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April 1984 85p

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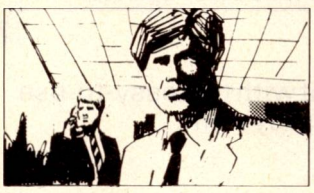

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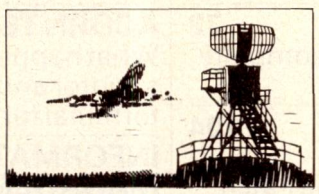

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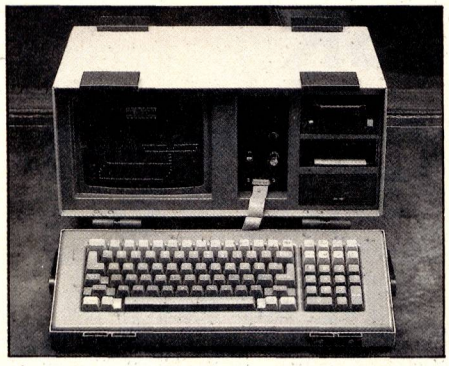

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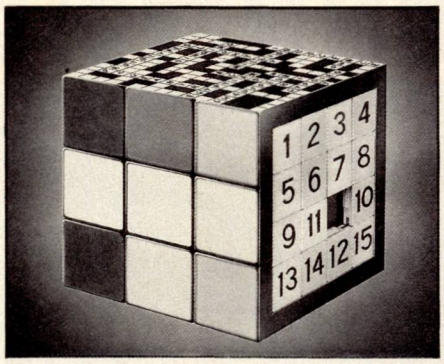

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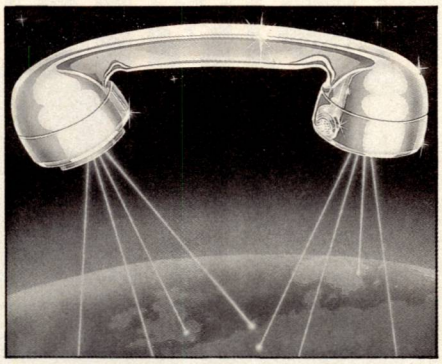

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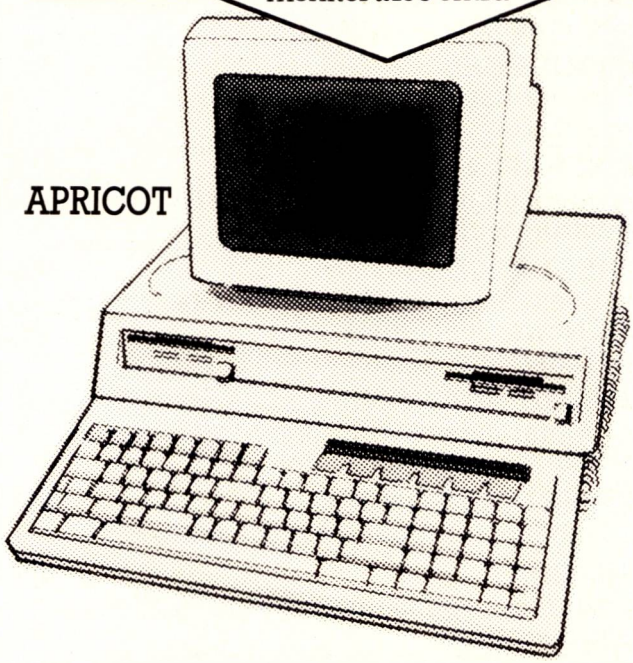

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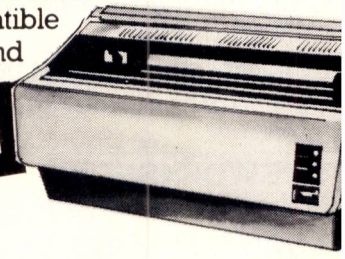

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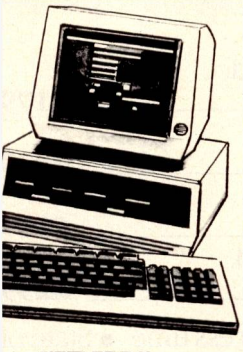

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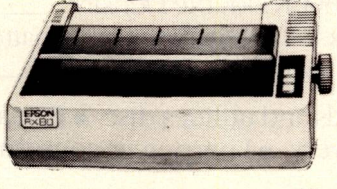

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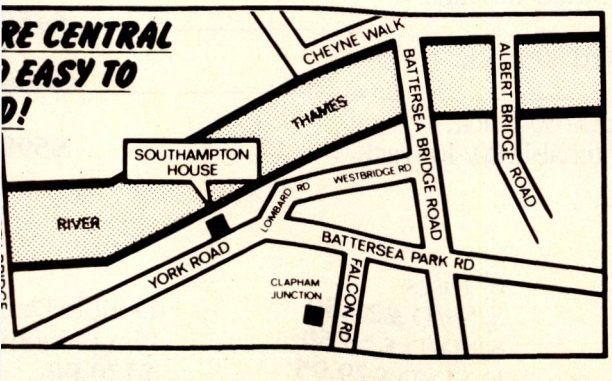

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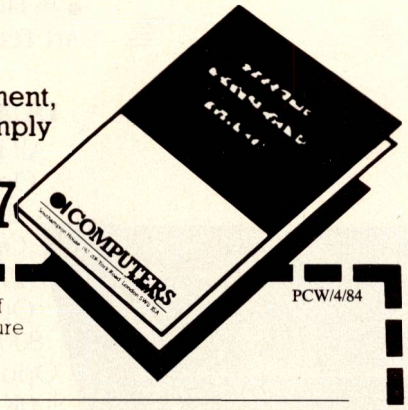

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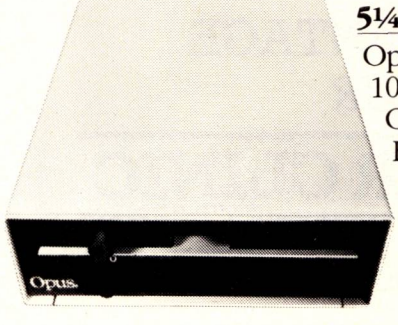

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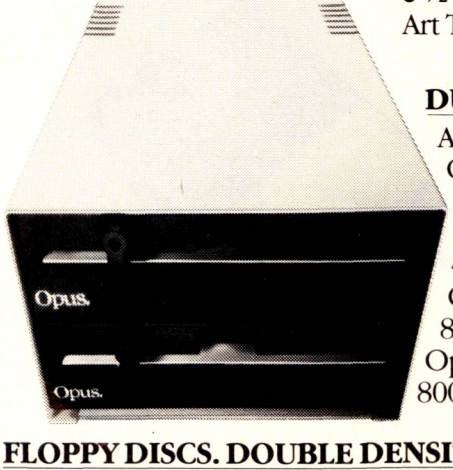

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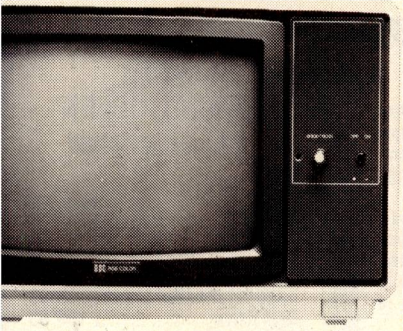

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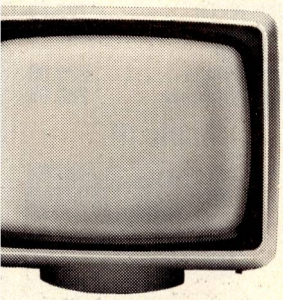

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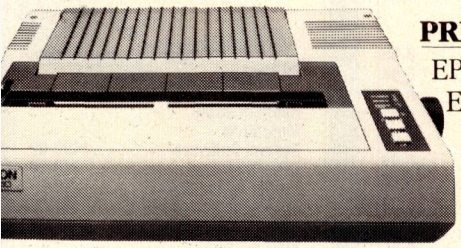

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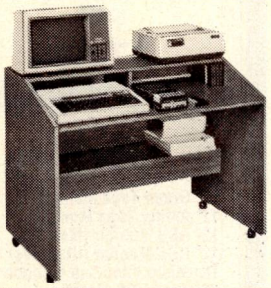

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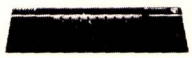

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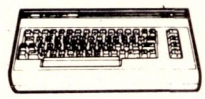

SHARP MX-700

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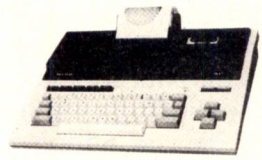

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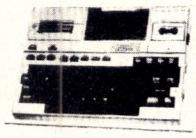

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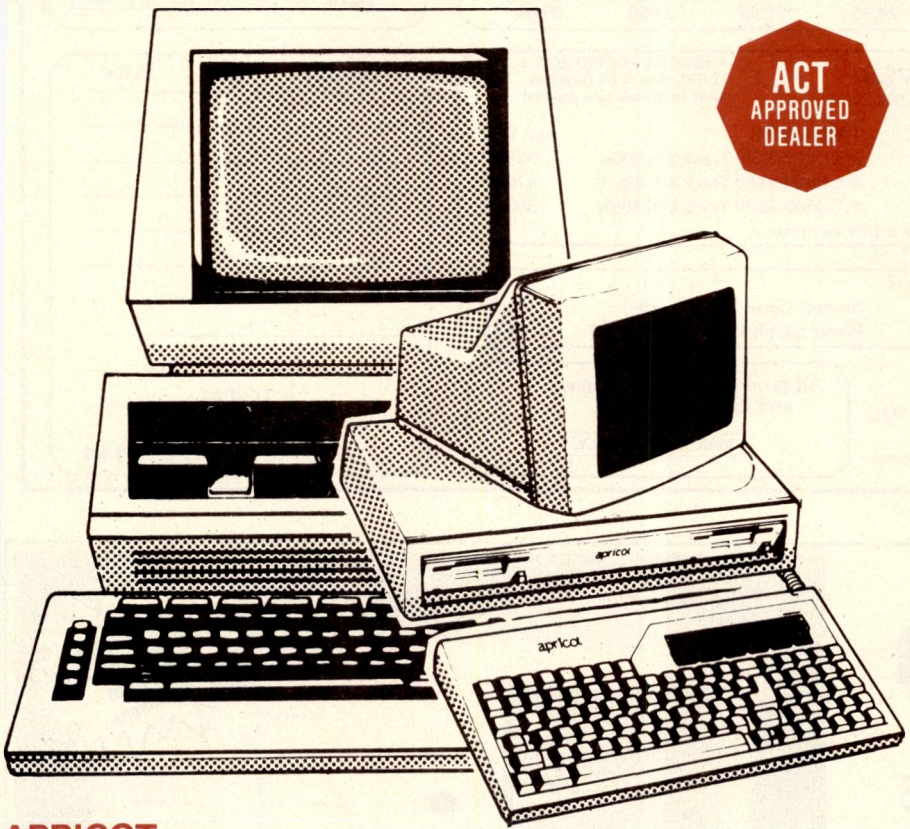

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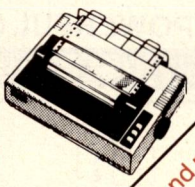

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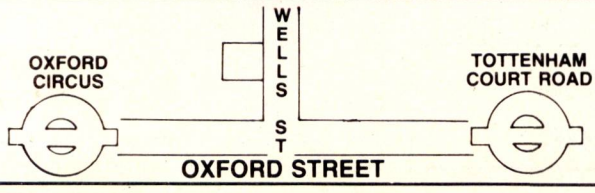

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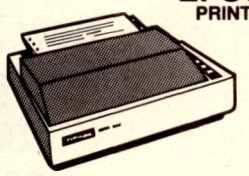

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2.0MHz	225
2.457M	200
3.276MHz	160
3.2768M	150
3.57594	98
3.6864M	300
4.0MHz	150
4.032MHz	290
4.194304	200
4.433619	100
4.80MHz	200
5.0MHz	160
5.185MHz	300
5.24288	390
6.0MHz	140
6.144MHz	150
6.5536M	200
7.0MHz	150
7.7328M	250
7.168MHz	160
7.6MHz	200
8.0MHz	150
8.0833M	395
8.86723	175
9.0MHz	200
9.375M	350
10.0MHz	175
10.7MHz	150
10.24MHz	200
12.0MHz	175
12.528M	300
14.31818	170
16.0MHz	200
18.0MHz	180
18.432M	150
19.968M	150
20.0MHz	200
24.0MHz	170
24.930M	325
48.0M	175
100.0M	375

