT 1
;"LEFT OR RIGHT ?"; LINE d$: IF
 d$<>"L" AND d$<>"R" THEN GO SUB
460: GO TO 330
 400 PRINT BRIGHT 1; PAPER 5;AT
6,5;"DIR.  ";d$
 410 INPUT PAPER 7; BRIGHT 1;"NO
. OF SQUARES ?";s
 420 PRINT BRIGHT 1; PAPER 7;AT
8,20;"SQUARES:";s
 430 IF c$>="1" AND c$<=STR$ l T
HEN GO SUB 480
 440 IF c$>="A" AND c$<=CHR$ (64
+l) THEN GO SUB 560
 450 GO SUB 270: GO TO 300
 460 FOR a=1 TO 3: PRINT #0;AT a
,10; PAPER 2; INK 6; BRIGHT 1; F
LASH 1;" ERROR ": BEEP .1,-a
-20: NEXT a: PAUSE 100: RETURN
 470 REM  UP & DOUN
 480 FOR a=1 TO l: FOR b=1 TO l
 490 LET b$(a,b)=a$(b,a): NEXT b
: NEXT a
 500 LET m=VAL c$
 510 IF d$="U" THEN FOR x=1 TO s
: LET b$(m)=b$(m,2 TO )+b$(m,1):
 NEXT x
 520 IF d$="D" THEN FOR x=1 TO s
: LET b$(m)=b$(m,l)+b$(m, TO l-1
): NEXT x
 530 FOR a=1 TO l: FOR b=1 TO l:
 LET a$(a,b)=b$(b,a): NEXT b: NE
XT a
```

```
540 RETURN
550 REM  LEFT & RIGHT
560 IF c$(s)="A" AND c$(s="G" AND
d$(1)="F" THEN LET m=CODE c$-64:
 FOR x=1 TO 8: LET a$(m)=a$(m,2
TO )+a$(m,1): NEXT x
570 IF c$(s)="A" AND c$(s="G" AND
d$(1)="R" THEN LET m=CODE c$-64:
 FOR x=1 TO 8: LET a$(m)=a$(m,t
+a$(m, TO t-1): NEXT x
580 RETURN
590 REM  SET PROBLEM
600 PRINT AT 10,8;"PLEASE WAIT
WHILE";AT 11,5;" GRID IS SET UP"
610 FOR j=1 TO d
620 LET cr=INT (RND*2)+1
630 LET s=INT (RND*l+1)
640 LET e=INT (RND*2)+1
650 IF cr=1 THEN LET c$=CHR$ (I
NT (RND*l)+49)
660 IF cr=2 THEN LET c$=CHR$ (I
NT (RND*l)+65)
670 IF cr=1 AND e=1 THEN LET d$
="U": GO SUB 480
680 IF cr=1 AND e=2 THEN LET d$
="D": GO SUB 480
690 IF cr=2 AND e=1 THEN LET d$
="L": GO SUB 560
700>IF cr=2 AND e=2 THEN LET d$
="R": GO SUB 560
710 NEXT j
720 PRINT AT 10,8;"
    ";AT 11,8;"
"
730 RETURN
740 REM  INSTRUCTIONS
750 FOR a=183 TO 183+(8*l) STEP
 8: PLOT a,168: DRAU 0,-(8*l): N
EXT a
760 FOR a=168 TO 168-(8*l) STEP
-8: PLOT 183,a: DRAU 8*l,0: NEX
T a
770 FOR a=1 TO l: PRINT OVER 1;
PAPER a; BRIGHT 1;AT a,23;"
  "( TO l): NEXT a
780 INK 2
790 PRINT AT 1,3;"[illegible]
"
800 PRINT AT 2,3;"[illegible]
"
810>PRINT AT 3,3;"[illegible]
"
820 PRINT AT 4,3;"[illegible]
"
830 INK 0: PRINT AT 7,6;"INSTRU
CTIONS"
840 PRINT '"  THE OBJECT OF THI
S GAME IS TO MOVE THE LINES SO T
HAT THEY FORHTHE PATTERN AS SHOU
N ABOVE."
850 PRINT '"  YOU MAY MOVE LEFT
 AND RIGHT  (ROUS A TO ";CHR$ (
64+l);") OR UP AND DOUN  (COL
UMNS 1 TO ";l;")"''"  WHEN A SQU
ARE MOVES OFF THE  END OF A LIN
E IT WILL REAPPEAR  AT THE OPPOS
ITE END."
860 PRINT FLASH 1;AT 21,5;"PRES
S ANY KEY TO PLAY": PAUSE 0: CLS
870 RETURN
880 REM  CHECK GRID COMPLETE
890>LET ce=1
900 IF a$(ce)<>v$(ce) THEN RETU
RN
910 IF ce=l THEN GO TO 930
920 LET ce=ce+1: GO TO 900
930 FOR x=1 TO 50 STEP 2: BEEP
.01,x: NEXT x
940 PRINT AT 18,0;" YOU HAVE C
OMPLETED THE GRID"''"  DO YOU U
ISH TO PLAY AGAIN": INPUT "(Y/N)
";x$
950 IF x$<>"Y" THEN STOP
960 RUN
970 REM  SAVE/LOAD VARS M/C
980 DATA 42,75,92,126,254,90,40
,2,207,27,235,42,89,92,1,4,0,167
,237,82,237,56,235,54,216,35,115
,35,114,201
990 DATA 42,75,92,126,254,216,4
0,2,207,26,64,90,35,54,0,35,54,0
,201
1000 FOR x=0 TO 45: READ g: POKE
 32001+x,g: NEXT x
1010 RETURN
1020 REM  LOAD & SAVE GAME
1030 IF c$="SSS" THEN RANDOMIZE
USR 32001: SAVE "grid" DATA z$()
  INPUT "DO YOU WISH TO CONTINUE
? ";s$
1040 IF s$="Y" THEN RANDOMIZE US
R 32031: LET t=t-1: RETURN
1050 STOP
1060 IF c$="LLL" THEN CLEAR : LO
AD "grid" DATA z$(): RANDOMIZE U
SR 32031: LET t=t-1: CLS : GO TO
 170
```


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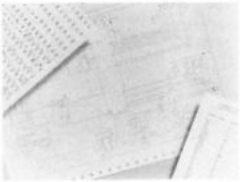
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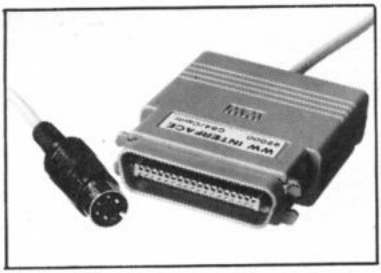
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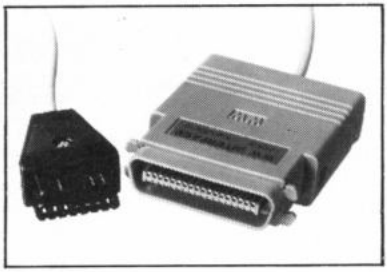
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HACKER TARGETS

The targets that attract the loving attention of the experts of computer communications described in *PCN*'s second exclusive extract from *The Hacker's Handbook*.

Wherever hackers gather, talk soon moves from past achievements and adventures to speculation about what new territory might be explored.

On-line hosts

On-line services were the first form of electronic publishing: a series of big storage computers act as hosts to a group of individual databases by providing not only mass data storage and the appropriate 'search language' to access it, but also the means for registering, logging and billing users. Typically, users access the on-line hosts via a phone number which links into a public data network using packet switching.

The on-line business began almost by accident; large corporations and institutions involved in complicated technological developments found that their libraries simply couldn't keep track of relevant new scientific papers, and decided to maintain indices on computer. One of the first was the armaments and aircraft company, Lockheed.

In time the scope of these indices expanded and outsiders were granted access. Other organisations with similar information-handling requirements asked if space could be found on the computer for their needs. Eventually Lockheed and others recognised the beginnings of a quite separate business; in Lockheed's case it led to the foundation of Dialog, which today acts as host and marketing agent for almost 300 separate databases.

Originally on-line hosts were accessed by dumb terminals rather than by VDUs. Today the trend is to use front-end intelligent software on an IBM PC which allows the naive user to pose his/her questions informally while offline. The software then redefines the information request into the formal language of the on-line host and then goes on-line via an auto-dial modem to extract the information as swiftly and efficiently as possible.

On-line services require the use of a whole series of passwords: the usual NUI and NUA for PSS, another to reach the host, yet another for the specific information service required.

The categories of on-line service include *bibliographic*, which merely indexes the existence of an article or book — you must then find a physical copy to read; and *source*, which contains the article or extract thereof. *Full-text* services not only contain the complete article or book but will, if required, search the entire text.

Financial services

The financial world can afford more computer aids than any other non-governmental sector.

Over ten years ago Reuters put together the first packages which gave some questioning power to the end user. Each Reuters Monitor is intelligent, containing a mini and some firmware which accepts and selects the stream of data from the host at the far end of the leased line, marshalls interrogation requests and takes care of the local display. There is little point in eavesdropping into a Reuters line unless you know what the terminal firmware does.

The first sophisticated Stock Exchange prices 'screens' used modified closed circuit television technology. But London now uses Topic, a leased line variant on viewdata technology, though with its magazine-like arrangement and auto-screen refresh, it has as much in common with teletext as Prestel. Topic carries about 2,500 of the total 7,500 shares traded in London, plus selected analytical material from brokers.

Datastream represents a much higher level of sophistication: using its £40,000 plus pa terminals you can compare historic data — price movements, movements against sector indices etc — and chart the results.

The hacker's reward for getting into such systems is that you can see share and other prices on the move. None of these prices is confidential. However, this situation is likely to change as there will be electronic prices services giving privileged information to specialist share dealers.

All these services are only available via leased lines; City professionals would not tolerate the delays and uncertainties of dial-up facilities. However, dial-up ports exist for demonstrations, exhibitions, engineering and as back-up — and a lot of hacking effort has gone into tracking them down.

Business information

Business information is usually about the credit-worthiness of companies, company annual reports, trading opportunities and market research. The biggest electronic credit data resource is owned by the international company Dun & Bradstreet: during 1985-86 it is due to spend £25m on making its data available all over Europe.

In addition, all UK companies quoted on the London Stock Exchange and many others who are not, have a report and analysis available from ICC (Inter-Company Comparisons) who can be accessed via on-line dial-up through a viewdata interface and also by Datastream customers. Dun & Bradstreet also have an on-line service called KBE covering 20,000 key British enterprises.

Prodigious quantities of credit and background data on US companies can be found on several of the major on-line hosts. A valid phone number, passwords and extracts from the operations manual of one of the largest US services, TRW, sat on some hackers' bulletin boards for over twelve months during 1983 and 1984 before the company found out.

According to the *Washington Post*, the password and manual had been obtained from a Sears Roebuck national chain store in Sacremento. Some hackers claimed they were able to alter credit records, but TRW maintains that telephone access to its systems is designed for read-only operations alone, updating of files taking place solely on magnetic tape.

University facilities

In complete contrast to computers that are used to store and present data are those where the value is to deliver processing power to the outside world. Paramount among these are those installed in universities and research institutes.

Although hackers frequently acquire phone numbers to enter such machines, what you can do once you are there varies enormously. There are usually tiers and banks of passwords, each allowing only limited access to the range of services. It takes considerable knowledge of the machine's operating system to break through from one to another.

However, the hobbyist bulletin board system quite often provides passwords giving access to games and the ability to write and run programs in exotic languages.

In the UK, many important university and research institution computers have been linked together on a special data network called SERCnet. SERC is the Science and Engineering Research Council. Although most of the computers are individually accessible via PSS, SERCnet makes it possible to enter one computer and pass through to others.

Banking

Prominent among public fantasies about hackers is the one where banks are entered electronically, accounts examined and some money moved from one to another.

Most 'remote stealing' from banks or illicit obtaining of account details touch computers only incidentally and involve straightforward fraud, conning or bribery of bank employees. For hackers, however, the very considerable effort that has been made to provide security makes the systems a great challenge in themselves.

In the UK, the banking scene is dominated by a handful of large companies with many branches. Cheque clearing and account maintenance are conducted under conditions of high security with considerable isolation of key elements.

In the United States direct attacks on banks have been much easier because the technology adopted is much cruder and more use is made of public phone and telex lines. One of the favourite techniques has been to send fake authorisations for money transfers.

The trick is to spot weaknesses in the cryptographic systems used in such authorisations. The specifications for the systems themselves are openly published; one computer security expert, Leslie Goldberg, was recently able to take apart one scheme and show that much of the 'key' that was supposed to give high level cryptographic security was technically redundant.

There are, however, a few areas where banking is becoming vulnerable to the less mathematically literate hacker. A number of international banks are offering their big corporation customers special facilities so that their Treasury Departments can have direct access to their account details via a PC on dial-up.

Telebanking is now available via Prestel and some of its overseas imitators. Although such services use several layers of passwords to validate transactions, if those passwords are misacquired, the bank account becomes vulnerable.

Electronic mail

Electronic mail services work by storing messages created by some users until they are retrieved by their intended recipients. The ingredients of a typical system are: registration/logging on facilities, storage, search and retrieval, networking, timing and billing.

Electronic mail is an easy add-on to most mainframe installations, but in recent years various organisations have sought to market services to individuals, companies and industries where electronic mail was the main purpose.

The system software in widest use is that of ITT-Dialcom. It's the one that runs Telecom Gold.

In the Dialcom/Telecom Gold service, the assumption is made that most users will want to concentrate on a relatively narrow range of correspondents. Accordingly, the way it is sold is as a series of systems, each run by a 'manager': someone within a company. The manager is the only person who has direct contact with the electronic mail owner and he in turn is responsible for bringing individual users on to his system — he can issue mailboxes direct, determine tariff levels and put up general messages.

In most other services, every user has a direct relationship with the electronic mail company.

The basic systems tend to be quite robust and hacking is mainly concentrated on second-guessing users' IDs. But increasingly their cutomers are using PCs and special software to automate logging-in. The software packages, of course, have the IDs nicely pre-stored . . .

Government computers

Among hackers themselves the richest source of fantasising revolves around official computers like those used by the tax and national insurance authorities, the police, armed forces and intelligence agencies.

Although I know UK phone freaks who claim to have managed to appear on the internal exchanges used by Century House (M16) and Curzon Street House (M15) and have wandered along AUTOVON, the US secure military phone network, I am not aware of anyone bold or clever enough to have penetrated the UK's most secure computers.

HACKER'S HANDBOOK

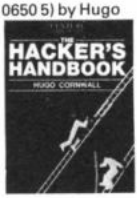
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MURPHY'S LAW

Mike Gerrard's flickering torchlight falls on two very different games this week. One has fancy packaging and a price-tag to match, the other makes a humbler claim to fame. Which does the Dungeon Master open his doors to?

I made the mistake of thinking I could get this week's Commodore column planned before even looking at the adventures concerned. Pride of place was to go to *Amazon* from Trillium, a graphics adventure of two double-sided disks, with handsome packaging that seemed to justify the high asking price of £19.95. After that, I thought, a few paragraphs on a more humble offering from Ducksoft, *Time Search*, a tape-only game at the comparatively bargain price of £7.95. But then I looked at the adventures themselves. I'll still begin with *Amazon*, but it certainly doesn't get pride of place.

Up the river

Amazon was written by author Michael Crichton, perhaps best-known for the books *Coma* and *The Andromeda Strain*. It begins by putting you in the Communications Control Room of the NSRT, the National Satellite Resource Technology consulting firm. A field team has been sent out to the Amazon basin, and you're awaiting a transmission from them.

The top half of the screen is given over to graphics, with a fuzzy screen where the transmission is due. The instructions tell you your first command after loading should be NEW DATA, but this is ineffective and you must type in the exciting WAIT, whereupon transmission begins and you're invited to tune it in with your joystick.

The field team has been wiped out, it transpires, and a native peers at you through the screen before transmission is also wiped out. You are summoned to Murphy's office. GO TO THE OFFICE, I typed, thinking I wasn't very adventurous. 'Improper Command' was the response, as it was to GO TO OFFICE and GO TO MURPHY. I tried WAIT again, only to be told ungrammatically 'You better go to the office.' GO TO THE OFFICE, then 'Improper Command.' So much for the game's sophisticated vocabulary recognition. I persisted in trying to go to Murphy's office and found success at last.

Murphy asked me my name, and kept me waiting while he pretended to search for a file, then gave me a couple of screens of information, occasionally allowing me to participate in the adventure by typing yes or okay now and then (though experimenting showed you can type anything in those places.)

A tedious few minutes later, Murphy told me to go to the airport and catch a flight for South America. There you see a flight leaving, but when you go to the appropriate gate you're reminded you haven't got a ticket. All you have is a sealed envelope.

You can't go north, south, east, west, up, down, in or out, or to a ticket office, nor can you even open the envelope. I tried tearing and unsealing it, and all the words on the word-list you're given (and some that weren't) but to no avail. The flight left, the game was over and I had to reload from scratch.

I sat through the same opening sequence, but this time when Murphy dismissed me I tried to ask for a ticket. I was dismissed, but knowing how fussy the program was about commands I tried again with, ASK MURPHY FOR A TICKET. At that point I was told I'd disobeyed orders, the game was over, and I had to reload again.

By now a few hours had gone by because I had some loading problems, not helped by the instructions telling me to load side three first, instead of side one. What graphics I did see looked impressive, as do those on the packaging, but I'm afraid it's now been consigned to the shelves as more of an obstacle course than an adventure.

Time machine

Thankfully *Time Search* restored my faith in the fun of adventure playing, and this is one I will be going back to again and again, as I try to hunt down a time machine. The adventure has been written by someone who plays adventures, who knows how people play adventures, and what they want from them — like funny response to four-letter words, and the ability to do silly things, as well as real problems to solve rather than ones set you by poor programming.

You leave your front door, to head off and explore the town, past the post office and straight into the pub. Yes, this is what we want. Whether Neville the part-time barman has any use remains to be seen, but his tankard of beer was delicious, and came in handy.

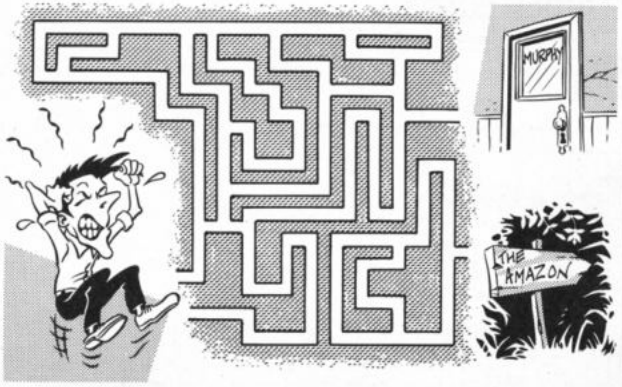
It seems that whichever way you go, you're eventually plunged into darkness. Right, where's the torch? Ah-ha, here it is, but the wretched thing won't light. It nearly did . . . then it nearly did again . . . then it nearly did again . . . hang on, something fishy here. The torch was left here by a previous adventurer and is now useless. This is the kind of game where you can't believe everything you read, however, so let's leave the torch for the moment.

Magic plays its part, and you'll need a little to find a source of light. One of your rewards for doing so is to plunge into a devious maze of underground burrows. Mapping this out was a mix of fun and frustration, but I emerged at the other end clutching a couple of new items.

Going in the other direction led me to a dead-end, near which was a whiff of wild animal, though nothing emerged from the bushes, thank goodness. What does emerge with regularity is the evil Groark, whom you must outwit constantly by a means which has become rather too familiar.

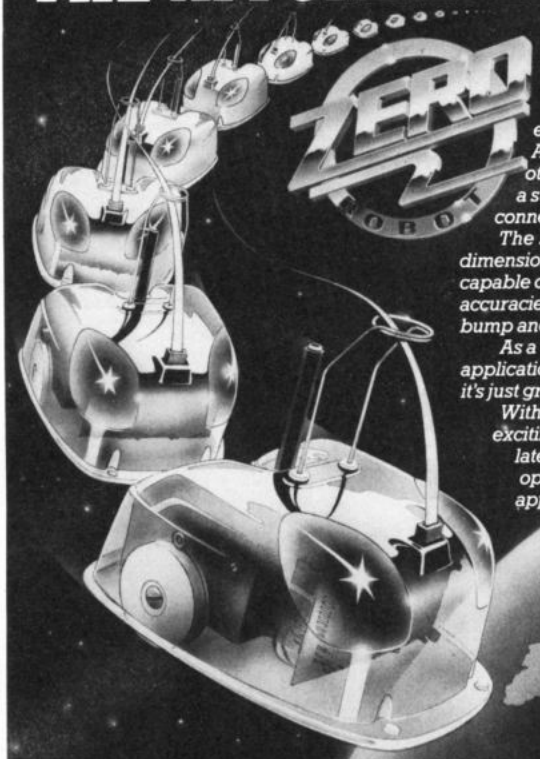
So far, I've uncovered 50 or 60 locations, and will no doubt be uncovering more if I can manage to cross this raging torrent of a stream. CROSS STREAM? 'Yes! Furious in fact!' comes the answer, but even with a bow, arrow and coil of rope I haven't yet managed to haul myself over.

This week's two titles show there are no rules about adventures, except that most people want a good one. *Time Search* is one, and I reckon you should search it out for yourselves.



AT LAST... THE AFFORDABLE ROBOT.

The Zero 2 Robot has arrived. It's the first truly micro robotic system available and remarkably it costs less than £100.



Controlled electronically through a cable from your computer, it is equipped with wheels, pen, line follower and two tone horn. It will connect easily with the Spectrum, BBC B, Acorn, Commodore 64 and all other personal computers with a standard 'D' type RS 232 connector.

The Zero 2 Robot will add a new dimension to your computer. It is capable of precision movement to accuracies of 1mm and can be fitted with bump and hole sensors.

As a teaching aid it has endless applications and for P.C. users at home it's just great fun.

With additional software and some exciting new add-ons planned for later this year, the Zero 2 Robot will open up a whole new area of applications and games.

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PCN 2

WORKBENCH



This week sees the start of an exciting new weekly feature in *PCN* Workbench. While most magazines concentrate on what you can do with software, we'll be taking you into hardware. Each week there'll be a project that will enhance the hardware side of your system — things like simple reset switches and external sound speakers. We're starting from scratch by talking about tools and how to solder — so there's no excuse, even if you're a complete beginner.

Necessary tools

When it comes to playing around with electronics most computer owners are scared. They'd like to get out a soldering iron to make their own add-ons, but don't know where to start.

In Workbench we will take you through the fundamentals of building projects for many home computers, and show you how easy it is.