IDC Connectors:

Speed Block type	PCB PLug with latch Strut Pins	PCB PLug with latch Angle Pins	Female Header Socket	Female Card-Edge Connectors
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10 way	90p	99p	85p	120p
16 way	130p	150p	110p	—
20 way	145p	166p	125p	195p
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24"	219p	235p	345p	540p
36"	230p	250p	375p	595p

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1end	160p	200p	260p	300p
2end	290p	370p	480p	525p

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16pin	10p	42p
18pin	16p	52p
20pin	22p	60p
22pin	25p	70p
24pin	25p	70p
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10	15p	28p
16	25p	40p
20	30p	50p
26	40p	65p
28	55p	80p
34	60p	85p
40	70p	90p
64	120p	160p

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16pin	49p	106p
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28pin	240p	290p
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41612 A + B 2 x 32 way	275p	320p	220p	285p
41612 A + C 2 x 32 way	295p	340p	240p	300p
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2x18 way	210p	175p
2x22 way	215p	250p
2x23 way	175p	—
2x25 way	285p	275p
2x28 way	190p	—
2x30 way	310p	—
2x36 way	360p	—
2x40 way	380p	—

D CONNECTORS: Miniature

	Male 9 way	Male 15 way	Male 25 way	Male 37 way
Solder	80p	110p	160p	250p
Angle	160p	210p	250p	355p
Pins	120p	130p	195p	295p
	Female			
Solder	110p	160p	210p	350p
Angle	165p	215p	290p	440p
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On the ground floor at Morse you can browse through the demonstration hall and try out the TeleVideo TS1605 IBM-graphics-compatible, the new TeleVideo TPC1 portable, the DEC Rainbow 100 and 100 Plus, the DecMate dedicated word processor (we have the kit to convert it to a computer), the Hyperion, the NEC PC8201 hand-held and APC, the Kaypro II, 4 and hard-disk 10, the Hewlett Packard touch-sensitive HP150, the Epson QX-10 with Multi-Font, the absolutely new Sanyo IBM-compatibles at sub-£1000 prices, and the best-selling "4th Generation" Apricot. Packaged programs like Lotus 1-2-3, dBASE II (we are dBASE fanatics), Quickcode, Quickgraph, Friday, Wordstar, Calcstar, Datastar, Infostar, Reportstar, Zork, Deadline, Context MBA, Versaform, PFS Write, PFS File, PFS Report, PFS Graph, Supercalc 1, 2 and 3, VisiCalc and all the Visi's, Micromodeller, Turtle-Logo, Norton Utilities, KnowledgeMan, Superfile, Rescue. Most of these we have in IBM PC-DOS format, MS-DOS and a few others. Also accounting software by Pegasus and Compact. We also have computers, programs and advice for people to whom the above paragraph is quite, quite meaningless! Our prices are extremely competitive and the phone number is 01-831 0644.

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N·E·W·S·P·R·I·N·T

New machines from Amstrad and Oric, a sound box for the Spectrum and a look at the growth in the multi-user market. Guy Kewney reports.



Strategic move

A report categorising the IBM personal computer as 'too expensive to be used by more than a fraction of the office workforce', suggests that multi-user microsystems are usually half the price per user.

The report is based on the US market and, if it had been made here, it would have suggested the same thing about the ACT Sirius — that machine being still the leading office microcomputer at the last count.

Strategic Inc, author of the report, reckons that an IBM personal computer with a local network linking it to other IBMs in the same office works out at $3000 to $4000 per head — obviously including some kind of bulk-buy discount.

By contrast, multi-user machines such as those from Convergent Technologies, Burroughs (the same machine!), Molecular, NCR, Televideo, Onyx 'and a dozen or so other established suppliers', can put computing power onto a family of desks for around $2000 per head.

For a report costing $1500, it has missed the point by several feet.

Strategic suggests (quite sensibly) that 'potential end users of computer systems need to be reminded that IBM is not the only solution to be considered, and that other computer vendors are viable and offer very competitive personal computing alternatives.'

The company quotes itself as a guinea-pig. 'Strategic itself has been able to save over $40,000 by installing Televideo terminals on every employee's desk, and connecting them together via a Molecular Computer (Multicomputer in the UK) multi-user microprocessor system, as opposed to installing IBM PCs.'

But the fact that there are cheaper alternatives to the IBM can't be so much of a surprise to Strategic, that it feels obliged to part with the details only in exchange for $1500!

And to be fair, it isn't. What the report does contain is a mass of statistics which any company manager would find useful, showing where users of micro networks have had problems, and what sort of costs are ahead. And it shows how the different manufacturers differ in their solutions.

But it fails to notice that there really is a difference between the cost of a computer, and the cost of selling it.

And the cost of selling a computer in the minicomputer bracket includes the cost of paying a salesman. And salesmen have to be trained.

The dealers of Commodore computers can tell a tale or two about this. Customers who know what they are about tend to ask irritating questions — questions like 'Why can't I just buy a 64 and a hard disk and an 80-column adaptor and that cheap word processor program and a cheap printer? They ignore the fact that the dealer would go bust trying to pay his salesman's commission out of that sort of deal.

As long as the cost of 'training' is included in the price, single microcomputers will cost more than a terminal plus a share in a community micro.

And as long as that is true, people will buy multi-user micros for large departments.

But one day, when the typical micro costs roughly the same as a typical terminal (and why shouldn't it? It's got screen, keyboard and some circuitry), people who want training will go out and buy it separately.

And, in the meantime, Strategic's consultants are quite right, and the multi-user market will grow.

I rather think however we will see the costs of stand-alone micros plus network coming down very heavily.

And we will see a boom in corporate training.

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Support for APL

Excitement mounts among 'real' do-it-yourself programmers who scorn Basic and use a programming language called A Programming Language ('APL').

Their language is going to be tied into the BBC Micro — once the Z80 version is available.

The APL User group announced this version at its Annual General Meeting, and was expecting quite a fuss to be made about it, because it provides full BBC graphics.

The price of the language is expected to be around £100, and the Z80 basic system is expected to cost under £2000.

The author of the program is Anthony Camacho: however, I must warn readers that the software has been published by Acornsoft.

Acornsoft does not sell software: the company licenses it on terms that



Delighted though I am to see Micronet win an award, I have to confess to a wry grin at the award it did win.

The electronic mail and electronic software distribution side of Micronet is the jam on a very ordinary Prestel service. As electronic mail, it works — just. As software distribution, it is improving as the quality of its stock of programs improves.

'Innovation of the year', even on the top of Prestel, I might buy. But the idea of 'systems innovation' to me carries too much of a suggestion that there is a sense of purpose and organisation about it.

Still, there it is: The Recognition of Information Technology Achievement (RITA) team calls Micronet the systems innovation of the year, and good luck to them.

The photo shows Richard Hease, boss of EMAP (who put Micronet together), receiving the award from David Fairbairn and Ian McNaught-Davis, TV star and computer company chief.

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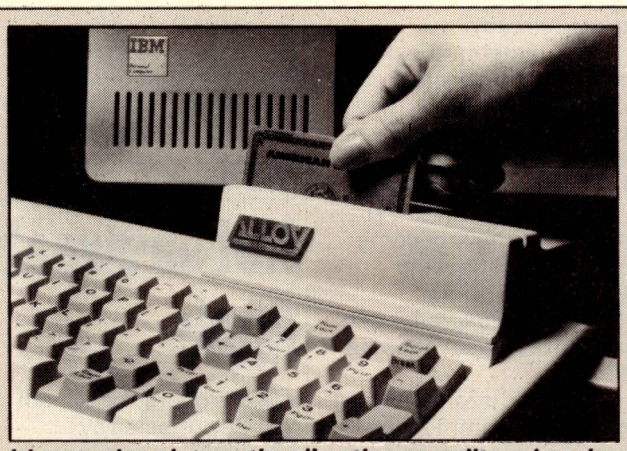

It's a step in an interesting direction, a credit card reader for an IBM personal computer. In America, every shop telephone has one, and the phone automatically reads the magnetic stripe, dials the credit card, asks whether you're good for more credit, and gets the authorisation code.

Thanks to the care with which British Telecom and the DoI protect telephone engineers from computers, getting something that can dial the number is an exercise in frustration. But at least, now, with an expensive computer, you can read the card. Details from Alloy Computer Products, on (0285) 68709.

absolutely prohibit your making backup copies.

Whether the terms under which it imposes this licence are in fact legally enforceable has yet to be tested. However, given Acornsoft's known predilections for taking legal action over this matter, customers would be well advised not to make backup copies.

Other software suppliers attempt to prevent backing up of programs, too, but tend to be less draconian about it.

I know of no other case where a software publisher has taken this beyond the mild deterrence stage, into the High Court, as Acornsoft has done in the case of this publication.

I do not recommend the purchase of software which cannot be backed up, and neither would any sensible computer consultant—especially business software.

Details from Inner Product Ltd, on (01) 673 4047.

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No kidding!

Now that the American builder of the Sirius, Victor, has filed for Chapter XI bankruptcy, the fight for survival by ACT is going to get nasty.

For the most part, the people who might have been frightened by the death of Victor were frightened enough by the mere possibility.

But there were a lot of people who reasoned that 'Victor is still selling machines, in America and in Europe, and so it must be making enough money to be a viable business, once it gets its staffing to a sensible level.'

Apparently, not. The former boss of Victor, Chuck Peddle, was forced by Victor's owner, Kidde Corporation, to retain the network of Victor distributors and the staff.

They will say that it was IBM. It wasn't—it was Victor.

ACT, however, will have to face the dismay of people who really didn't expect this, and will have to convince the world that the Sirius really can be built in Scotland.

Crystal ball-gazing is profitless: but, for the record, I will predict that ACT's survival depends more on how soon it speeds up the Apricot, gets the 'snow' off its screen, and gets version 3 of Concurrent CP/M on both machines.

Concurrent CP/M is set for April. Demonstrations have been done already.

In America, look forward to what Chuck Peddle will do next, having resigned from Victor last Christmas. He is no longer rich, down to his last couple of million dollars. In terms of launching a new corporation, that isn't a peanut. In terms of personal finance, it should keep him in the gambling style he likes for a few years. But that isn't really enough, and I expect to see him start up a new machine, soon.

Whether it'll be another micro, I don't know. I expect his latest hobby-horse, communications, to loom large.

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Alternative plans

Having spotted that the £40,000 Plan 4000 local network was a bit beyond the pocket of most small offices, and that the company wanted something more powerful than Plan 2000, Zynar has launched Plan 3000. This offers a central file server of 15Mbytes (and up) and runs the same software as the other two.

Price starts at around £8500, and details are available on (0895) 59831.

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Spectrum amplifier

For those who like to be able to hear their Spectrum chirping away, the Amplisound box has the extra benefit of switching all the other leads in and out of the box. It saves swapping mic and ear cables, for instance. But it does take its power from the Spectrum. Cost is £26 including £1 handling charge from AGF Hardware, 26 Van Gough Place, Bognor Regis, PO22 9BY, or phone (0243) 823337.

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Atmos error

Initial versions of the new Oric Atmos micro (reviewed next month), with that lovely new keyboard, are likely to be recalled for a chip change in the next couple of months.

The new version includes, among its other improvements, a tape error checking algorithm.

Early users report that this works so well, it finds errors in tapes where there are no errors: so before loading a tape, a program has to be loaded to disable the error checking program.

Later versions of the Atmos will have this interesting 'feature' removed, and the error checking process should work correctly.

Oric has now formed a new joint venture company with Kenure Plastics—to manufacture British micros.

The new company, called M3 (it is sited at the end of the M3 motorway), is expected to make 10,000 units a month—Oric also expects to have to make 20,000 extra units each month, at other sites.

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Come-back

So much for my theory that the Apple II was dead: the corporation has announced worldwide sales of over 100,000 IIes in December.

John Sculley, the president of Apple, attributed the sales to 'a reduction in price and strong dealer promotion programmes'. He also noted that the $2.5 million paid by Franklin 'had been included as income.'

Sculley told me that another contributing factor, perhaps as important, had

N·E·W·S·P·R·I·N·T

been the announcement of IBM's 'peanut' or PC Junior.

That machine failed to impress people who had been postponing the purchase of their Apple, and they went ahead with the Apple.

The result was a first quarter revenue report showing sales up by 48% over the same quarter last year—though profits were heavily down at $5.8 million compared with $23.5 million for last year's first quarter.

Sculley insists that the high figures aren't just a flash in the pan. 'We will sell as many IIe machines as we sell Macintosh machines, this year,' he said.

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Happy family

Brother got very excited about its HR5 printer because it costs £147.

It also runs off torch batteries.

But I would say that printing at 30 characters per second, using a matrix and a thermal transfer ribbon with a life of only 50,000 characters (two medium-size articles in *PCW*), the only reason to be excited about it would be that it is pretty quiet. But talk to distributors Thame Systems on (084 421) 5471 if you must have a portable printer. Or read the review of Brother's EP44 on page 168 of this issue.

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More knowledge

Responding to criticism that MDBS was 'great for storing data, but you need to be a programmer to use it', Micro Database Systems has released Knowledgeman Plus.

The new product is vaguely reminiscent of Lotus 1-2-3, in that it does more than the single function of database (Lotus does more than spreadsheet).

Where Lotus 1-2-3 is a spreadsheet with some data retrieval and some text editing, this product is a database, with spreadsheet and text editing. It also includes a graphics package, and a painting package, in colour.

Tamsys will be distributing the product for 16-bit micros using CP/M-86 and MS-DOS operating systems, and Tamsys director Patricia Oldcorn predicts a Unix version.

The company is also releasing a version of Knowledgeman which software houses can use to build specialist applications.

It isn't user programmable, but it does allow the user as many Knowledgeman functions as are needed for the specialist data processing function it has been turned into.

Details from Tamsys on (07535) 56747.

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QL user group

Quick off the mark: an Independent QL Users' Group (IQLUG) has been formed already.

The founders are well known for organising good user group activities: they are Brian Pain and Leon Heller who originally set up the Tandy Users' Group.

Fascinating to see how quickly they have become enthusiastic about the Sinclair QL. The first newsletter, *Quanta*, landed on my desk a week after the launch.

It included information on the group, a comment on SuperBasic, a discussion of the 'C' language, and an introduction to the 68008 processor chip.

The article on 'C' includes a little program that turns the TRS-80 into a terminal on a phone line, and which, Leon Heller hopes, will 'probably run with little change on the QL, when the Sinclair 'C' compiler comes along.'

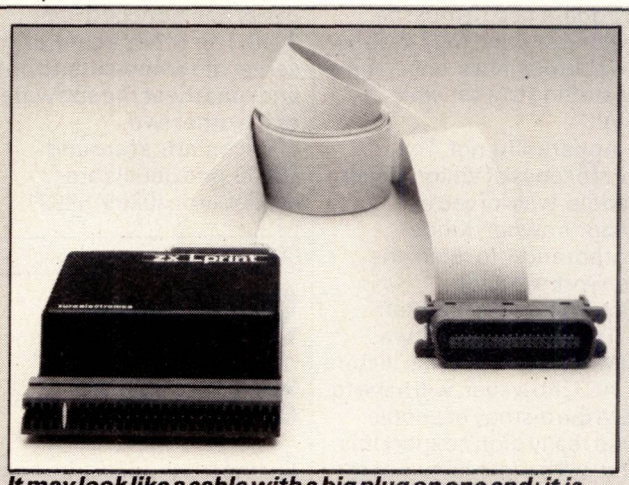
I think it could be fun, however.

The last item in the little newsletter is entitled: 'Thirty-two bits indeed! Who do Sinclair think they are kidding?'

And it quotes Motorola, the maker of the chip, as calling the 68008 'a 16-bit chip with an 8-bit data bus.'

I said there would be arguments about 8-16-32, didn't I?

For details contact Brian Pain at 24 Oxford Street, Stony Stratford, Milton Keynes, or phone (0908) 564271. No, you don't have t have a QL to join.



It may look like a cable with a big plug on one end: it is actually a peripheral for the Spectrum, intelligent enough to take the contents of the screen, and print them on a wide range of ordinary matrix printers. Price, including a Centronics cable, is £45. It also prints, normally. ZX Lprint III is available from Euroelectronics at 26 Clarence Square, Cheltenham, Gloucester. Phone (0242) 582009.

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Not so sweet Apple

Apple's operating system 'can be protected by copyright', according to a legal decision in America.

Franklin made imitation Apples, and Apple sued on the grounds that Franklin used Apple operating software. Franklin counter sued, saying that Apple was guilty of breaking US laws or fair trading.

The decision by a 'third circuit court of appeal' led to a judgement that cost Franklin $2.5 million, paid to Apple.

UK users should contact CK Computers, the Franklin distributor, for details of how this might affect them. Phone (0934) 516246.

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Legal duplication

Discussing the fact that most pirated copies of programs emerge from the supplier and the printer before they are even released is a touchy subject, like discussing one's chronic flatulence at a flower show.

Nothing daunted, a Bradford company has plunged in with reckless honesty, offering a service to software authors—they make the hundreds of duplicate diskettes the author can send to the stores.

That is duplication, not copying. 'The main danger is unauthorised copying,' remarks Jeff Eke, founder of the company, Discform.

'To protect against this, we check every package's original authorship', (you

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Spacing. 2K buffer. bes. selling Daisywheel	£349 + VAT	£395
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BROTHER HR-15

13 CPS. Bi-directional. 10.12.15 CP1 + PS	£344 + VAT	£395
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SMITH CORONA TP1

12 CPS. 10.12. CP1. unidirectional	£208 + VAT	£239

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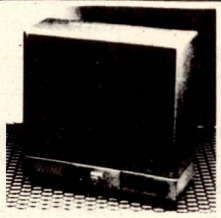

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BBC dual 800K disk drive	£699 + VAT	£803
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* DUP. To copy and rename a file on disc.
* FORMAT. Formating program for 40 & 80 tracks.
* FREE. This utility provides a disk usage analysis.
* MDUMP. Enables you to display and modify any part of BBC memory.
* MERGE. Merge a number of text files into one file.
* RELOCATE. Downloads a basic program to &E00.
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Single drive 200K. 40 trks. double sided	£173 + VAT	£199
Dual drive 400K. 40 trks. double sided	£330 + VAT	£379
Single drive 400K 80 trks. double sided	£199 + VAT	£229
Single drive 400K 40/80 trks. switchable. DS	£217 + VAT	£249
Dual drive 800K 80 trks. double sided	£382 + VAT	£439
Dual drive 800K 40/80 trks. switchable. DS	£408 + VAT	£469

All above drives are low power slimline. (0.3 A typ. at + 12v and 0.4 A at + 5v per drive). Normally extra power supply is not required. the BBC Computer power supply is designed to drive two low power drive (IT IS NOT DESIGNED TO DRIVE INTERNAL ROM BOARD)

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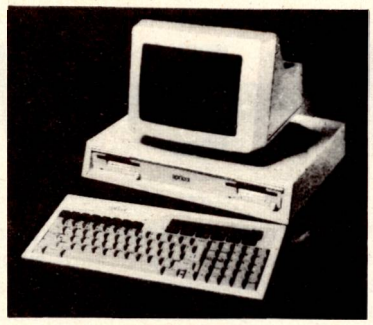

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have to prove you wrote it!) 'and issue a guarantee assuring confidentiality and security of copies' (they don't make a few copies for themselves while they're about it).

Discform makes it sound unusual. Maybe it is. Every time I go to a computer club meeting, I am always surprised to find people playing games which Acornsoft won't even admit it is thinking of writing.

How does this happen? Nobody at Acornsoft would do it, would they?

Discform is on (0532) 451440.

➔➔➔

IBM-compatible Osborne

Osborne has finally unveiled the IBM-compatible version, which it hopes to make in the UK, and sell for £2500. Probable release, if plans go ahead, would be around June/July.

The demonstration I saw was impressive enough up to a point. The machine would load and run any program — provided it didn't use the P-system. Then, quirks of the IBM Pascal implementation occasionally baffled it. 'We're still working on it,' Mike Healy, managing director of Osborne UK, assured us all.

Still it did run Lotus 1-2-3 and Flight Simulator, which often throw other imitation IBMs.

Osborne has also released its Disk-Pac which upgrades the original miserly 100k per drive to a comfortable 400k each.

The system does make the box a little more fragile, with two heads flapping around inside the diskettes, needing to be protected when you travel.

Irritatingly, you can't read data off a new quad density diskette, even off one side of it (it doesn't work in discrete sides) with the original single density or double density machines. IBM you can read, Xerox, you can read. Osborne, you can't. Grrr. I haven't met a 'single-sided' diskette that won't format both sides, yet.

➔➔➔

C you later

Not content with charging you money for the software, a great many people who sell language compilers also want you to send them a share of the money you make selling your own programs, written with their compiler.

This handicap doesn't apply to Desmet C. The language C is popular for two reasons — first, because it is the one that Unix people use, and second, because it is a pretty good language.

At £125, if Desmet C is any good at all, then it must be good value for users of Sirius, Apricot and IBM personal computers.

Going purely on information provided by the distributor, MLH Technology, special features include the ability to write programs that use the 8087 maths chip (an option on all three machines) and the ability to link assembly language routines in.

MLH Technology is contactable in Cheshire on (0606) 891146.

➔➔➔

Special service

Hoskyns, one of the best-known names in the traditional computer business, reckons that the main benefit to be gained by buying micros from itself is the Hoskyns Gold Service.

This involves bulk discounts on IBM, DEC Apple and Hewlett Packard micros, plus printers.

To my mind, however, the really interesting side of Gold from Hoskyns is the 'access to seminars, product updates, onsite maintenance', and also priority access to Hoskyns 'extensive people and machine resources.'

This group has its own range of IT Series software, which it modestly describes as 'the first truly integrated range of personal computer software specially designed for the corporate user.'

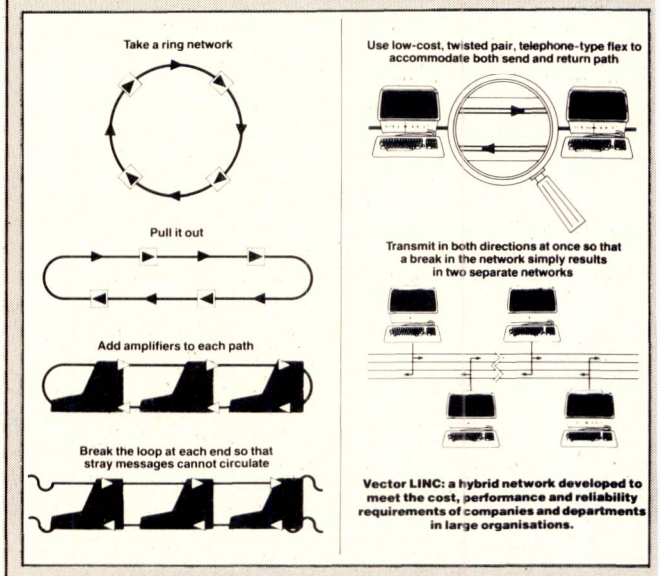
It may be true, even though I've heard the claim more than once before.

The heart of the software is a program called KeepIT, costing £300, which is 'a menu-driven relational database system from Mathematica, the company that produced the world-beating Ramis II database.'

The other nine packages, things like CalcIT at £270 and WritIT (£350) can be linked into KeepIT.

More interestingly, so can independent software products like Lotus 1-2-3 and Spellbinder.

Hoskyns reckons that the corporate user, buying bulk orders of personal computers, currently makes up 70% of pc purchases.



Vector once announced a local area network. Guess what: it linked micros together, not people. So if you wanted to send a message to somebody, you had to know which machine they were using.

Now, 'electronic mail' has been added to LINC, Vector's network. You may wonder why that wasn't the first application for LINC, and the answer is: computer people don't think that way.

Details, for Vector owners, on (07535) 69375.

➔➔➔

Revenge

An enraged publicist rang on behalf of Digital Research, after I reported on Concurrent CP/M and its drawbacks last month.

'Didn't you compare it with MS-DOS directly?' stormed this old friend.

No, I hadn't. 'Why not?' Because the one is concurrent, and the other is not. The one lets me do two things at once, the other doesn't. 'That's not the point!' he argued.