It is very important to have a decent toolkit; bad tools lead to badly built projects which won't work. A decent toolkit costs about £30, and will last for years.

So what tools should you buy? The central piece of equipment is a soldering iron. The one you choose should be fairly small and around 17 watts. A soldering iron that's built like a poker and has a high wattage will only damage your components. Expect to pay around £7.



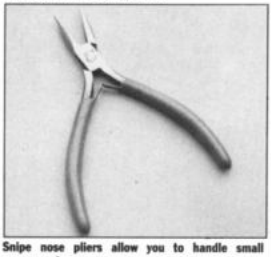
A low wattage iron prevents you from damaging components. The bit should be 2.3mm.

If there isn't a small bit on the end, buy one. Iron clad bits are the best value as they last longer. Using a wet sponge to wipe the soldering iron bit is also essential as it not only cleans excess solder off the iron but also makes the bit last longer.

Of course the type of solder that you use is also important. Don't buy the solder that is used in metalwork, the type that has to be dipped in flux; *always* use solder made from 60 per cent tin and 40 per cent lead that contains its own non-corrosive flux. This is usually in five cores that run through the solder.

A decent pair of cutters are also needed to cut your components, wire etc, rather than scissors or pliers. Don't buy the cheapest pair of small side cutters as they don't last long. Pay as much as you can afford — you won't regret it.

As well as the cutters you also need a small pair of snipe nose pliers for doing fiddly work. Again, buying a decent pair pays off in the long run.



Snipe nose pliers allow you to handle small components.

Wire strippers are handy but not essential as it is possible to cut your wire using the cutters, but wire strippers do make life easier. You can buy wire cutters that not only cut the insulation from your cable but pull it off as well.



Edge cutters enable you to cut component leads near the circuit board.

A selection of good screwdrivers also helps. A set of small jeweller's screwdrivers is extremely handy, and the ones with allen keys and small spanners are even better. Don't forget that the nuts and bolts you will be dealing with are usually small.



A meter is essential for checking voltage.

Just as handy is a multimeter. In fact, it is often essential as you will have to check voltages to make sure that everything is working correctly. Again, spend what you can afford, and expect one that's adequate to cost around £7.

So let's build up our toolkit. Maplin is a good source, so we have listed its prices and parts numbers.

15W Miniature Soldering Iron	**FJ44X**	**£6.75**
Box-Jointed Min Insulated Pliers	**BR78K**	**£6.75**
Low Cost Min Cutters	**FY19V**	**£5.45**
Pocket Multimeter	**YJ06G**	**£6.95**
		£25.90

How to solder

The standard of soldering in an electronics project can make the difference between success and failure. One dry joint and the entire project is likely to function incorrectly or not at all.

The first few workbench projects are deliberately simple: this is to allow you to get used to handling a soldering iron.

Preparing components

Make sure that the leads are clean and free from grease for a good connection. It's also a good idea to tin the connections: simply place the iron on the leads or wire to be soldered and apply a first thin layer of solder to the area to be soldered.

The leads of the component you want to solder should then be carefully bent so that it will fit into place. Place the iron on the joint. Next, the solder should be offered up to the lead of the component, not the iron. As soon as the solder starts to flow around the joint, the solder, and then the iron should be removed.

Once the joint has cooled down it can be inspected. The solder should completely surround the joint and look bright and shiny. If it has a crystalline appearance or looks dull, you probably have a dry joint, which must be remade. Sometimes reapplying the iron for a couple of seconds does the trick.

Mistakes to avoid

Don't leave the iron on the component too long — it may get damaged. The iron should only touch the component for a couple of seconds before you apply the solder. People often put too much solder on the joint; use only enough solder to cover the joint completely.

Always make sure that your iron is hot and kept clean as a cool or dirty iron won't make a good connection. Keep a damp sponge on hand so that you can clean the tip of the iron as you go.

PROJECT 1

To stop your Spectrum's power socket coming unstuck, Stuart Cooke explains how you can make a simple power on/off switch for less than £3.

A major omission from the Sinclair Spectrum is a reset or power off switch. The only way to wipe out an existing program is to pull out the power connector from the rear of the machine.

Unfortunately, the socket can become so loose from the wear and tear that the plug no longer fits tightly and the computer turns itself on and off at the most inconvenient moments, especially if you have caught the power lead.

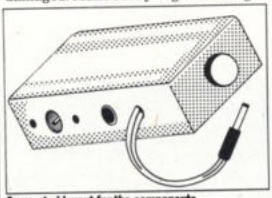
This simple project should prevent many of these problems as it provides your Spectrum with an on/off switch and a power indicator.

Construction is extremely straightforward. First decide how you are going to place the components inside the box and then drill the holes where necessary. Next, lay out the components as they will fit inside the case and cut the lengths of wire necessary for them to connect inside.

It is probably a good idea to make the wires slightly longer than necessary as this makes it easier to manoeuvre the components once in the case.

The wires should be connected as shown in the diagram. Be careful to get the wires the correct way round, as an incorrect connection could damage your computer.

Connect the resistor to the socket. Use a bit of the sleeving from the cable to cover the legs of the resistor so it won't touch any component it shouldn't. The LED should be the last component to be connected as it is the one most likely to be damaged. Make sure you get it the right way round. The leg nearest the side with the flat should be connected to the resistor. Again, cover the leads with sleeving before joining it to the cable and resistor.



Suggested layout for the components.

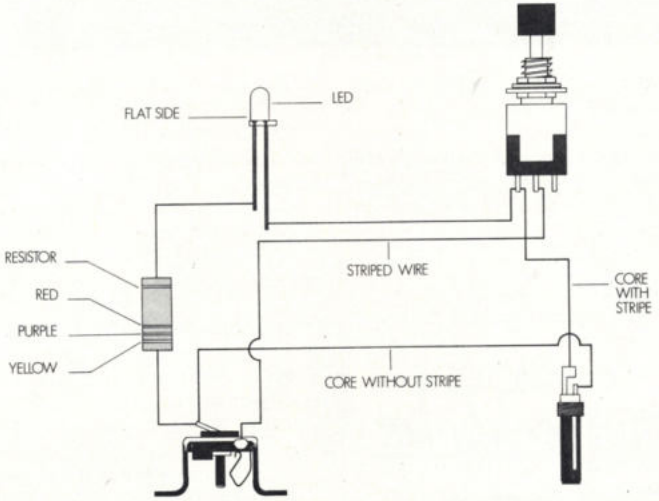
It's a good idea to check the wiring a couple of times before you install the components in the box.

In use

When using the project the Spectrum power supply goes into the socket on the box and the flying lead from the box goes into the Spectrum. Now, when you want to turn off the Spectrum you simply press the button on the box. Don't forget that the power supply is still connected to the mains and should be unplugged when you're not using the Spectrum.

All components needed for this project are available from Maplin Electronic Supplies, 0702-552911

Parts: total cost £2.57	Cost	Maplin No.
Small Box	59p	FK73Q
2m Zip wire	28p	XR39N
2.1mm std power plug	16p	HH60Q
2.1mm power socket	23p	HH85G
pushlocks switch SPCO	£1.20	FH41U
Red LED	4p	YY40T
LED clip	4p	YY40T
4K7 standard resistor	3p	S4K7



This schematic diagram shows which wires go where, follow it religiously.

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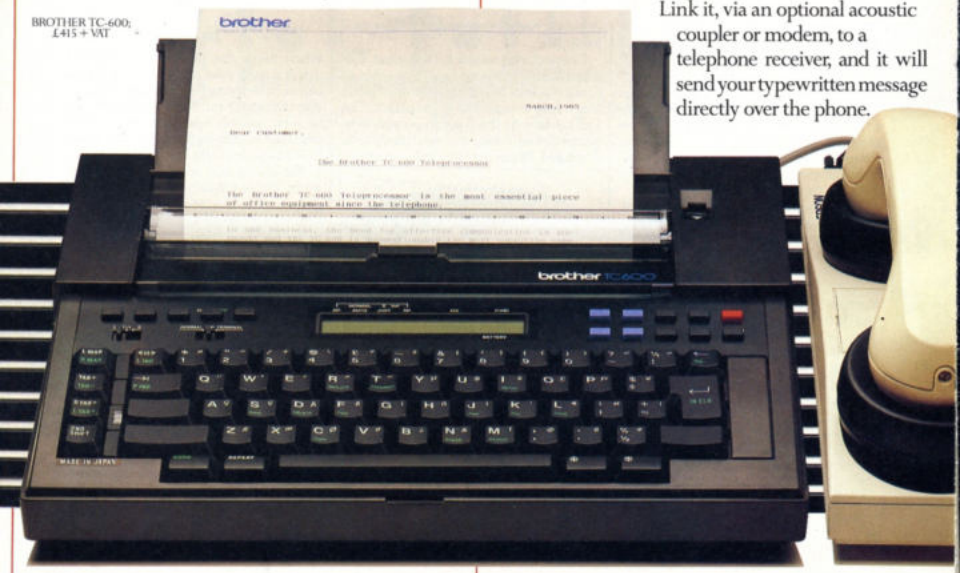
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DEVIL'S ADVOCATE

The Demon is a devil of a modem, offering the sort of facilities you'd expect to pay a lot more for, says Kenn Garroch.

There has been an awful lot of talk and rumour about what was originally known as the Unicom modem. At last it has arrived, under the name of the Demon. At £57.44, the little devil has controlling software, available for the BBC Micro only so far. That is an extra £23, bringing the total to £80.44. This means the Demon has more facilities than many devices costing twice the price.

First impressions

The review version was set up to work with the BBC Micro, but since it operates through the RS432 port there is no reason why it could not be operated with other systems, with the appropriate software.

Most of the features are software selectable with only three buttons on the front to select originate/answer, baud rate scan auto/manual, and whether Bell or CCITT frequencies are to be used. The latter is probably the reason why this amazing gizmo still doesn't have the necessary little green sticker from the BABT.

Commands preceded with *

ANSWER ON/OFF	Turns the auto answer on or off
BAUD n	Sets the baud rates between 1200/75, 300/300 answer, 75/1200, and 300/300 originate
CARRIER	Waits 20 seconds for a carrier to appear; returns an error if it doesn't
CHAT	Enables a simple terminal mode
CLOSE	Closes all currently open files (*eg* CLOSE £0 from Basic).
DETECT ON/OFF	Enables the auto baud rate detect and select system; also controlled by switch on the front of the modem
DIAL number	Auto dials the specified telephone number
DLOAD name	Downloads a file from the modem and files it on the current filing system
FLOW ON/OFF	Select XON/XOFF
GET	This resembles DLOAD but specifies the file type in the command *ie* GETCPM fnm
HOPPIT	Remove the Zromm from the operating system to prevent clashes with other software
HOST	Gives the calling system total control over the BBC, *ie* similar to *FX 2,1 and *FX 3,1. The difference is that the Beeb retains its use of the keyboard as well — a powerful command
NOVEC	Disables all Zromm interrupts
OFF	Takes the modem off line
ON	Puts the modem on line
PRESTEL	Starts up the built-in Prestel software
PRETZEL	Dials 618 for connection to the London Prestel service
PSS	Auto dials the PSS computer in Slough, then puts the system into terminal mode
SEND	Resembles ULOAD closely except the format is specified in the command, *ie* SENDASC fname
STATUS	Returns the current status of the modem, whether on line, baud rate etc
TERMINAL No	Auto dials the number (No) and puts the Beeb into terminal mode. This is similar to CHAT mode but with a lot more facilities
TIMEOUT mins	Sets the amount of time before the modem automatically hangs up. Can be set between 0 and 255 mins
ULOAD name	Used to send a file to someone else. Three types of protocol are available; normal ASCII text, ASCII-HEX data and XMODEM binary data

In use

The Demon has three wires coming out of the back: one for connection to a telephone socket; one to a 5-pin domino for the Beeb's RS432 socket; and the third is the power supply lead which connects to the mains supply via a 9V transformer. Demon seems to have saved its money on plugs and sockets. As none of these leads are detachable from the modem, moving it around can result in a tangle of trailing wires.

Connecting up was easy apart from getting the RS432 plug into the BBC the right way round (due to the plug's dumb design). After inserting the ROM and turning everything on, a boot message tells us that the lucky old Beeb now has a Demon Zromm V.1.0. Sadly, *HELP Demon Zromm V.1.0 displays nothing about the star commands available.

One of the nice things about the system, as it stands, is the number of bits and pieces hidden inside the system for would-be hackers to find.

Work on the obvious sort of project — such as a Basic program to phone bulletin boards until it gets through — or, in fact, most others is easy. The facilities are instantly available with the star commands (see box).

Documentation

The review system came with the customary photocopied manual that appeared to be incomplete. Not included were *HOST and *GET but Demon says these will be in the final version.

The manual has three sections: a simple overview of how to get started; a complete breakdown of the commands with examples for most; and a set of technical notes on control of the modem. This involves pulsing the RTS line of the RS232 port to control the baud rates and autodialling. There is also a section showing how to program the system from machine code.

Verdict

The Demon modem is an excellent buy for the BBC. Versions for the Commodore 64, the Spectrum, and the Amstrad should be available soon.

The only problems I had were generally caused by entering confusing commands which, perhaps, mucked up the timing. Fortunately, the system is flexible enough to get around almost any comms problem you might have.

REPORT CARD: 1 TO 5

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

Product Demon Modem **Price** £84 for modem and BBC software, £60 for modem only, £4.95 for a disk of board numbers **Supplier** Demon Electronics 01-930 1612.

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  - Popular Computing Weekly 7/3/85

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READING BETWEEN THE LINES

All kinds of text are transferred directly into your micro with the Omni-Reader. Character reference by Geof Wheelwright.

A tough assignment. I collected a large cardboard box holding a device which would eliminate the paperclip office by 'reading' paper documents into text files on a micro.

I was excited by the prospect of being able to have all my favourite reviews, articles and program listings transferred into my micro without the tedious typing bit. I even had visions of selling the filing cabinet.

Oberon International's Omni-Reader is an under £500 optical character reader (OCR) which runs on any micro fitted with an RS232 serial communications interface and a terminal communications program. I tried it with several micros: a Compaq portable IBM compatible, the Tandy Model 100 portable and the NEC PC-8201A portable.

Features

Expecting something sturdy and precise, I opened the box to find a plastic tablet, supporting a plastic hinged ruler with a plastic read head and a series of somewhat confusing LED lights running along the top of the device. There was a whiff of Heath Robinson about the thing.

Moving to the back, I noted the 'interfaces' and function switches. The device has a socket at the far right for the mains (an external power supply generates the necessary voltage), a socket for the read head lead and a full-spec 25-line RS232 D-plug socket. There are also two sets of DIP switches; the first sets baud rate, the second sets communications functions (pitch of type, handshaking, beep on/off, international character set selection).

In use

After fruitless hours trying to use the Omni-Reader I sent out for another — the original review machine's read head was defective. With the new machine, my original frustration soon turned to fascination.

The reader was still hard to use, and I had to move the head across the text at exactly the right spot and at the right speed, but I did get it working, and for a machine costing under £500, I consider that a major achievement.

Using the Omni-Reader is initially like driving someone else's car; you know what you're supposed to do, and what the car should do, but you don't know you must stick your finger in the dashboard and wiggle it to get the turn signal working. It's a matter of getting the knack before you can use the device properly.

The Omni-Reader works off a standard RS232 serial interface and should operate with any machine with a full-specification RS232 or RS423 (the Beeb's serial interface). The manufacturers, Oberon, kept the system 'open' by not supplying any cable as standard equipment. But this leaves it up to you to make up your own cable, with either a standard D-plug or a BBC-style DIN plug on the other end.

The communications protocols are a little unusual, but they seem to work; No Parity, one start bit, eight data bits and two stop bits. Most communications or 'terminal' programs let you set these, but make sure yours does before you invest in the Oberon system.

The difficulty of interpreting the meaning of the LED indicators at the top of the machine could possibly be simplified with a little embedded LCD display, to give an English language reading telling you what's going on at any given moment. And guide rails on both sides of the Omni-Reader, along with a more sturdy ruler, would make the system much less something you have to get the hang of.

I'm sure that having developed this technology for the current machine, we can look forward to an enhanced or more upmarket OCR soon. The basic components are there.

Verdict

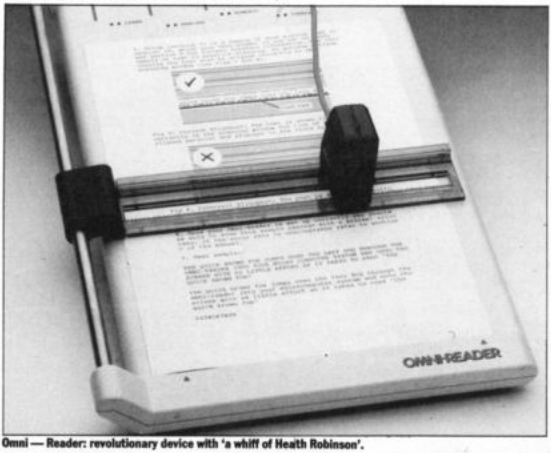
The Omni-Reader is a good idea in need of a few refinements. Because the price is comparatively low, it's hard to complain, but I wouldn't mind paying up to £100 more to make it a little more sturdy and a bit easier to use.

I see the Omni-Reader as the ZX81 of the optical character reader world — it's cheap, it works, but it's difficult to use and limited in its power. I can hardly wait for the 'Spectrum'.

REPORT CARD: 1 TO 5

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

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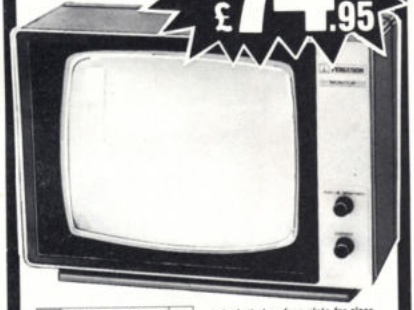
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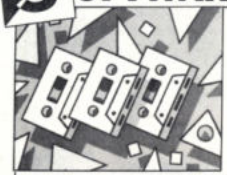
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SOFTWARE PRE-VIEW



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AMSTRAD



Pin Ball Wizard, the first pin-ball table simulation for the Amstrad, is a conversion of the popular Spectrum game. There are five speeds to choose from and the display's colourful. But what a pity Sagittarian Software didn't take the opportunity to offer any different screen layouts. The ball's rather small, but the flipper response is fast.

Sir Lancelot	**£6.95**	**Melbourne House 01-940 6064**
Mystery Of Java Star	**£7.95**	**Shards 01-514 4871**
Pinball Wizard	**£8.95**	**CP Software 0423-57089**
DFM Database	**£14.95**	**Amsoft 0277-230222**

COMMODORE 64



MULE is here at last. It's a sort of cross between *Kingdom* and *Monopoly*, but in a sci-fi setting. There are three skill levels and up to four can play, or you can play against your 64. The aim is to amass dollars by installing MULEs (Multiple Use Labour Elements) for mining or cultivating. Might sound dull, but it's turning more than a few heads and looks set to do well.

No, there's no mistake, *The Hobbit* does now cost £17.95 — on disk. There are over twice the locations, with sound and better graphics.

The Hobbit	**17.95**	**Melbourne House 01-940 6064**
Realm Of Impossibility	**£11.95**	**Ariolasoft 01-834 8507**
MULE	**£11.95**	**Ariolasoft 01-834 8507**
Las Vegas	**£6.95**	**Anirog 0322-92513**
Eiffel Tower	**£7.95**	**Chalksoft 0775-79518**

SPECTRUM



Wriggler is Romantic Robot's first game. Written by Devonshire House, the cassette features original music to listen to while playing the game — shades of Automata. There are four basic locations, some 250 screens and an unusual scenario. As a maggot your aim is to come first in the Annual Maggot Marathon. Also unusual is the loader; ever seen a Spectrum screen load from the bottom up? And the programmers really know their code — the graphics and animation are excellent. Even better, there are surprises throughout. Esoteric maybe, but a sure hit with those in the know—buy it.

The Wriggler	**£5.95**	**Romantic Robot 01-625 9463**
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GAMEPLAY

ORIC

DON'T PRESS Q

Every now and then comes a game with a certain something. *Don't Press the letter Q* is one of them. It's simple, but invokes a love-hate relationship between player and program.

You know you've got something weird from the inlay: 'I set the computer to add "games" to the pathways. With sinister speed and efficiency it created dozens of video games with hundreds of variations and deviations.'

When you load the game its strangeness is immediate: 'Do you like the bomm song?' it asks. Actually, that's just for the background music. 'Do you want to play the standard pathways?' is harder to answer at first.

As far as I can make out, the goal is to achieve 30,000 points,



when there may or may not be a nice surprise. It's easiest to see the game as several games, linked by passageways. Once you've entered one, you must win it to move on. The inlay says there are 35 different video games of over 5000 types, but you'd be a fool to imagine each game is very different. There are 30 beacons in the pathways, but as with the rules for most of this game, you'll have to work out their significance for yourself.

Some of the offerings are a bit simple: for instance, there's one screen where you and another shape move round leaving a trail. If you can force the other shape into a closed area so it's got nowhere to move, you win. Easy.

Then there are Pac-man variants. In one of these you and two ghosts roam a maze littered with power pills. Gobble pills for points, avoid the ghosts and when they're all gone it's on to the next.

Sounds simple? Well, some of the variants are much harder and the evil meter counts down to zero at an alarming rate.

Win a screen and the happy meter is reset to zero. Win or lose, the program makes comments like 'I spit upon your toenails' or 'I mildly dislike your play'. Exasperating at first, but they soon degenerate rapidly to mildly annoying.

It's wacky, difficult and totally addictive. **Bryan Skinner**



Rating 9/10
Price £8.50 **Publisher** IJK 0253-55282

COMMODORE 64

MOTOCROSS

Motocross is an American import and is a cross between *Pole Position* and *Full Throttle*, and lets you do a ton on two wheels. Here you're driving through a scorched desert.

Down at the bottom centre of the screen is the rear view of a forward-crouching, left-leaning, white-garbed motor-cyclist. A closer look just about reveals that he's hunched astride a motor-bike; a growling engine sound confirms it.

Your route across this trackless waste of solidified gravy is marked out at regular intervals by hay bales. A slight push on the joystick and the engine tone rises, the figure straightens up the bike and roars away.

Actually, he stays where he is. It's the hay bales that start moving toward you, giving the illusion that you're racing along. The illusion is intensified by the background scenery (mountains and clouds) scrolling swiftly to the left or right.