No, I suppose it isn't. I should have mentioned the small point that WordStar

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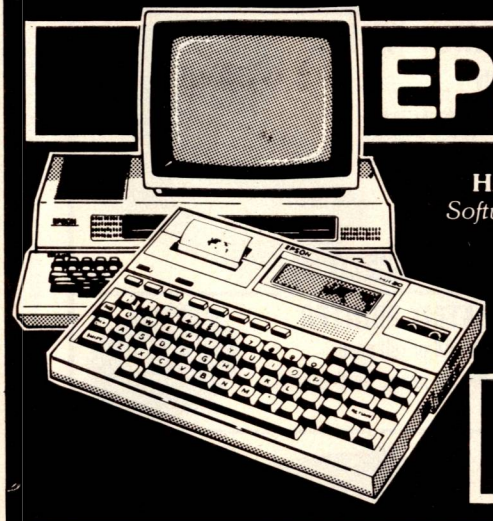

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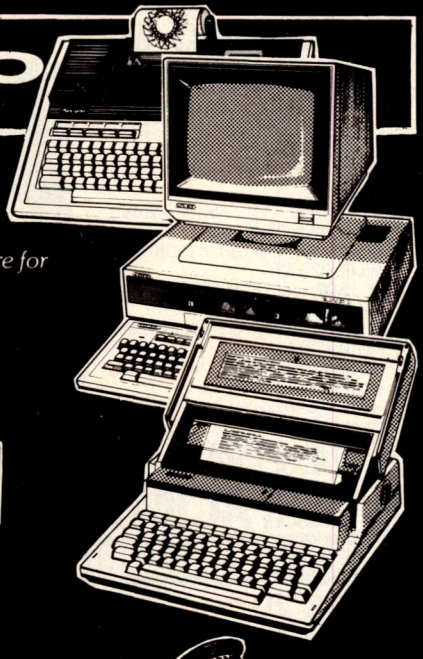

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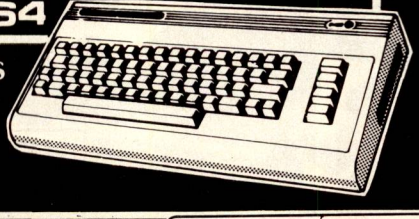

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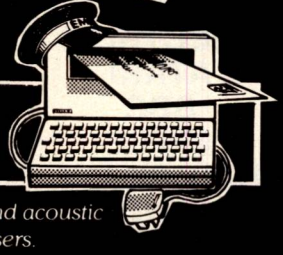

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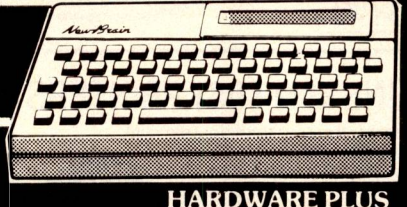

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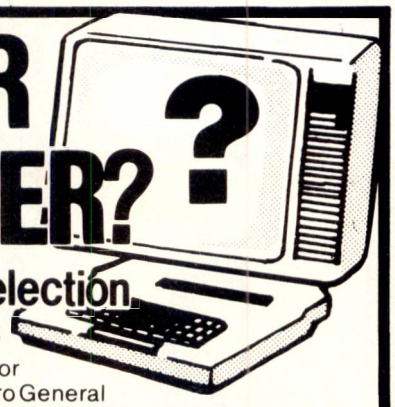

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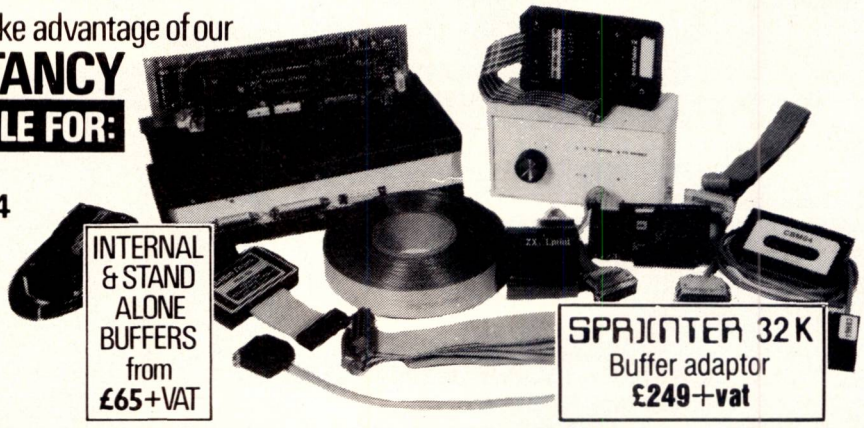

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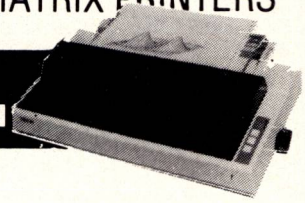

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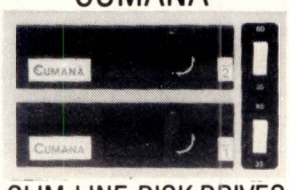

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under Concurrent, even the first Apricot version, runs roughly twice to three times as fast as the MS-DOS version.

The episode was symptomatic of the sudden upsurge in aggression noticeable from Digital Research. The company seems to be smelling blood.

If Steve Jobs, Apple's founder, is right, there will be blood. Just before Macintosh was launched, Jobs predicted that IBM was on the point of dumping Microsoft.

His theory is that PC-DOS is soon to become an IBM product, not a Microsoft one, and that MS-DOS will be separate from, and noticeably different from, PC-DOS. And he predicted that IBM would *not* support windows, but would write its own windowing package.

Jobs isn't the first person to come up with this sort of theory: it is widespread. At press time, neither Microsoft nor IBM had said anything to confirm the idea. Nor did I expect them to.

Concurrent support

One new supporter for Concurrent CP/M is a software house, Graffcom.

The company sells an office management package called O-Man, and an integrated accounting system, ISBS-F. Both are now available under Concurrent.

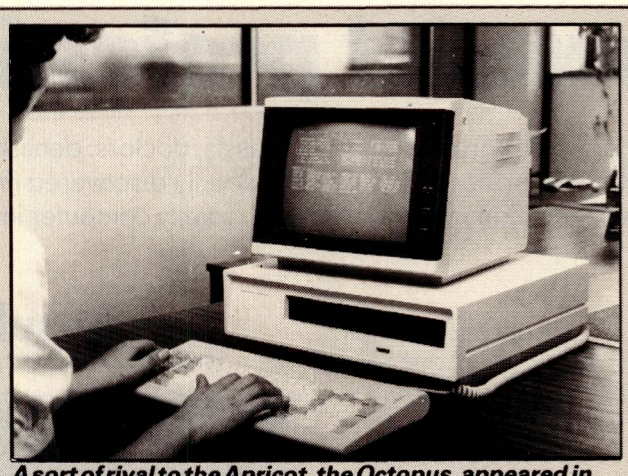
In a sermon which I couldn't have declaimed better myself, Robert Owen, head of Graffcom, pointed out sternly: 'It must be remembered that systems software, like hardware, needs good application software to make it work.'

Manufacturers, he said, are now beginning to install and use Concurrent, 'but this is only a halfway house since you need application software to capitalise on concurrent features.'

He didn't actually say that there is no software available, but he came uncomfortably close, and if I were Digital Research, I might wonder whether I needed friends with quite so explicit a line in praise.

But embarrassing friends or not, Owen is quite right: and at least he has provided word processor, spreadsheet, database and accounting programs which really will run concurrently.

Graffcom is on (01) 385 9422.



A sort of rival to the Apricot, the Octopus, appeared in public for the first time at the Which Computer? Show. It is like an imitation DEC Rainbow.

Like the Rainbow, it uses both Z80 and 8088 (8 and 16-bit) micro chips, and like the Apricot, the sandpapering and finishing varnish has yet to be applied.

It has one more operating system than the Apricot, being a multi-user system as well as standalone. If LSI Computers has built it right, it will be very fast as an 8-bit machine. And LSI has added its own supervising operating system to share tasks to the appropriate processor — this is called Elsie.

If it starts getting dealers, I'll start getting excited. Details on (04862) 23411.

Health and maturity

On another concurrent stage, it distresses me to report that the suggestion by another magazine that Clive Sinclair's QL will run those nice Psion programs all at the same time is wrong.

Concurrent operating systems for the Motorola 68000 family of chips (the 68008 is the one in the Sinclair QL) have been proliferating — Digital Research has just been commissioned to write one, by Motorola itself.

But the Psion software was written before the operating system was ready, and doesn't use it, and is not concurrent.

Word reaches me that it will be.

While Psion is busily converting its business QL software, Digital Research has some time to catch up, by writing a product called Concurrent DOS.

'Written in the "C" language, Concurrent DOS is derived from Concurrent CP/M,' states Digital Research. 'It provides a CP/M mode, and an IBM PC-DOS mode,' the company says. That is designed to let Motorola run IBM programs on its own microcomputer, the VME/10, built around the 68000.

Some people have ignored this side of the news, and have concentrated, instead, on the fact that the deal covers Unix.

Unix, unless we are all careful, threatens to drag computing back into the dark ages, where all micros have to pretend that they are dumb appendages to a remote computer, and can hardly even change a dot on their screens.

However, it does look as if taking Unix seriously is supposed to be a sign of health and maturity, and since Digital Research has actually done a deal with the bit of American Bell holding the rights to Unix, and intends to let people move programs from Unix System V to other operating systems, people are naturally going to say that Digital Research is showing signs of health and maturity.

Windows on ICL

Trust ICL to prepare a microcomputer with the latest windowing version of Concurrent CP/M, present it at the Which Computer? Show, and not tell anybody that they had the operating software up. They said 'we will preview our new 16-bit computer', which somehow failed to strike the necessary sense of 'wow!' So I didn't bother looking at it. Only afterwards, did somebody from Digital Research pass the message on. But I gather that ICL has not actually implemented the windows on its machine.

You can get details of the new machine on (01) 788 7272.

TV licence evasion?

You can watch television on your new MicroVitek Cub colour monitor.

That may not sound too much of a deal, but it does make it a lot more likely that

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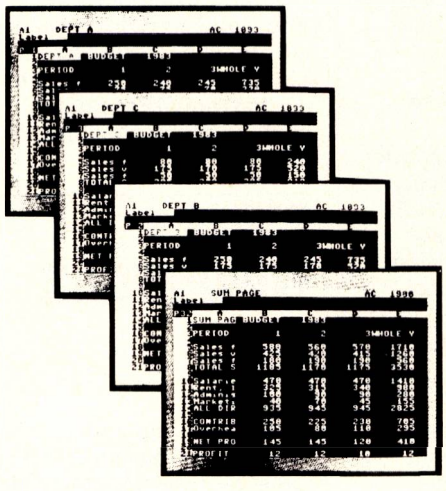

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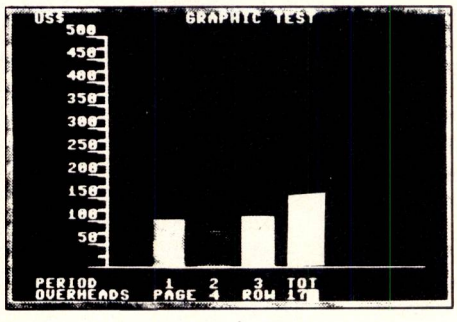

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Thinking ahead

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you can plug the monitor into your computer. Many monitors require very specialised signals to function: the new Cub is very tolerant.

And, if you plug it into your video tape recorder, and tune in a station, you can watch *Call My Bluff.*

Let us hope MicroVitek is prepared for people who will try to buy this thing to avoid paying their TV licence. It won't work, but they'll try. 'I don't have a TV set,' they will say.

Also, there will be people who buy a 'computer terminal' on business expenses, and plug it into the video recorder. Tsk, tsk.

Details on (0274) 727274, and the price is around £250.

Keeping tabs on Abraham

It is no fun for a shop going through the cash register printout or 'till roll' every evening, feeding the information into a computer.

So two people now connect your micro to a cash register direct: Tabs, makers of the famous accounting programs; and Abraham Cash & Computer terminals.

Tabs links in to Omron cash registers. Abraham links a 'Globe' micro to a Gold 81 cash register, with software included. The cash register and software cost £1300. Incautiously, perhaps, Abraham has called the system the 'Golden Globe'—I hope he has a sense of humour.

Details on (0272) 47002. Tabs is on (0264) 64166.

Wren dependent on Prestel

You get three months' free subscription to Prestel and Micronet 800 when you buy the £1000 Wren (Benchtested in this issue). It will dial the number, log on, and get your mail, all by itself.

Honestly, Prism has done all it can for the Wren, building it compact, pricing it low, and being safe and orthodox in choosing CP/M Plus as the operating system. There should be no horrible surprises.