The game offers automatic or manual transmission, the latter with three gears. The scrolling of the track and landscape is very smooth and moves at a rate of knots when your bike's going flat out. If you dare to look up,



you'll see a magnification of your handlebars at the top of the screen, complete with working intruments.

Even better is the option to race on an empty circuit or against other computer-controlled cyclists. The whine of another bike as it races up behind, and then past you, is pretty unnerving.

The sense of speed is excellent and the engine noises first rate. Speed freaks, this is one for you. **Bob Chappell**



Rating 8/10
Price £7.95
Publisher System 3 Software
01-735 8171

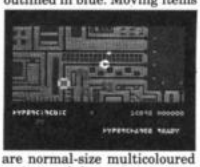
COMMODORE 64

HYPERCIRCUIT

There are some games that look and sound great, but after about five minutes playing you realise that that's all they've got going for them. *Hypercircuit* is one of these.

You control a yellow thingy, patrolling a printed circuit board (PCB). Your task is to defend your PCB from marauding molecules which try to create a fault in the circuit. Strip all this mumbo-jumbo away and you're left with a maze-type game, vaguely reminiscent of *Black Thunder*, but nowhere near as good.

The PCB is a grey background, the tracks are black, outlined in blue. Moving items



are normal-size multicoloured sprites and the various components of the circuit are lined in black, but limited in colour to pink or blue. The home bases (haven't seen them in the latest Maplin catalogue) contain spinning shapes.

The start's pretty standard. The pieces of your patroller come together from all quarters of the screen and it's into the fray.

Pressing fire releases a pellet which zaps off, bouncing down the tracks, blasting nasties.

And that's all there is to the game. The nasties come in various colours and shapes, but they're all the same size. Some (the easiest to handle) follow the tracks at various speeds, according to type. Others fly overhead, and there are mine layers, mains spikes and electro jets which can fire back at you.

When things get really hairy you can zap every track-bound nasty in the vicinity with a hypercharge blast.

The accompanying music is nicely done, fast and furious, matching the action. The scrolling and movement is also well-treated. But five minutes and you've seen it all. **Bryan Skinner**



Rating 5/10
Price £7.95 **Publisher** Alligata 0742-755796

COMMODORE 64

MINDSHADOW

Who am I ? Where am I? No, I haven't just woken up from a heavy night out. I've been playing *Mindshadow*, one of Activision's latest, where the aim is to discover your own identity. It's an illustrated adventure, and disk only — hence the price.

After wandering about on a nicely drawn beach it's plain that it's both desert and deserted. But if you get lonely or stuck you can call up your friendly local Condor, a feathered creature who gives advice, but only three times. As it turns out, the advice isn't always that useful.

Strolling around the island you come across a hut. Nothing much here except some dry straw. Then it's off to the jungle, passing a wrecked dory before ripping off a length of steel. In the jungle you can collect a vine, then it's back to the beach, east to the rocks and down to a cave — you must tie the vine to a rock first. Digging in the cave unearths a map. Examine the map and you see the hut and a set of triangles. It doesn't take much to work out that these indicate directions — if a triangle is apex up it means North and so on.

So it's back to the hut — but climbing the vine breaks it, so think again. . . . Must be more in the cave — yes a small rock with a rough surface.

Following the coded directions brings you to another



beach, and a half-buried trunk with a bottle of rum.

The graphics are good — colourful, detailed and drawn quickly. Some are slightly animated, not up to Melbourne House's *Castle of Terrors*, but the rippling sea and wheeling seagulls look pretty. Five lines of text appear below each picture and you can toggle between text and image by pressing Return. The keyboard response is slow, but you can chain commands together with full stops.

Frankly, I wasn't impressed. Know thyself, goes the adage, but all I know is that without any real challenge I become bored quickly. **Bryan Skinner**



Rating 6/10
Price £19.99
Publisher Activision
01-486 7588

MYRDDIN

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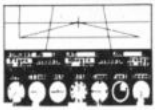
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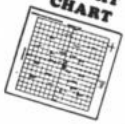
AMSTRAD CPC 464



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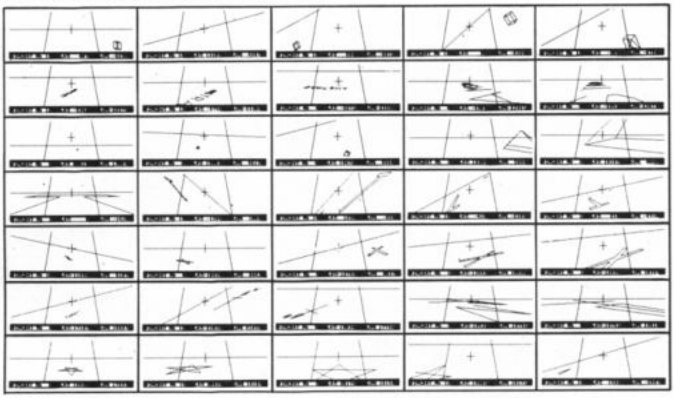


FULL SCREEN DISPLAY



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GAMEPLAY

SPECTRUM

FINDERS KEEPERS

As Magic Knight, you aim to obtain a place at the famous Polygon Table by exploring a castle and collecting treasures for the King's daughter.

At first sight a platform game, this does have some absorbing variations. As well as amassing objects, you examine, drop, sell or even trade them with some of the locals. And you don't start out on your quest totally destitute — your worldly goods consist of a lump of cheese, an Olympic medal and a chunk of catmeat.

In just the early part of my travels, I came across even odder objects: Gordon's Foot (whatever that is), a carving



knife, a philosopher's stone, a pile of mud and a tube of glue. Some interact with others.

A panel at the side of the screen shows the total value of your assets, cash in hand, lives, and energy remaining. The list of objects you are carrying is displayed whenever you attempt to pick up another.

Each room is separately named and has its own screen. Move to an exit on one screen and your knight, looking like Snoopy in armour, pops up in the adjoining room. There are two exceptions. Somewhere in the castle are two mazes, which both feature multi-directional scrolling over several screens.

Many rooms are similar, being differently configured platforms, but there is a good cross-section of ghouls, ghosties and gizmos, and the graphics are clean and clear. Animation is smooth and presentation and screen layout are top notch.

This thoroughly enjoyable game has plenty of depth and interest. Even at three times the price it would still be excellent value. At its budget price it's a smasher.

Bob Chappell

Rating 9/10
Price £1.99
Publisher Mastertronic
01-486 8108

SPECTRUM

A DAY IN THE LIFE

A day in the life of . . . who else but the man who made British home computing what it is, Sir Clive himself. But what a let-down. We've come to expect high quality from the company that produced *Death Chase*, *Full Throttle* and *Codename Mat*, but now the quality's taken a nosedive.

The goal is to steer the balding and bearded head of Mr Computer through some 20-odd screens to knighthood at Buck House. The inlay makes reference to Sir Clive's becoming Dame Commander, an irreverent and irrelevant throwaway line culled from *Private Eye*. Definitely not cricket, and not particularly funny.

First task of the day is to get dressed — dodge the manic television, down the stairs, past the lethal feline and to the cupboard. With clothes donned (not that you notice because all you see is a blue head) a key appears in the attic, so it's back upstairs to collect the key before you can exit screen right.

Each location has tasks which have to be completed in a certain order. For example, to catch the 8.15 you must reach the station cashpoint, then a brolly appears which must be picked up before you can board the train.



All screens use a white background, and the sprites are large, colourful and smooth. There's some clever over-and-under sprite handling, and each screen is tricky to master — though not, I suspect, for a hardened games player.

Moving Sir C about is difficult — there are channels to move through which require precise positioning.

Micromega may want to move away from 'Black Leather' into bright and breezy games, but this is a dodo.

Clare Gurton

Rating 5/10
Price £6.95
Publisher Micromega
01-223 7672

COMMODORE 64

PENETRATOR

An old Spectrum favourite has at long last been translated for the Commodore 64. This version of the classic *Scramble* arcade game has been converted, pepped up and let loose by its original publishers, Melbourne House.

Bearing in mind that there have been enough 64 *Scramble* clones to have filled a dozen caverns, you might wonder whether it was worth bringing one out this late. It certainly was.

For the uninitiated, games of the *Scramble* persuasion have you flying a fighter plane/spacecraft through caverns/tunnels trying to bomb/rocket assorted enemy fuel dumps/missiles. Delete as appropriate.



Penetrator follows this standard pattern with two notable exceptions. No longer do you have to obliterate the foe's fuel depots in order to replenish your own fuel reserves.

In *Penetrator*, you have an unlimited supply of whatever it is that keeps your craft airborne and the flames belching from the exhaust. The fuel dumps have been replaced with rotating radar towers but the deadly ground-to-air missiles are still there — in abundance.

The second innovation is that you can customise the supplied landscape and come up with your very own bespoke cavern complex, complete with newly placed radar bases and missiles. And, better still, your masterpiece can be saved to tape for subsequent games.

There are four sequential stages in *Penetrator*, each progressively tougher. If you're not the greatest player in the world, you can still get to see all the stages by selecting the training mode.

Graphics are well up to par — the scrolling is smooth, the animation crisp. The differing explosions of ground-based and airborne objects are particularly well done while the stirring music does a grand job of keeping the old adrenalin pumping.

All in all, a welcome revival of a classic.

Bob Chappell

Rating 8/10
Price £7.95
Publisher Melbourne House 01-940 6064

AMSTRAD

FLIGHT SIMULATION

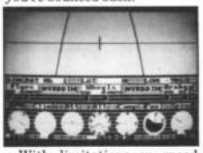
This is the first of its kind, so you have to look at it in a particular light. There are many other flight simulators (especially one for the IBM PC, which seems to have become a yardstick) but they don't run on the CPC464, so they're irrelevant.

Or are they? Since Neil Armstrong crashed a mock-up of the lunar module the game has moved on.

The Myrrdin flight simulator has limitations: the 3D ground-plan is rudimentary, the view forward flickers unpleasantly, and you won't be able to practise much in the way of aerobatics. On the plus side the simulator is easy to get to grips with, performs logically, and has a decent range of performance levels determined largely by the speed you select.

The windscreen and instrument panel are drawn painfully slowly but once you're rolling the dials move smoothly. Take-off is a straightforward matter of opening the throttle and taking off the brakes — landing needs more care, but Myrddin has written in a kind of Immelmann turn whereby touching the ! key switches you abruptly through 180°, so that you can practise landing immediately after take-off.

Besides a manual, the game comes with a map of the terrain — try to cross the edges of the flight simulator's universe and you're bounced back.



With limitations on speed and altitude, and with the ability to execute only a fairly shallow turn, the package is more a test of navigation than of piloting skills. The terrain gives you three runways to try out, but you have to find them first. The landmarks are colour-coded line drawings with token perspective. The controls are simple and easily memorised, but some are like a steering wheel with too much free play.

There will surely be better flight simulators for the Amstrad than this, but as the first of its kind considered in isolation it's an entertaining piece of software.

David Guest

Rating 6/10
Price £11.95
Publisher Myrrdin Software 0793-40661

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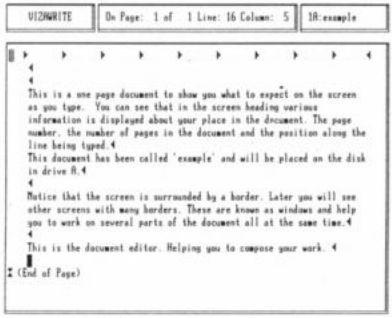
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COMPOSE YOURSELF

Peter Worlock becomes a Mac virtuoso with Musicworks.