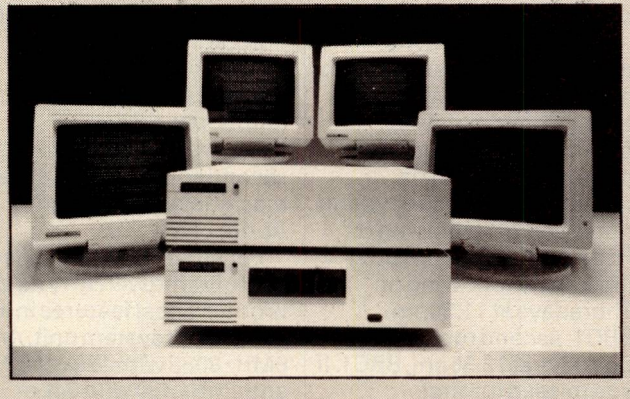
But the future is not in Prism's hands. It depends on Prestel.

One thing you can do with Prestel, if you are lucky enough to be included in the experimental service, is send telexes. So the Wren can be used to send telexes.

But it can't receive them, not yet. And it can't receive messages from people on Dialcom/British Telecom Gold electronic mail, nor send messages. And it cannot send messages overseas, either.

Word is that Prestel is about to do all these things.

If I were Prism, I would hold my thumb. And hope that it all happens soon enough that gangrene doesn't set in first.



Best news for me at the Which Computer? Show was the announcement by the established, respected Data Dynamics, that it had adopted the very good, but hopelessly underrated Sig-Net micro range.

The Shelton Sig-Net design was three years ahead of its time when it was launched: only low-key support and marketing has held it back from fame.

Possibly Data Dynamics can boost it onto the UK scene, if not the world market.

Shelton launched a multi-user version at the Show. Data Dynamics will not only market, but build the micro system.

Details on (01) 848 9781.

Colourful future

The first serious alternative to the Pluto graphics board may be the Magus board, for Sirius, Future Computers, and IBM PC machines.

It provides very low-cost colour graphics at £500, and is the board chosen by Future as its built-in colour graphics unit.

Details on (0225) 60965.

Pascal software for Apricot

Pascal P-system software will now run on the Apricot.

The Pascal distributor, TDI, demonstrated a Peachtree accounting system at the recent ACT show, boasting that 'it took us only two days to transfer the five packages from our development Sage computer (using a Motorola 68000 chip) to the Apricot.'

The software wasn't just demonstration: it costs £800 for the full suite.

Details from Peachtree on (0628) 32711, or TDI on (0272) 276447.

PCW Show news

Hooray! No more cramming into the Barbican exhibition hall (converted multi-storey car park) for the *PCW* Show!

It is moving to the new Olympia exhibition hall, in September. The dates are 19 to 23 September, and the hall really will be ready by then.

It still is the biggest and best computer show in Europe, so cast off your memories of the amazing crush of 1983, and make sure your holiday is a different week. (Also see Show time '84.) Details from Montbuild on (01) 486 1951.

Did he fall or was he pushed?

Nobody actually *knows* anything about why Jack Tramiel left Commodore.

He had been given a nice new red Transam car by his family, and to their astonishment, instead of setting about a day of meetings with people at the Consumer Electronics Show, he just vanished over the horizon.

Speculation which sounds informed to me suggests that he was pushed.

There was no secret of the

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hostility between Tramiel and the company chairman, Irving Gould, who had considerably more shares. And Jack Tramiel's management style annoyed a lot of executives.

But losing something as unique as that management style can only mean an improvement in internal comfort. They will come to regret it. It'll all end in tears. You'll see.

Watch this space

Details of the new Amstrad computer are still hard to come by (Benchtested next month). However, it is known that the new machine is going to be supplied in two boxes—a keyboard plus tape deck in one, a monitor plus power supply in the other.

So there will be one cable from screen to wall, and another from the keyboard to screen.

Price is said to be under £200 for a monochrome machine, but Amstrad boss Alan Sugar will release no details except to say 'wait till 10 April.'

There is also a rumour of a colour monitor, as an alternative to green monochrome, and a very MSX like Basic (MSX is the new Japanese standard, as found on the Spectravideo micro, Benchtested last month).

What impressed me, however, was the man heard boasting in a bar that he took a chess program from the Sinclair Spectrum, and had it up and running on the Amstrad inside a week.

Word is that all the big multiple stores (Rumbelows, Dixon, etc) which carry Amstrad audio equipment, are eager to add this range to their stocks.



Next time Future Computers starts 3-D television advertising, I hope it runs 'future advertising' spots, so that the rest of us have a chance to get our red and green specs out.

The company has done its best to demonstrate Softnet on the system, and has proved that Digital Research still has not quite cracked networks.

And it has put a 120Mbyte hard disk into its IBM 'Thinkalike' box.

Computers in control

Computers in Control, the BBC's latest micro broadcasting venture, aims to show how processing power can be harnessed to mechanical devices. The five part series will be hosted by Ian McNaught-Davis, presenter of the original BBC Micro programme *Making the Most of your Micro.*

Although computer control is a complex technical subject, the series is devised to get ideas rather than theory across, so studio demonstrations and practical projects involving the BBC Micro will be used extensively. Input from industry experts will be combined with outside material on projects under development, such as Team Lotus' work on a computer-based suspension system for its racing cars.

Backup in the form of programme notes and demo software to be downloaded through Ceefax will be provided. The series is in five parts, and each part is repeated twice. The days and times are: first showing on Fridays at 12.30pm, BBC2; first repeat following on Thursdays at 11.30pm, BBC1; second repeat on Sundays at 12.35pm, BBC1. If you missed the first programme on 2 March you can still see its second repeat on Sunday 18 March.

Jerry Sanders

Micro patch

An enterprising patchwork quilt/computer addict has developed a program for designing patchwork quilts. Mary Hewson, who wrote Patbuild, says it enables the user to construct patterns, allocate and rearrange colours and edit and store patterns on tape. Patbuild is available for the BBC Model B for £10 from Mary Hewson, 10 Christchurch Bay Road, New Milton, Hants BH25 7NU.

Margaret Spooner

Deutscher MicroFrame

A cheaper, single board MicroFrame will be on show at the Hanover Fair in April—but it won't have the Tycom logo. Tycom has signed its first technology licensing deal for the new baby MicroFrame, which it designed, with Beta Systems International. The deal promises to yield a MicroFrame for under £2000.

Beta Systems is a Berlin-based electronics manufacturer. This is the first machine it has attempted as it majors on floppy disks and controllers. Beta has plans to distribute the 8088-based microcomputer throughout Europe using its own distribution channels. Tycom said that it plans to reimport the German MicroFrame, effectively its second source, and the first machines will be ready in April.

For around £1750 the new MicroFrame will carry its big brother's best features in a half-height system unit. An 8MHz 8088 with 128k of RAM, and 4MHz Z80 with 64k of RAM will offer both MS-DOS and CP/M as standard—future developments might also bring a 68000 plug-in board and the Unix-alike Xenix operating system in time.

The Microframe's 'heart'—its multi-purpose bus—is more or less the same. There will be a host of interfaces available as standard: Eurocard; RS232; serial keyboard; Centronics parallel port; and the SASI.

The easy way out of the micromaze.



If all Theseus needed to find his way out of the maze was a ball of thread, why hasn't the computer industry come up with something just as simple to navigate the micromaze?

At last it has. Ashton-Tate's book Through the MicroMaze is as valuable to the novice computer user as that ball of thread was to Theseus. It takes you right through the maze and back out again, arming you with the knowledge to protect your business against the evil forces of poor software.

Through the MicroMaze comes with FRIDAY!, software that demands no prior knowledge of computers. With FRIDAY!, you quickly turn your paper files into electronic files. It handles Mailing Lists, Invoices, Cheques, Sales, Inventory, Reports and just about anything that needs to be done.

With FRIDAY!, understanding is immediate. Through the MicroMaze provides the first stage in getting a computer to run your day to day activities. FRIDAY!'s manual takes up the story with a step-by-step tutorial. By the time you've worked through that, you will be running your own applications.

First-rate documentation, simple menus and masses of help on the screens gives you a desktop file management system that is both powerful and easy to use. It works with other software too – with WORDSTAR, with 1-2-3 and, best of all, with dBASE II. So as your business grows your investment in computer software is protected.

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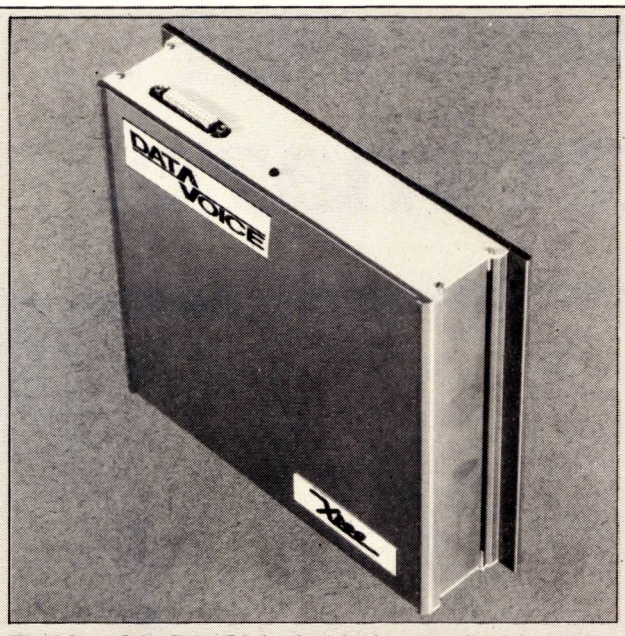

The idea of the Data/Voice box is that you don't have to wire your computers together in an office, because there is a nice intercom system already there.

The system provides networking of a sort for around £100 per connection, according to builder Xtec.

Case does something equally clever, called Grapevine. It is supposed to be faster, but more expensive.

Xtec is on (025 126) 4222.

With three out of four ports free, the new MicroFrame can hook-up directly to existing models.

Peter Williams, Tycom's marketing manager, reckons that Beta Systems will turn out 'no less than 10,000 units in the first two years'. While he was reluctant to give the royalty figure which Tycom received, Williams said that the deal would be worth at least £250,000 'minimum.'

Paul Walton

Rainbow 100+ review

Digital Equipment's enhanced Rainbow, the 100+, is claimed to be a rival to the XT version of the IBM PC.

That 'plus' is the integrated 5 or 10 Mbyte winchester hard disk which DEC has tucked away inside the system box of the original Z80 and 8088 Rainbow—significantly enhancing the performance and speed of its progenitor (you can add your own hard disk too).

Just to recap, the original Rainbow—now called the 100A—was launched with 64k of main memory, and dual 5¼in, 400k, built-in disk drives. Main memory is now up to 256k as standard, expandable to a hefty 896k in the 100+. And DEC took the opportunity of adding some new ROMs in the 100+, largely to add extra functionality of the keyboard.

Field upgrading the Rainbow 100A to 100+ can be bought as a package from DEC. Its field engineers will do the job for you for £2390 for the 10Mbyte version, or the 'special offer' (while stocks last!) of £1290 for 5 Mbytes. A winchester utility program and both operating systems are bundled in.

A unique feature of the 100+, useful for those in a hurry to run either 8-bit CP/M or 16-bit MS-DOS one after the other, is the ability to divide that winchester disk into four separate partitions. Switching on the system brings up a menu-choice of floppy-disk drives A, B, C, or D, self-test option S or terminal emulation option T.

The winchester disk arrives set up to offer two equal partitions of the CP/M-86/80 operating system. These are logical drives E and F to the system, allowing the operating system or an application program to boot directly. Alternatively, there is yet another option to switch to either of the Rainbow's own installed floppy drives called A and B.

In order to repartition the winchester, and store the MS-DOS operating system or applications software, it is necessary to use the winchester utility program (on floppy) supplied by DEC. However, if you run into any problems I found they were answered with the most unnerving courtesy and pace by DEC's customer service.

Ultimately, the winchester might be partitioned in the following combinations: one to four chunks of CP/M; one to four chunks of MS-DOS; one or two chunks of CP/M with the balance being MS-DOS; or just two enlarged chunks of MS-DOS without the original CP/M. The best of both worlds? It's more besides.

On the machine which I reviewed DEC had already loaded both the CP/M word processing package, Select-86, and an MS-DOS implementation of Lotus 1-2-3 which it distributes for the Rainbow. These occupied two of the four partitions available on the winchester. The voracious memory of Lotus 1-2-3 and some demonstration data unfortunately meant that it was not possible to load just MS-DOS alone, and I had to load operating system and application together before exiting back into the system, but this was a small price to pay for the sheer simplicity—and speed—of being able to boot an installed application program.