From the moment the Macintosh was unveiled its outstanding graphics talents — typified by the icons and *Macpaint* — received all the attention. I suspect there are many who are unaware that the Mac has considerable sound facilities too. Now, after several pictorial software packages, comes *Musicworks* and, as has been the case before, the Mac has brought out the best in its programmers.

Features

Musicworks allows you to compose and play back music compositions for up to four voices, adding a choice of nine instruments and a variety of ADSR envelopes. The bulk of these are preset with two exceptions — on the instrument list are two synthesisers and you can define your own waveform for these.

The choice of instruments is a little unadventurous — fairly easy waveforms like piano, trumpet, flute and chimes — but the sound output is of exceptionally good quality — as the catalogue of dozens of classical pieces demonstrates.

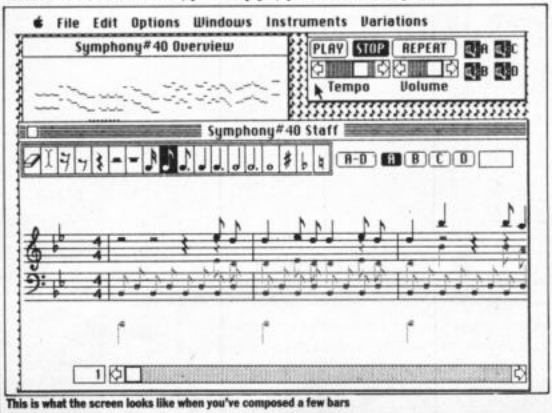
The real power of *Musicworks* comes from the composing facilities where the control is in keeping with the Mac philosophy of icons and mouse movements. Using an on-screen stave and a toolbox of notes and rests, you simply select the type of note you want, position it on the stave using the mouse, then draw in the next one. There are comprehensive editing facilities, too — *Musicworks* is a 'music processor' in the way that *Macwrite* is a word processor and *Macpaint* is a picture processor.

To wrap things up, you can also select a variety of time and key signatures.

In use

If you have any facility for music, *Musicworks* is extremely easy to use. If you don't, then the going is a bit tougher. The major criticism of the package is that there is no way to sound a note immediately, so those of us who like to — or must — play it by ear are at a disadvantage. There are ways around the problem: you can select the current bar and have it repeat while you edit so you can hear what you're creating, but it's a fairly clumsy process.

If, however, you can read music, composing is a dream. *Musicworks* takes all the hard work out of the job, automatically making your piece fit the measure by inserting spaces where necessary, or tying notes across a bar. Using the cut and paste facilities makes repeated sections — especially bass lines — easy. Simply write the section once, copy it to the Clipboard, then paste it into your score where you like.



This is what the screen looks like when you've composed a few bars

You work on one of the four parts at a time, but you can choose to hear either that voice alone, or any combination of the four together.

Having got the music right, you can then fool around with different instruments and envelopes to get the sound you want, and you can change your mind at any time. The Mac multi-tasks to a certain extent too, so you can have the music play while you edit.

The different instruments sound like their namesakes, and the preset ADSR envelopes are useful. They are presented in non-technical language so if you don't know anything about attack, decay, sustain, release, you can make sense of Soft-Short, for example. In addition, there are two percussive sounds.

If you're a non-music-reading musician, a second composing option might be better. This is the Grid, which works like the traditional stave but doesn't require knowledge of crotchets, dotted minims and the like. Down one side of the grid is a piano keyboard and filling in a square next to your chosen key will create the correct note. If you know your way around a keyboard, the Grid will work well for you.

Finally, when everything is the way you want it, you can print out the score showing all or any of the four parts.

The illustrations on this page were produced using a Brother M10009. The Mac is only designed to drive Apple's Imagewriter, but various products allow you to drive Epson compatibles. We used *Epstart* from P&P Micros (0706-217744) as a software driver. However, we've not been able to get other applications on the Mac to drive the Brother with *Epstart*. This may be because there are two versions of the printer; one doesn't support the no-parity protocol demanded by the software.

P&P also sells the Hanzon serial board for the Epson RX-80 and MAC Epson Connection for all dot-matrix Epsons. We'll be taking a much closer look at these in the near future.

Verdict

While the actual sound output of *Musicworks* doesn't compare with what can be achieved with some of the music packages available for the Commodore 64 or the BBC, as a way of using a computer to create music it is outstanding. The combination of the Mac's hardware facilities and the imagination of the programmers has created a program that is fun to use, and a powerful tool for serious musicians.

REPORT CARD: 1 TO 5

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

Name Musicworks **System** Apple Macintosh **Price** £70 **Publisher** Hayden **Supplier** Retail (distributed by Softsel).

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EASY ACCESS

Access to a wide range of bulletin boards and Prestel-type systems is easy with *Specnet*, says Tony Dennis

New software for the VTX5000 means Sinclair owners can access bulletin boards, electronic mail services, databases and even The Source.

Before Prism's demise, the VTX5000 had already dropped from £99.95 to £70. When Prism's old stock comes onto the market, the VTX will probably be one of the cheapest modems yet. The drawback to a VTX5000 was that it could be used only for accessing Prestel services (Micronet/Homelink) or systems that had adopted the Prestel format (ICL Bulletin and Communitel). That has all changed: new 'scrolling' software allows it to be used for accessing systems which don't use pages to display information but scroll text continuously across the screen. Bulletin boards are a prime example of a 'scrolling' system.

In fact, one new package, *Specnet*, was designed specifically to allow VTX owners to access the growing number of bulletin boards which support 1200/75 baud rates. The program is a modified version of Andrew Glaister's *Specterm* which turns any Spectrum into an intelligent terminal for telephone communications use. *Specterm* was published in *Sinclair Answers* but Stephen Adams' version for the VTX never appeared. He is now selling *Specnet* himself.

Features

The most interesting feature is the facility to download or upload files, be they Basic, machine code or text. This is possible through the use of error checking protocols. The protocols go under various names — Xmodem, Christensen, blocksum or CP/M — but they all amount to the same thing.

A number of *Specnet* features are available when you go into EDIT mode. A good example is the ability to stop what you type on the keyboard being sent to the screen (EDIT + N). When you want to see what you are typing again, just press EDIT (shift + 1) and E to make the screen echo the keyboard input. These commands are contained in the instructions, but I found things were self-explanatory, except when it came to file transfer.

Xmodem protocols require certain communication settings. These are: one start bit, eight data bits, no parity and one stop bit. All UK bulletin boards currently support this protocol, so *Specnet* defaults to this setting. However, there is another common setting used by BT Gold, among others. That is: one start bit, seven data bits, even parity and one stop bit. To change *Specnet*, go back into Basic, POKE 26603,123 then RAND USR 26600. *Specnet* can then be used with BT Gold.

Xmodem explanation

The Xmodem method of file transfer breaks data down into blocks. If any corruption occurs, the program detects this and asks for the defective block to be sent again. Ten retries are allowed before the whole transmission is aborted. The effect is that if the download is completed the file must be error free. Using Xmodem protocols takes a good deal longer than transferring files by other methods. Text files where any corruption is easily spotted need not be transferred using error checking. However, Xmodem is an extremely reliable form of transferring software, which is what 90 per cent of VTX owners will want to do anyway. Incidentally, as files transferred with Xmodem protocols are held in tokenised form, it is possible to store a program for say a BBC Micro on the Spectrum, then transfer it to the BBC Micro at a later date.



With Specnet and the VTX5000 you can access on-line services in the UK and the US.

In use

Going on-line with *Specnet* was quite straightforward. Power up the Spectrum with VTX5000 attached. Take the option (7) which returns the micro to Basic. The program is then loaded in the normal manner (LOAD "") after which an introductory menu appears. This contains the numbers of four bulletin boards to try. Keep the modem switched to the Mnet setting and phone the required number. When the board's modem answers, flick down the line switch and the green carrier detect light should come on. The bulletin board's welcoming message should then appear on the screen, allowing you to sign on as usual. When accessing a bulletin board such as CABB London it was necessary to ask for ten nulls to see the text perfectly. Nulls are a stream of zeros designed to give a slow terminal time to catch up. Otherwise things operated very much the same as any other terminal.

Specnet was also used to access BT Gold, the electronic mail service. First, it had to be poked to alter the settings. Then the correct phone number, Gold's 1200/75, has to be used. Once the system's modem answered, I had to flick the line switch down and send a couple of carriage returns (press Enter twice) before the familiar PAD> prompt appeared on the screen. Again, the VTX needed nulls before the text would appear perfectly, but it is easy to get BT Gold to change this or set them up when you first subscribe.

Specnet can be used to access popular on-line services in the US such as The Source or Compuserve. However, it is first necessary to subscribe to Packet Switch Stream (PSS). This is a service which allows the user to make a local call to what is known as a node. From the node it is possible to hook into data lines all over the world. The big mainframe data services are all on some form of PSS system. Naturally, this all sounds very complicated for the ordinary Spectrum user but it works out much cheaper than phoning the US direct.

Software such as *Specnet* cannot turn the VTX into a 300/300 baud modem. This is because baud rates are fixed in hardware. There are no supressed frequencies either, despite what some owners persist in believing.

Verdict

Specnet has the facility to save programs to cassette, Microdrive and certain disk interfaces which follow Microdrive procedure. It does not allow the use of a printer on-line. *Specnet*'s instructions are pretty primitive, and changing protocol settings requires a poke instead of a menu option.

Notwithstanding these gripes, *Specnet* is still ahead of its rivals.

It is unfortunate that the VTX works with only 16K, 48K and Spectrum Plusses because the RS232 interface needed to drive a modem is built in to the modem and cannot be accessed. Because *Specnet* is so new, only CABB carries any Spectrum software, although all the bulletin boards could.

A second software package for VTX5000 owners, by Stephen Gold, is available to Prestel/Micronet subscribers for £2.95. Go to page *600614988# to download. It is scrolling software and has a menu option to allow you to select communication settings. The main difference between this and *Specnet* is that there is no software download facility. It can, however, be used for BT Gold and bulletin boards.

Name Specnet **Application** Communications software **Price** £5.95 **Availability** Stephen Adams, 1 Leswin Road, London N16 7NL (01-254 1869).

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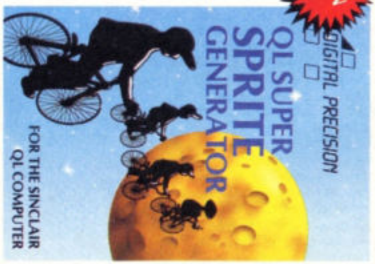
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Atari owner has some disk based software for exchange. Tel: 051-487 8768.

Atari letter quality printer and disk drive wanted, will swap Commodore 64 plus loads and loads of software and tape unit. Tel: Bedford 44060.

Atari 1010 disk drive and tape recorder wanted. Will swap Commodore 64 plus recorder and software. Tel: Bedford 44060. Also wanted antics and analogues.

For sale brand new Atari 64K RAMpack for 600XL. Sold 600XL bought 800XL. Offers: Write to Mr Thompson 23 Arthurswood Rd, Withywood, Bristol BS13.

Atari VCS plus including Space invaders, Pac-man, defender, Yars Revenge etc. Bargain at £120 ono. Tel: Southend-on-Sea, 0702-529598.

Atari 400 (48K) Basic cartridge and manual for sale, pair joysticks including, bargain at £75. Tel: David after 11pm. Tel: 01-948 6654.

Atari software cheap: Airstrike, Bug Attack disks £5 each. Donkey Kong, Submarine Commander, Gorf ROMs £8 each. All excellent originals. Tel: 01-341 0464 evenings.

Atari software to swap or sell. Inc Donkey Kong, Pole Position, Sam Speech synth and many more. Tel: Poole 686423.

Atari Joysticks: Le Stick, mercury-filled, super-sensitive joysticks. Excellent condition. Cost £25 each new. Only £8 each. Tel: 01-341 0464 eves.

Atari software sale or swap. Bruce Lee, Solo Flight, Necromancer, Blue Max. Also disk drive wanted. Tel: 0904-791067, after 6pm.

Commodore 64

Commodore 64 disk software, Microsoft Multiplan £35, Abacus Chartpack 64 £10, Micro-Magpie £20, plus many tape games including Decathalon and Hobbit all at £3 + P&P. Tel: 0628-39469.

CBM64, C2N, joysticks, software worth £90. Excellent condition, lots of mags etc. Worth over £355, sell £270. Tel: Errol on 01-808 4684 after 4pm.

Wanted VIC 20 software, Data base, Bank, Writer, Junior Education. For sale, or swap games. Tel: Grays 892034 after 6pm.

CBM 64 computer + 1520 printer + cassette + many original games + joystick. Owner will split all but games. Recent guarantee £300. Tel: Llantrisant 226067.

CBM 64 to swap. Over 200 games, eg. Soccer, Decathlon, Summer Games. Send list to 25 Boswell Street, Middlesbrough, Cleveland TS1 2HT.

CBM 64 games — swap Scrabble or Grandmaster Chess for Monopoly or Cluedo. Write: David Rawlinson, 37 Campion Close, Bolton-on-Dearne, Rotherham, S Yorks.

Vic 20 software. Unexpanded, 8K and 16K. From £1.50. Programmers Aid £15. Know your IQ, £4. All originals. Quick sale needed. Tel: 021 4540234 eves.

Wanted: Commodore 64 in reasonable condition, no software/hardware necessary. Will pay around £90. Tel: 0745-75425 (Bodfari) after 6pm. (Jon).

Commodore 64, data recorder, Quickshot II joystick, some software: Camels, Beach Head, Karn. All virtually unused: 6 months old. £200.

Commodore 64 + disk drive 1541, + cassette unit, + 3 educational programs, + 2 disk games, + 5 empty disks, + Quickshot 2 joystick. Only 2 months old. Value over £520. Sell for £375 ono. Tel: Peter 01-883 4669.

Vic 20 £50, C2N £20, 16k RAM £20, intro to Basic £7, games tapes £1 each, 2 books £3, joystick £2, £99 lot, swap Spectrum + accessories. Tel: 01-748 7325.

CBM 64 bargains, Easy Script word processor £25 ono. Future Finance finance planner £25 ono. Currah speech synthesiser as new, only £20. Tel: Andy on 0924-402453.

Commodore 64 Stuff: Pixstick lightpen + paintbox and 3 games £30 new; £24 ono. Paddles + 2 paddle compatible cartridges £36 new; £28 ono. Rat Race and Jupiter Lander £11 new; £8 each. Tel: 0823-74410 now.

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Commodore 64 wanted: around £100 for the computer without extras. 1541 disk drive wanted for around £100. Tel: 021-454 0234 (eves).

Vic 20 + C2N, 16K + 8K expansion, £140 worth of software which includes six cartridges. Price £160. Tel: 01-800 7275. Mark, after 5pm. Offers welcome.

Commodore 64, wanted Flightpath 737 on cassette. State price. Nine Spectrum games for sale. Send SAE for list. Contact D. Hoult, 16 Tinshill View, Leeds LS16 7AT.

Commodore 64 owners: Wallie Goes To Rymeland £4.50, Chinese Juggler £4, Aquaplane £3.50, Vortex Raider £3.50, Ripspeed £4, Games Creator £8.50. Tel: 0823 74410. Ask for Steven.

CBM 64 software to swap; 500 games and utilities. American and English titles, disk based. Send list to P. Short, 16 Manor Road, Brighton, or Tel: 0273-672171.

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Oric-1 software £2.50 each including postage Scuba Dive, Harrier Attack, 3D Maze/ Breakout, Hunchback, Hopper, Johnny Reb. Tel: Paul (0373) 71327 evenings. All perfect condition.

Atmos software £2.50 each including postage Scuba Dive, Harrier Attack, 3D Maze/ Breakout. All originals, perfect condition. Tel: Paul (0373) 71327 evenings hurry! hurry! hurry!

Oric software for sale originals about half price. Over 50 games including Doggy, Zebbie, Dambusters Manic Miner, Don't Press Q. Tel: 01-485 5393.

Oric 1 — joystick interface by P.A.S.E. takes 2 joysticks plus 1 free game tape and listing. £12 ono. Many Oric 1 games. Tel: 01-748 7325 (Barnes) Keith after 4.15pm.

Oric Atmos 48K, manual and software. Quick sale wanted. Bargain at £70. Tel: 061-485 5153, and ask for James.

Oric Atmos software Xenon-1, Zorgons revenge, Probes 3, Mr Munch Mr Wimpy, Defence Force, Marc £4.50, each, including postage. No offers. Tel: Bloxwich 406411.

Oric 4 colour printer, extra paper, pens, excellent condition, hardly used £70 or exchange for Atmos. Multimode II, FM,USB,LSB. H Hume 17B Langton Rd, Edinburgh EH9 3DA.

Oric 1 48K, as new, £80 of software. Cassette recorder £30 of books £100 ono. Tel: North 55011 or 164 Cimla Crescent, Neath, W Glam, S Wales.

Oric Atmos 48K six months old, 18 cassette games, Downsway programmable joystick interface, books. Cost £350, £150 ono. Tel: Harthill (0501) 51481. After 6pm.

Oric-1 48K plus cassette recorder, games, books and manuals. Hobbit, Zargons Revenge Two Gun Turtle, Oric Flight, Scuba Dive. Sell £120. Tel: Castleford 514044.

Oric-1 48K micro computer for sale with software, 2 programming books and all leads. Very cheap at £50. Tel: Daniel 021-359 1685.

Oric-1 48K with manual and leads, 7 games, £30 worth books and listings. Cost over £200 — accept £100 ono. Tel: 01-366 7612.

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Others

Sharp MZ-700 computer with built-in cassette unit, lots of software plus instruction manual, all for £180. Tel: 061-370 7022.

Sharp MZ 80K 48K £180 ono. Sordm5, cassette printer cable £70 ono would consider pax for Texas TI 99.4A, software/hardware. Tel: 0480 75036, after 6pm.

Wanted Memotech keyboard and interface for ZX81. Peter Wood. Tel: 01-540 2702 after 5pm.

Memotech software for MTX series, games include Chess, Star Command, Minefield, Blobbo, Goldmine, Nemo, Knuckles, Toado, Kilopede etc. £2.50 each. Tel: Matthew 0622-842823.

Jupiter Ace software — 16K adventure game + Scramble type game £3. Also utilities dissassembler graphics/ screen designer etc. Sae for list. S. Leask, Robinson College Cambridge.

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Gemini database on disk for BBC 32K includes manual and wallet. 100% original. Ideal school or home business. Accept £13.75 ono including postage Tel: 0244-675717.

Amazing bargain, 32 PCN magazines, issues 38 to 71 cost £16, yours for £8 inc p&p. R. Shah, 64 Spring Grove Crescent, Hounslow, London, TW3 4DB.

Sharp MZ 80K built-in monitor recorder, extended Basic over 50 games, worth £500, bargain at £200. Tel: Bradford 0274-598622 eves.

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Newbain Model A, manuals PSU, Newbas Assembler, Chess, assorted adventures, pools and horses forecasting plus two Newbrain books £90 ono. Tel: 0685 73366, after 8pm.

16K ZX81, serviced Jan 84. In working order. Also software and mag. £25 the lot. Tel: 0948-3936.

Texas

Texas TI-99/4A, speech synthesizer, ex-Basic, Chess, Invader, Modules, double cassette lead, list file, Pilot tapes dust cover £100 ono. Tel: Mirfield (W Yorks) 0924 495565.

Texas TI-99/4A computer with modules and cassette software, good condition, also book of programs, £80 or nearest offer. Tel: Haworth 42487.

Wanted TI-99/2R magazines. Anything TI-99/4A computer **TI 99/4A** adventure software for sale. £3.50 as new. Belfast 0232 623001 after 6pm.

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Sinclair

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48K Spectrum includes ZX Printer, Interface 2, Fox programmable joystick interface, Sharp cassette recorder, £100 original games, worth £345, sell for £165 ono. Tel: 0582-660433 (Dunstable).

Spectrum software Hobbit, Valhalla, Psytron, Ant-Attack, Penetrator, Time-gate, Kong, Alchemist, Transam, Zoom, Maziacs, Horace, Scuba-dive, Pengy, Planetoids, Atic-Atac, Quest. Reasonable offers. Tel: (Glasgow) 041-881 6881.

Spectrum keyboard: £20. No soldering. Unwanted gift. Extra shift, space bar, joystick port. Power pack, add-ons fit inside. Tel: 01-661 1032 after 4.30.

48K Spectrum, leads, tape recorder, £30 worth of magazines and £500 worth of software £220 ono. Tel: Pete (0594) 24920 Lydn.

Wanted: Spectrum 48K + leads and manual. Pay £60 ono. Tel: Simon 061-485 3098.

Sinclair QL, as new, with games, sprite designer, machine code tutor, only £320 ono. Tel: 0325-312417 after 4pm.

Spectrum software sale: Sherlock £4; Lomidnight £4; Doomdarks £4; White Lightning £7.50. All originals, also Lo-profile keyboard £30. Tel: Melvyn 0977-511205 (after 6pm).

Spectrum Plus, cassette recorder, Kempston pro joystick interface, Kempston pro joystick, software and manuals. All new. £150 ono. Tel: Neil on 01-886 3052 after 6pm.

Spectrum programmable joystick interface, easy operation, with all games. Brand new, including top software. Bargain £25, joystick not sold. Tel: 01-903 4930 anytime. Pole position wanted.

48K Spectrum in good condition. Still boxed with some games £75. Tel: Byfleet 45386 (eves).

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Spectrum DK'Tronics keyboard £30, DK'Tronics lightpen £15, Microl Use and Learn £5, Protek Hunter Killer £4, CRL Fifth £5. Tel: 01-533 2529 after 6pm.

48K Spectrum 100+ games, Currah speech, joystick and interface, tape, boxed. Worth £450, sell £300 or swap for CBM 64 C2P, 1570 plotter. Tel: Taunton 76455.

Wanted Spectrum 48K issue 4, joystick and other peripherals considered. Tel: 01-373 6354.

3 hour video cassettes. Tel: 0408-21870 (eves).

48K Spectrum (mint condition) cassette recorder and over 50 programs. Will sell the lot for £120. Tel: 0296 623003.

Spectrum DK'Tronics keyboard, Kempston interface, sound box. Over £210 worth of software top titles. Cassette recorder, mags. Worth £450 sell £250. Tel: (0924) 253620.

48K Spectrum Interface 1, 2 Microdrives cartridges, ZX printer, data cassette recorder, 14in Decca colour television, 100 used tapes, £400. Tel: 051-678 0455.