Another economical feature of the 100+ is the free version of the Select-86 word processing system, found masquerading as the CP/M Editor. DEC explains that an almost complete version of this deluxe (it should be for £418) package is found in the CP/M menu as the Rainbow Editor, or RED.

The Benchmark timings were impressive as you might expect from the 4.815MHz 8088 chip running Microsoft's MBasic-86 (Revision 5.22 and, hence, not the latest) under CP/M-86/80 Version 1.1). The MBasic was running simple integer data, of single precision.

BM1	0.9
BM2	5.7
BM3	12.2
BM4	13.4
BM5	14.0
BM6	26.3
BM7	38.7
BM8	31.6
Average	17.8

All timings in seconds. For a listing of the Benchmark programs, see 'Direct Access'.

Paul Walton

Language learning

Tansoft's Linkword series of language-learning programs for the Oric gets this month's most-wanted program award. Developed by psychologist Michael Gruneberg, who now has contracts with enough software houses to implement Linkwords on all the best selling home and business micros, it's an unprecedented success for a program that retails for £12.95—and includes an audio tape.

Linkwords works by creating bizarre, zany or just unusual images out of English words that sound the same as the word being taught. Imagine having a drunken argument with a friend about whether trout is spelt with four Is. Imagine a lobster with a sense of

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A dBASE II User Group has been formed. For further details contact User Group Secretariat Caroline Tanner on 0908 568866.

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E.H.T.	Minimum 19.5kv Maximum 22.5kv	Minimum 19.5kv Maximum 22.5kv
VIDEO BAND WIDTH	10MHz.	6MHz.
DISPLAY	80 characters by 25 lines	80 characters by 25 lines
SLOT PITCH	0.41mm	0.63mm
INPUT: VIDEO	R.G.B. Analogue/ TTL Input	R.G.B. Analogue/ TTL Input
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Dynatech has launched a program generator that allows its user to create database application programs without having any previous computer knowledge. All the user has to do is define any records or screen layouts he requires and Home Filewriter will do the rest.

The package is available for disk versions of both the Atari and Commodore 64. It costs £39.95

Home Filewriter is the first part of the Codewriter package and allows the user to create, amend and delete database entries whether they be tax records, club membership records or home accounts.

For an additional £60 the rest of the Codewriter package can be bought, along with a backup copy of the first disk. This additional package adds more sophisticated sorting and searching routines, menu creative software and the facility to create formatted reports.

Tony Hetherington

humour. Imagine you had a hairy son holding a hedgehog. If you've managed to do all that, you've learned the meaning of the German words *Forelle, Hummer* and the French *erisson.*

Grammar is described in the same way — it's like remembering the punchline of a good joke. You start as an absolute beginner, and by the end of the program can cope with, for example, 'the pain is in my heart but the thief is with the telephone in the ambulance.'

The programs are notable for their absence of graphics. Gruneberg made it a condition that software houses write text-only programs — it's important for users to form *mental* images. This caused three software houses to turn the project down on the basis that programs without graphics don't sell, but the signs are that they've dropped a clanger.

Tansoft has launched French, Spanish, German and Italian versions, with Portuguese, Swedish and Hebrew to come later this year. However, the first series only takes you as far as the present tense: demand will dictate if or when further steps will be marketed. The programs are available now from most computer retail outlets — or phone Paul Kaufman on (02205) 2261 for further details.

Jerry Sanders

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Copyright protection

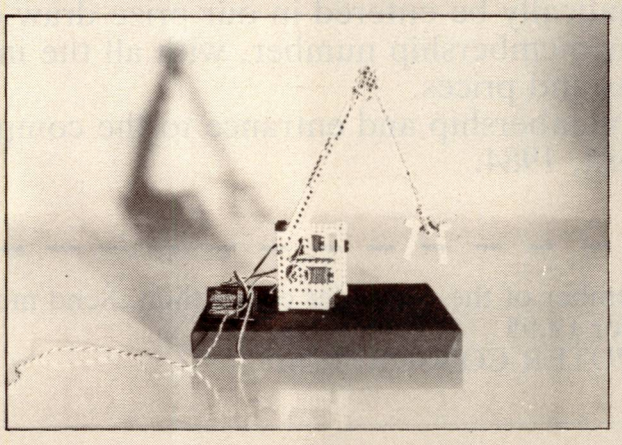
The Government intends to provide copyright protection for computer software, according to John Butcher, under-secretary of state for industry.

Speaking at the Computer Trade Association awards ceremony, at the LET Show in February, he said: 'I know that piracy of software, although a relatively new phenomenon, is causing concern. The UK software industry is a valuable part of the British economy and it is vital that it should have at its disposal the means to prevent illegal copying. The Government is aware of the problems and intends, in the current review of the whole of copyright law, to put beyond doubt that computer software will enjoy copyright protection.'

It is hoped that copyright legislation will be brought before Parliament in the next session. However, final decisions have not yet been taken on all the issues in the 1981 Green Paper and among the difficult questions which remain to be resolved is unauthorised home taping.

A further move to provide software protection comes from the Computer Trade Association which will inaugurate the Society of Software Authors in May, to be affiliated to it. The Computer Trade Association has also established a Software Register which aims to provide a numeric coded system for registering software, similar to international standard book numbers. It will provide proof of the origin date of a piece of software and be a reliable evidential method if required in court.

Margaret Spooner



Everybody who rang me up over the past year saying 'I know you can control a robot with the BBC Micro, but how?' should write to Commotion for details of the Beasty.

It will drive four 'servos' — electric motors that move things a precise amount and no further — and costs a mere £50.

Commotion also sells servos. Full details on (01) 804 1378.

➲➲➲

Mapping out the future

Grid computers has finally released its Compass portable micro in the UK.

The machine has been available in the States for some time and has even managed to hitch a ride in the Space Shuttle. Its major attraction is that it uses a very new (and very expensive) plasma flat panel display. This allows the machine to display a full 80 character by 25 line picture with none of the space problems associated with TV type displays.

The whole unit measures only 11.5ins wide × 15ins long × 2ins high and weighs only 10 pounds. Other technical highlights include an 8086, 16-bit main

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Show time '84

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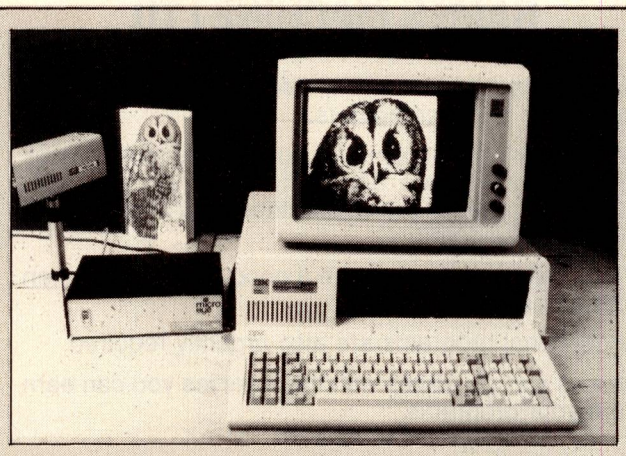
If you have ideas for features you would like to see at the show, we'd like to hear from you—drop a line to Sue Holliday at *PCW*.

Meanwhile, put the dates and details in your diary now:
***PCW* Show, Olympia 2, 19-23 September, 1984.**



The Microsight image-analysis and Microscale image-processing packages (reviewed in PCW, October 1983) are now available for the IBM PC.

The system runs under PC-DOS and requires 256k RAM. A complete system, hardware and software, is available from £1950 plus VAT.

Supplier Digihurst has also announced that the BBC version now supports a resolution of 256×256.

Full details of either are available on (0223) 208926.
Surya

processor supported by an 8087 maths co-processor and 256k of RAM upgradable to 512k. Secondary storage is provided by 384k of non-volatile bubble memory with the option of floppy or hard disk storage. Also included in the machine is a 1200/300 baud modem with integral driving software.

Grid describes the Compass as IBM-compatible (we all know what that means), but it does run MS-DOS version 2 as standard. Bundled software includes a spreadsheet, database, word processor, graphics package and various terminal emulators including IBM and DEC VT100.

The price hasn't been fixed at the time of writing, but it is likely to be *very* expensive.

Details on (0403) 64317.
Pete Bright

Logo for the Atari

Atari has announced a version of Logo for its range of micros.

Atari Logo is very much graphics oriented, with up to four independent turtles, collision-detection, a maximum of 128 colours and joystick capabilities. Atari claims that the quality of the graphics allows users to create video-game quality animated graphics.

The package includes two manuals—an *Introduction to Programming through Turtle Graphics*, and the *Atari Logo Reference Manual*—and retails at £60. A special deal has been arranged for schools and colleges, allowing them to buy an Atari 600XL with Atari Logo for an inclusive price of £175.

Atari Logo recently reached the final of the British Microcomputing Awards 1984 in the Creative Software category. Details on (75) 33344.
Surya



The Vector 4-S dual processor business micro has an automatic shift feature which detects different disk formats.

Foreign letter writing

For the businessman who wants to impress his foreign correspondents, Longman has just announced a foreign language letter-writing program called Tick-Tack.

The system is based on a bank of selected sentences, divided into sections dealing with such matters as prices, delivery, insurance and accounts. Each sentence has a code-number which is the same in all languages. You write by keying in the code of the sentences that make up your letter, and the program converts them into the foreign language text.

Researchers throughout Europe have checked all the target language used to ensure it's absolutely right for currency and idiom: in fact 15 languages have been researched, but those available now are French, German and Spanish.

For £150 (RRP) you get a language pair (English plus a foreign language) on disk, two hard copy dictionaries which reproduce the sentences available, a pair of commercial word lists containing a 200-expression vocabulary and a letter-writing guide for the chosen target language.

If you know a bit of the language already, you can draft up a letter and then personalise it by changing a word or phrase to suit. With a bit of programming knowledge as well, you can expand your disk dictionary pair to fill the entire disk.

The programs are designed to be run from within word processing software, and are available now for Apple II, IIe and III, IBM PC and Sirius. Contact Maggi Turfrey on (0279) 34622 for details of stockists.
Jerry Sanders

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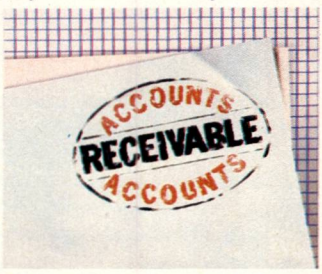

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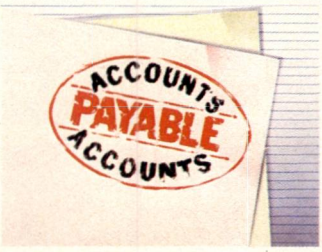

input VAT and, used with the Accounts Receivable package, produces instant VAT returns.