Spectrum 48K plus tape recorder, s/w including Dark Star, Android 2, £90. Tel: Littlehampton 713763.

48K Spectrum + programable joystick + Quickshot II + Interface 1with 1 Microdrive + tape deck + £200 of software and magazines. £215 ono. Tel: Blackpool (0253) 403994.

Spectrum software — 50 originals, cost over £300, sell £2.50 each, £130 the lot. Tel: 0954-81537 after 4pm for list. Ask for Russell.

ZX Printer £20. RAM Turbo interface £14.95. Tel: Lancing 764299. Will post on clearance of cheque.

16K Spectrum 6 original tapes including Horace and the Spiders and Horace Goes Skiing, lots of magazines and books, £55. Tel: Bedford (0234) 59170 after 4pm.

QL software to swap. Write to John Mitton, 11 Afon Street, Trehafod, Pontypridd, Mid Glam.

Spectrum games for sale. 16K and 48K. Spectrum penpals also wanted to exchange software, etc. Tel: Stafford 47351. Write to: 4 Greenway, Littleworth, Stafford, Staffs ST96 3TT.

Spectrum software to swap. Hundreds of titles. Send your list for mine, to Pamela Sellick, 1 Evenlode Park, Abingdon, Oxon OX14 3SZ.

Spectrum software for sale, half price, includes Hobbit, Valhalla, Jetpac, Lunar Jetman and more. Also Saisho DR10 Datacorder (new), £20. Tel: 01-764 9609 after six.

ZX81 + 16K, with software, books and mags, good order, £25. Atari video game, 5 cartridges, joysticks, paddles and keyboard pads, £39. Tel: Emsworth 5897.

Part exchange 48K Spectrum for Oric Atmos, Dragon or Electron. Collect in north west. Tel: Tony Clarke, Warrington 812014.

Wanted ZX81 16K or Spectrum. Exchange for sunlamp Electron A/D converter telescope 20 LPS exposure meter flashgun. Tel: 0408 21870 evenings please.

48K Spectrum £75. **Microdrive plus** Interface 1, 2 cartridges £50. **Lightpen** £15. Kempston interface £8. Sound amplifier £5. Carrycase £8. 103 St Lukes Road, Southend-on-Sea, Essex.

Spectrum software, half price, includes Star Strike, Battlezone, Sabre Wolf, Fall Guy, Dark Star. Also Currah micro speech, £15. Tel: Rossendale 220426 after 6pm.

QL Forth program by computer one original. With manual £40 new, £20 to you. Tel: 0379 2898.

48K Spectrum + recorder + Kempston joystick interface + competition pro joystick + Quickshot joystick + original software + books on machine code, and lots of listings. Cost over £250, sell for £129. Tel: 01-254 9750.

Microdrives wanted. Must be in good working order, please write with price to: M Whiffen, 14 Rivey Way, Linton, Cambridge. Other items considered.

Spectrum Interface One and one Microdrive, £63, which includes postage. Tel: Mick on 01-595 6451.

48K Spectrum Turbo Cambridge interfaces sound box. Computer case, books, mags, 3 joysticks, 22 games, cost £400, sell £230. Tel: 01-272 4592.

Eight ZX81 games for sale including Pilot, Defender, Scramble and others, £18 the lot. Tel: Keynsham 61010 for complete list and ask for Rob.

Spectrum computer plus RAM-pack plus 10 games, tapes and two books, £130 ono. Tel: Jason on (041) 776-6502.

Wanted ZX printer, cheap, in fully working order. Paper if possible. Write to Colin Townshend, 90 Cambridge Avenue, Gidea Park, Romford, Essex.

3 QL joysticks for sale, £12. Tel: 01-954 3600.

Wanted Spectrum penpals: over 14 years old. To exchange tips, software, etc. Write to Tony Carlick, 236 Central Avenue, Southend, Essex SS2 4EB.

Alphacom 32 ZX style printer. One year old, perfect condition, with full roll of paper. £45 including P&P. Tel: 0742 361178 (Jez).

ZX Spectrum 48K and software collection including Ghostbusters, Chiller, Blockbusters etc. Sell for £100, no offers. Tel: 01-550 1823.

Sinclair wanted: Spectrum 48K, £60 offered. Tel: Dave 051-424 5558 daytime.

48K Spectrum Dk'tronics keyboard, Kempston interface, Kempston joystick, reliable data recorder £50, software worth £275. Sell for £175. Tel: Hornchurch 72626 after 5pm.

48K Spectrum For electronics keyboard, cassette recorder, Interface 2 + joystick, original software (£150+), books. Worth £420+. Want £220. Tel: 07073-36308, and leave phone number. May split.

Sinclair flat screen pocket T.V. Boxed with earphone, case, month old battery unused. Quick sale, only £69 (R.R.P. £99.95). Tel: Glasgow 649-0037 after 6pm.

Spectrum games Jasper Strangeloof, Fyjamarama, Kentilla, Factory break out, and many others. Half price: write Jack Lockerby, 44, Hyde Place, Aylesham, Canterbury, Kent CT3 3AL.

Sinclair Spectrum 48K Stack light rifle, electronic rifle and games, used once £24. Sale due to computer change. Tel: 01-502 2681 evenings.

Sinclair interfaces 1 and Microdrive, 3 cartridges, little used, still in guarantee period, £65. Tel: Bristol 0272-562763.

Saga Emperor keyboard for Spectrum, unused duplicated gift, £45. Tel: Malvern 06845 68095 after 6pm.

Spectrum software for sale or exchange, including Knight Lore and Zeus assembler. Especially wanted: White Lightning or Machine Lightning. Tel: 0872-78520.

ZX printer for sale. Needs slight attention. Yours for £10 including P&P. Write to: R. Shah (RISCS), 84 Spring Grove Crescent, Hounslow, London TW3 4DB.

ZX interface II, new, still in packaging. Unwanted gift, £15. Tel: 051-652 0538.

Spectrum 48K, printer, Quickshot II joystick, programmable interface, and over £600 of software, including KnightLore Underworlde, White Lightning. Everything boxed with full instructions. Bargain £220. Tel: Brighton 32505.

Wanted Saga Crusaded or Lo- Profile, Spectrum 48K keyboard, good condition. Pay up to £30. Tel: after 7pm 01-806 3523.

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QUIT

Commodore is so badly overstocked with machines these days that it's having to give them away. Why, only last week it donated two gratis to a lucky beneficiary Somewhere in the South of England.

Since the recipient of these two machines was none other than the Prime Minister, and since the systems were the one millionth and two millionth boxes to roll off the Corby production line, Commodore might argue that the gift was more in the nature of a memorial than a clear-out. But Mrs Thatcher obviously wasn't impressed — she immediately passed the machines on to the Pope John School in Corby.

Which raises an interesting question, in a roundabout sort of way. The background is that a young Commodore employee called Carmella Polcaro, said by the company to be 17, helped to make the presentation to Mrs Thatcher. The company further says that 'Carmella has worked for Commodore in Corby for 18 months.

This sounds like a return to Victorian values, and Carmella must think herself lucky that she isn't being sent up chimneys. The school leaving age in this country is 16. Carmella's 17 years, minus the 18 months she's worked for Commodore, leaves something in the region of 15½.

Is Commodore, the holder of the Royal Warrant, dishing out machines to the Pope John School on the one hand and enticing its pupils with job offers on the other?

After a slow start to the year, the software scene has picked up recently with some titles that look good enough to stick around for a while. But that isn't enough for the pranksters at Coventry software house PSS. They seem to regard it as their mission in life to brighten the gloomy days of everybody involved in the home computer business.

Their latest bid for stardom is the release of 'a frightening conflict simulation' called Theatre Europe, in which the curtain comes down on us all.



Overwhelmed by your response to the last Laughline competition, we're striking while the iron's hot — here's another chance to win £20 for the funniest caption or speech bubbles to go with another photograph.

If it helps, the pic was taken inside manufacturer Maxtor's European repair shop, but don't let that cramp your style. It can be anywhere you want it to be (but we won't accept recycled cow jokes).

Send your entries to *PCN* at 62 Oxford Street, London W1A 2HG — we'll announce the winner in issue 109.

SYNTAX ERRORS

We printed an out-of-date telephone number for Microsoft in issue 103's report on the MacEnhancer. The code, 07535, is okay, but the number should be 59951.

In our report on the last days of the Ace last week we overlooked: Boldfield's telephone number, 0223-61175; the fact that the £35 doesn't include VAT; and Mr Downham's Christian name, which is Paul, not Peter as printed.

In our Demon review on page 28, the example given in the CLOSE command should read CLOSE#0, while TIMEOUT mins should generate an error after the set time.

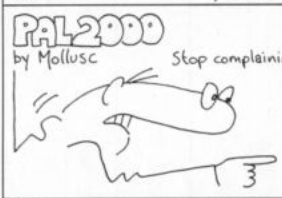
NEXT WEEK

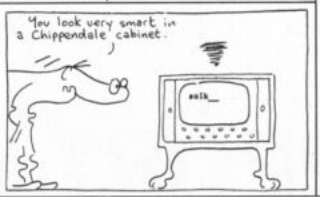
Memotech memory
Pull your Memotech together with this assembler listing for one of the UK's most neglected personal computers.

Sound archive
In our Workbench DIY section there's a blueprint for sound on the BBC Micro.

Win a Penman
One of the peripherals that impressed us most last year was the Penman Plotter — now it can be yours, as the prize in the latest *PCN* competition.

Basically sound
Basic 2.0 for the Macintosh looks like a significant step forward for the language they can't kill off.





PCN DATELINES

Event	Dates	Venue	Organisers
Info 85	March 26-28	Olympia, London	BED, 01-647 1001 647 1001
6809 Colour Show	March 30-31	Royal Horticultural Hall, London SW1	Computer Marketplace, 01-930 1612
London Festival of Computing The London Computer Fair	April 9-20 April 18-20	Various Central Hall, Westminster	Contact Jim Lagden, 01-240 8206 Patricia Spilsbury 01-303 8849 Prestel page No. 81018
Computer Assisted Learning Exhbn	April 11-13	East Midlands Conference Centre, Nottingham	Dr Phillips, Shell Centre for Mathematical Education, Univ of Nottingham, Notts NG7 2RD
Info/Comm Europe	April 14-18	Milan, Italy	Cahners Exhibitions, 01-891 5051
Saudicomputer 85 — Second Computer and Computer Graphics Show (Trade)	April 14-18	Riyadh Exhibition Centre, Saudi Arabia	Brendan Jennings, OES, 01-486 1951
Northern Computer Show (Trade only)	April 16-18	Belle Vue, Manchester	Reed Exhbns 01-643 8040
INFORMAT	April 16-20	Barcelona, Spain	Feria de Barcelona, Av Reina Ma Cristina, 08004, Barcelona
Computer Aided Production Management Exhibition	April 30-May 2	Wembley Conference Centre	David Houchin, 01-579 9411
Apple 85	May 9-11	Novatel Complex, Hammersmith, London	Pamela Goodwin, 061-480 7863
Electron and BBC Micro User Show	May 9-12	New Horticultural Hall, London SW1	Database Publications, 061-456 8383
Micro City 85 (Trade)	May 14-16	Bristol Exhibition Complex	ASP 04427-73291
Business Computer Show	June 4-6	Earls Court, London	Reed, 01-643 8040

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