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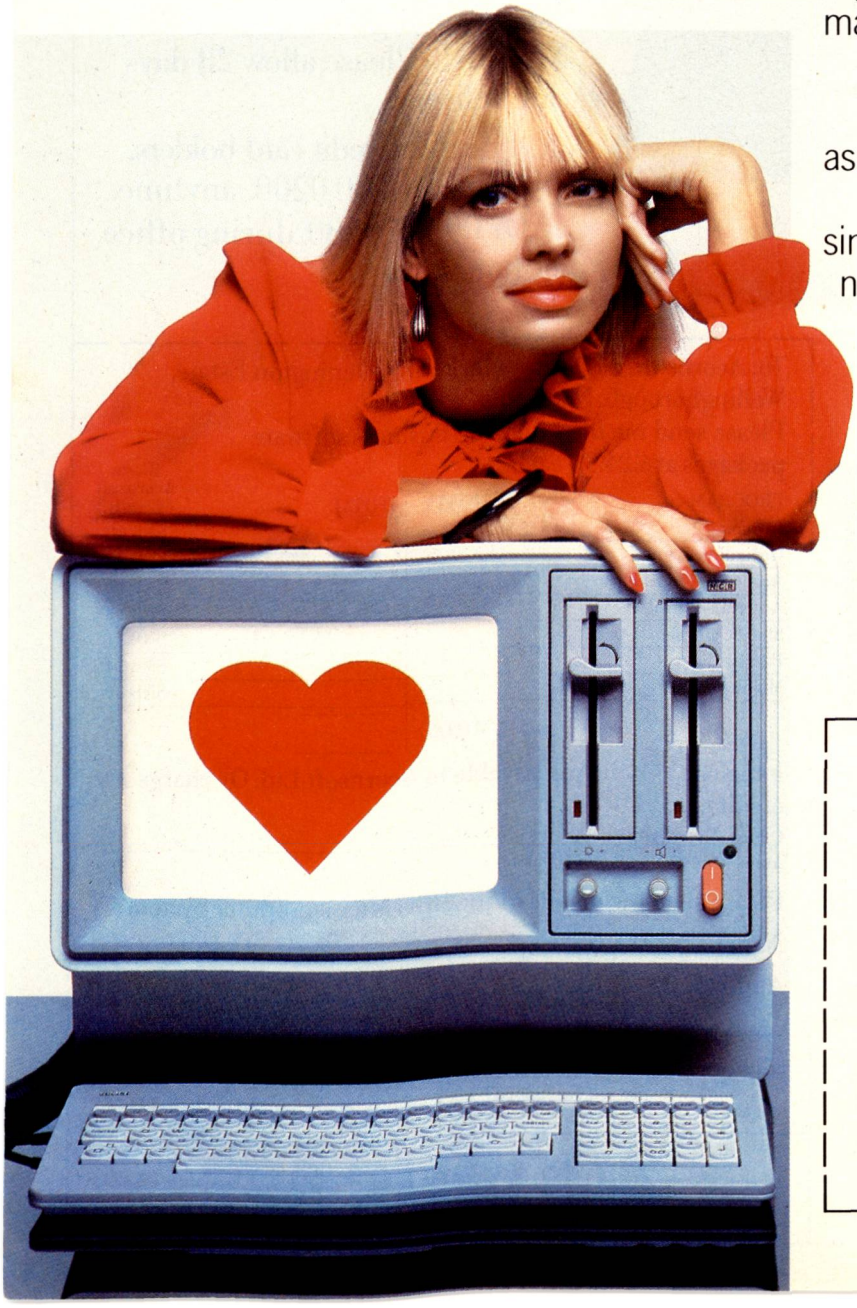

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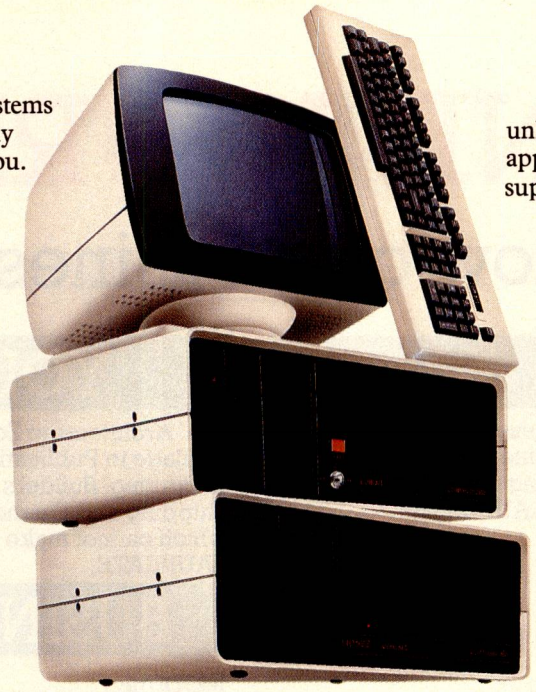

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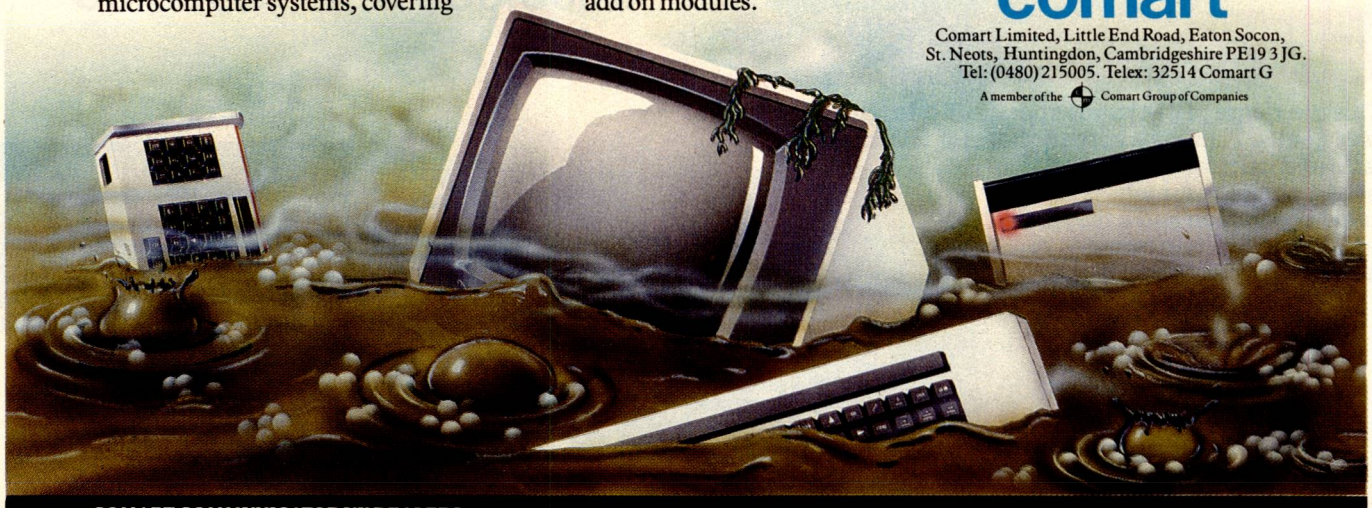

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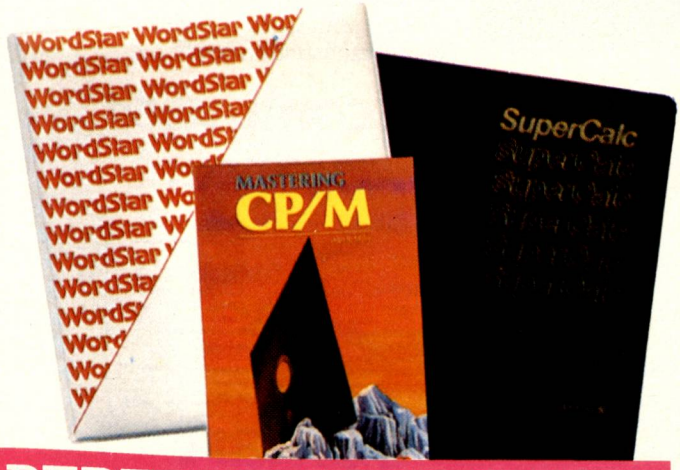

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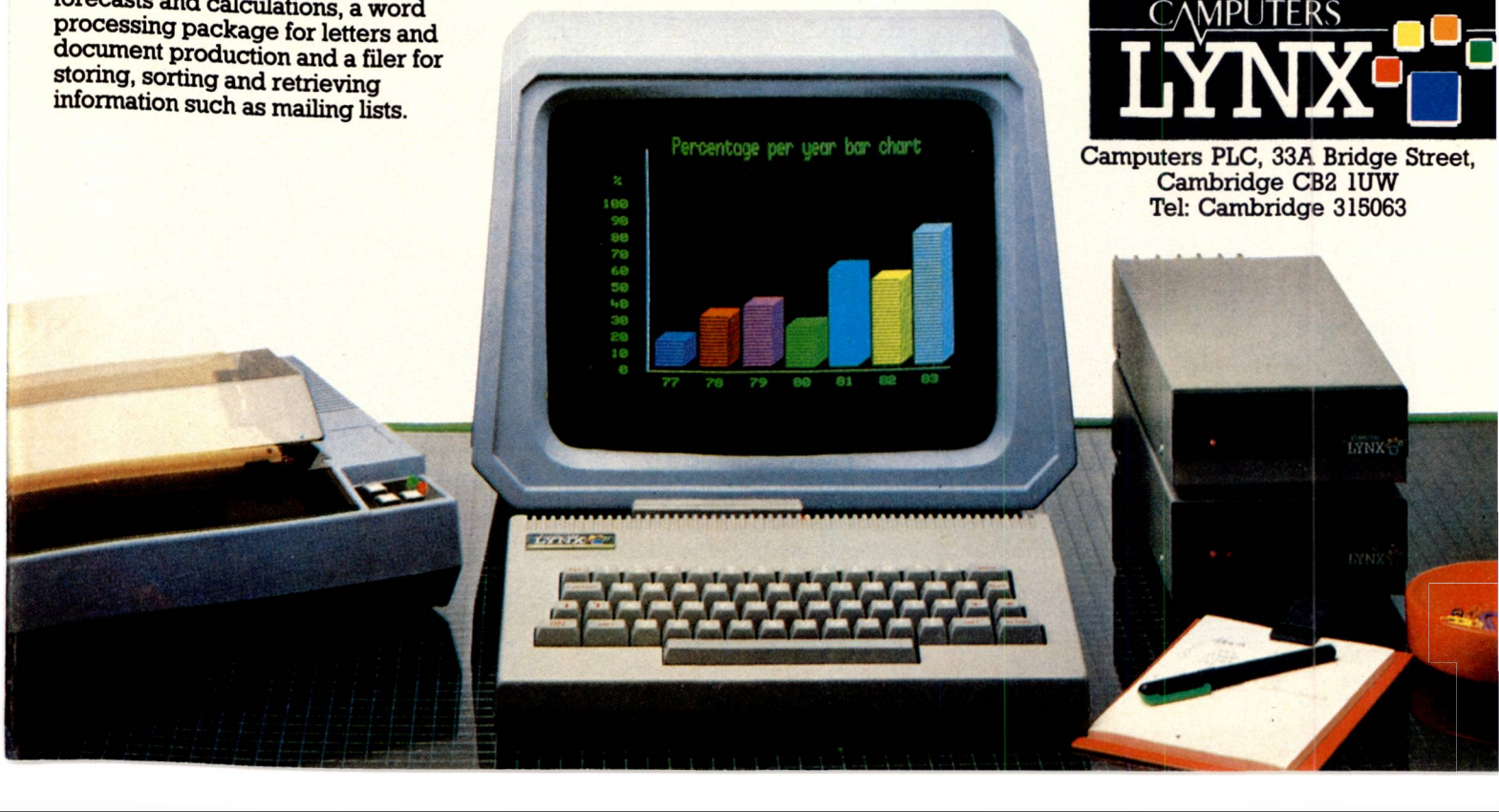

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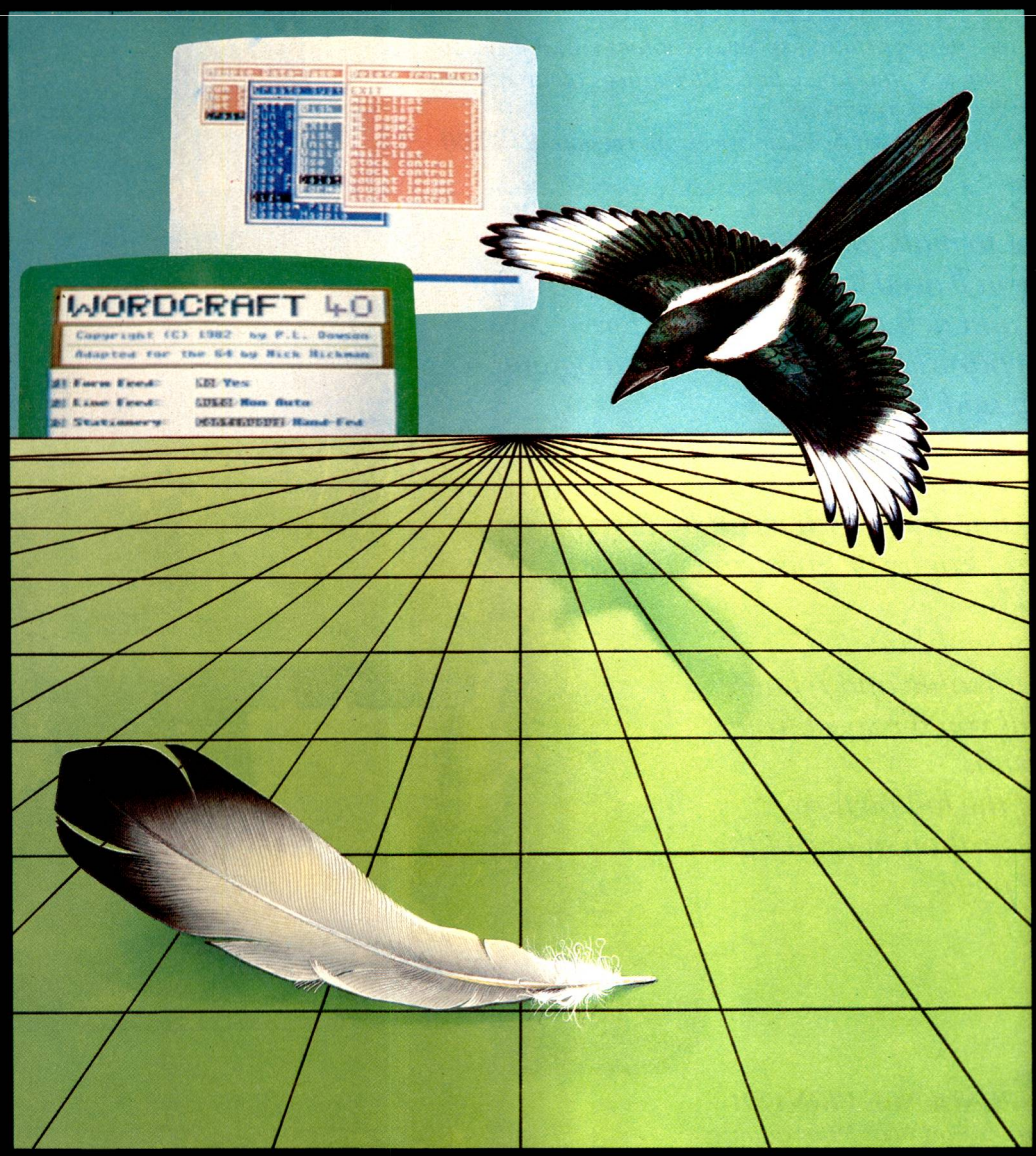

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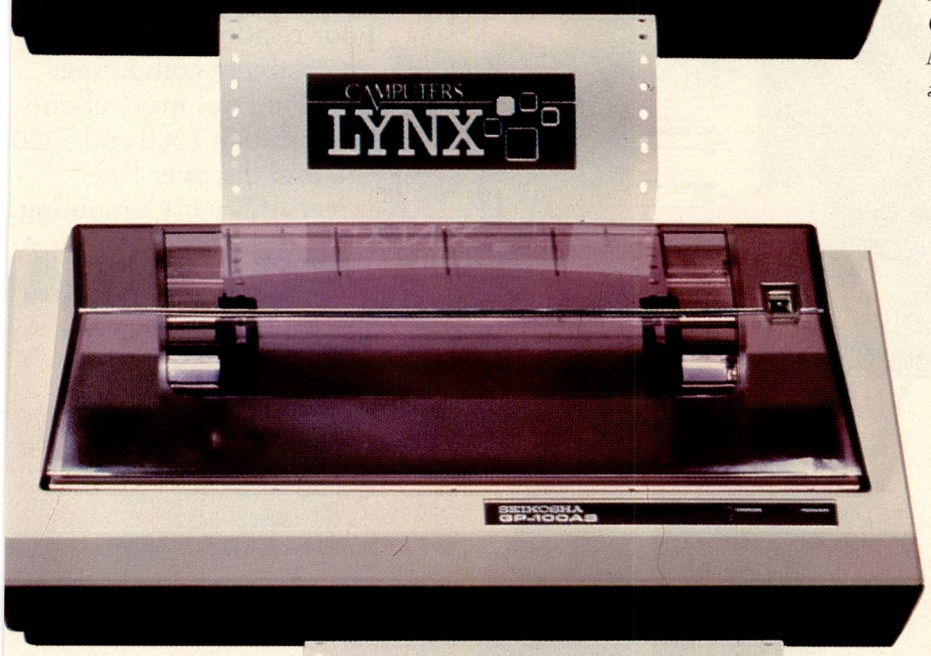

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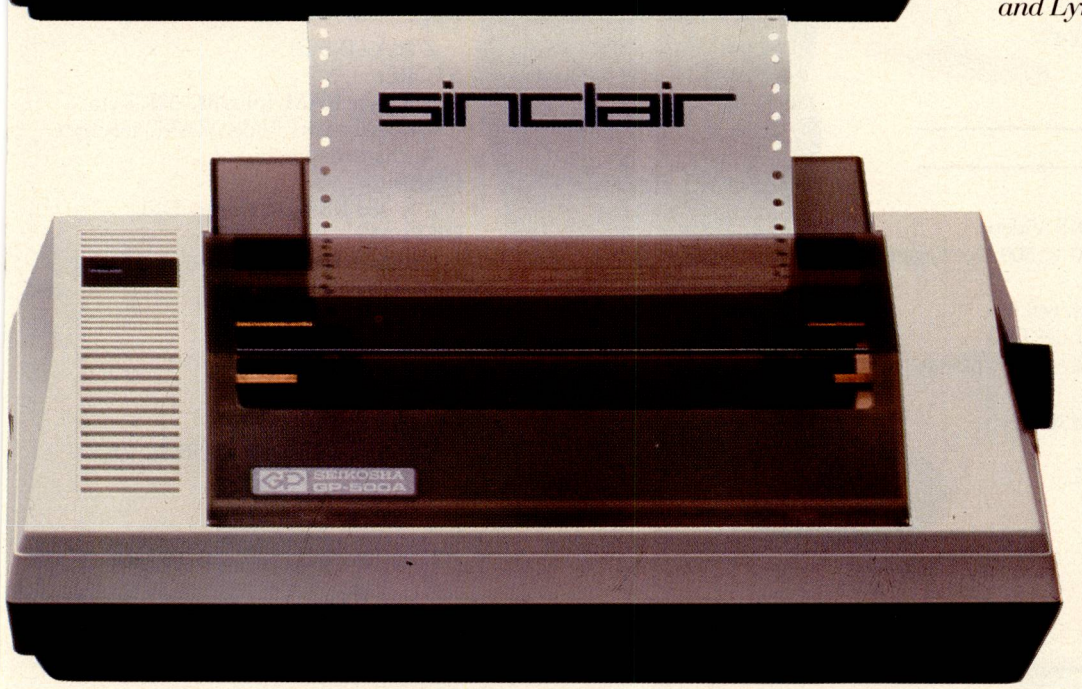

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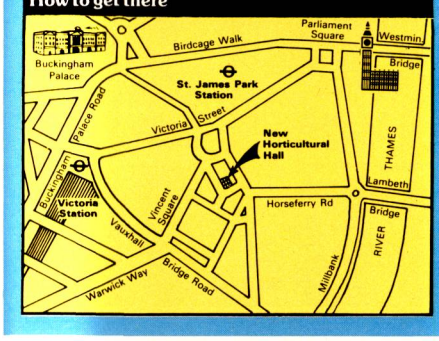

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PCW1

Jonos

Aimed at the military as well as the commercial market, this versatile and durable 'transportable' is available in a wide variety of configurations. Peter Bright dons his camouflage and makes his grand attack.





Military camouflage: the qwerty keys and numeric keypad are dark green and the rest of the keyboard is a paler shade

Before the release of the Osborne, if you wanted to move a micro, you had to pack it up and put it in the boot of a car. The Osborne put the main unit, disks and keyboard in one box, added a carrying handle and the portable was born.

Now everyone seems to be jumping on the portable bandwagon. Hardly a week goes by without a new 'portable' being released.

When I visited Compec last November, I came across a stand showing what appeared to be yet another portable. A closer look revealed that it was called a Jonos and it looked like anything but another boring portable.

The main claim to fame of the Jonos is that it's one of the first machines to use the new Rodime 3.5in 10Mbyte hard disks. These are very neat drives which take up less space than the equivalent floppy drives. The other main feature of the Jonos is that it's a bus based machine. This means it can be supplied in a wide variety of configurations ranging from a humble Z80 to a full blown Motorola 68000.

Jonos is trying hard to sell this machine into military markets as well as to the more usual business and engineering users. In order to compete in these sections, a machine has to be rugged and capable of enduring hard use. The Jonos satisfactorily proves its durability in both these respects.

Hardware

The Jonos is available in two finishes — either aluminium cased for military/engineering use or leather-bound for executive environments. The review machine was a military version and arrived complete with olive green camouflage paintwork.

When it's closed up the Jonos looks like a big metal box — no vents, nothing. This makes it quite weatherproof which must be a good thing in the field. It's also possible to run the Jonos off a 12 volt battery so that it can be used away from a power source.

The front and rear covers are held in place by hinges and catches. The front cover folds down to reveal the keyboard (*à la* Osborne) while the rear cover reveals all the vents, I/O ports and so on. It's best to remove the back cover completely otherwise it obstructs the cables.

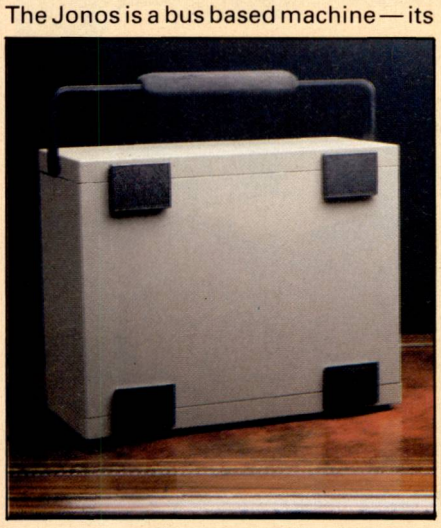
As an optional extra, the Jonos is available with an 80-column printer. This can be clipped to the back of the main unit when it's not in use and then unclipped when required.

The Jonos is well catered for as far as I/O is concerned. The review machine had two RS232 ports (one for a printer and one for a modem), a Centronics parallel printer port, and an external disk interface. The back board also has markings for an IEEE 488 machine control interface and two auxiliary I/O ports.

The overall finish of the machine is good — it certainly felt very robust. The only blemish I could see was where the case had been modified to take the hard disk. It looked as if someone had attacked the machine with a hacksaw and a none too steady hand. (Look closely at the photos to see what I mean.)

Inside

The Jonos is a bus based machine — its core is a common carrier into which a variety of circuit boards can be plugged. In this case it's the STD bus system. All the main circuitry is contained on cards that can be plugged into the 10 slot card cage.



Robust and weatherproof carrying case

The great advantage of using a bus system is that it provides the flexibility to plug in different cards to customise your system to your needs. This is illustrated very well by the fact that the Jonos can be supplied with either a Zilog Z80A running at 4MHz, or Z80B running at 6MHz, an Intel 8088 running at 8MHz, or even a Motorola MC68000 running at 8MHz. All this is in addition to the in-built 8085 which controls the screen and keyboard. If you use the 8088, the Jonos is claimed to be IBM compatible. As the review machine did not have this processor I couldn't test this out.

The review machine was supplied with a Zilog Z80B running at 6MHz. The Z80B is a souped up version of the old faithful Z80A which had a maximum clock rate of 4MHz. When I first looked at the review model I thought it was going to be a fairly average 8-bit machine. I was wrong — this Z80B is very fast. This was first illustrated when I started to play with WordStar — everything seemed to be working at double speed. I then ran the Benchmarks and it raced through them too. A quick look at the Benchmark table will show that it's by far the fastest 8-bit, and it makes most 16-bit machines look very sick! The average would have been even faster but for BM8 where it let itself down.

Memory is another area where the Jonos differs from most other 8-bit machines. Normally the Z80 can only directly access 64k of memory (RAM or ROM), but because the Jonos uses CP/M version 3 (otherwise known as CP/M Plus — see 'Systems software'), it's able to use what is known as 'banked memory'. The review machine had 128k of RAM divided up into two 64k pages, one of which was reserved for CP/M, leaving the other free for the user. The machine also contains 8k of

ROM which is a bootstrap for CP/M.

Disks

The Jonos can also be supplied with a 322k RAM disk. This is a board containing volatile RAM chips which the machine sees as a floppy disk. This means that most normal floppy disk operations can be applied to the RAM disk. The main use of a RAM disk is to speed up the execution. For example, a program like WordStar which makes a great deal of use of the disk to pull in the help screens will run very fast on the RAM disk. Don't forget that if you reset the machine you will lose your data!

In use, everything worked very well; the only major annoyance was the cooling fan which was very noisy. Also, because it sucks air in at the back and blasts it out at the front, it can do quite a fair imitation of a fan heater after it's been switched on for a while.

The Jonos can be supplied with a very wide range of disks, depending on your needs. The basic model comes with twin single-sided 3.5in Sony microfloppy disks. Other options include twin 5.25in IBM compatible drives, twin 5Mbyte Syquest hard disks — one fixed and one removable — and a single Sony microfloppy along with a 10Mbyte 3.5in Rodime hard disk.

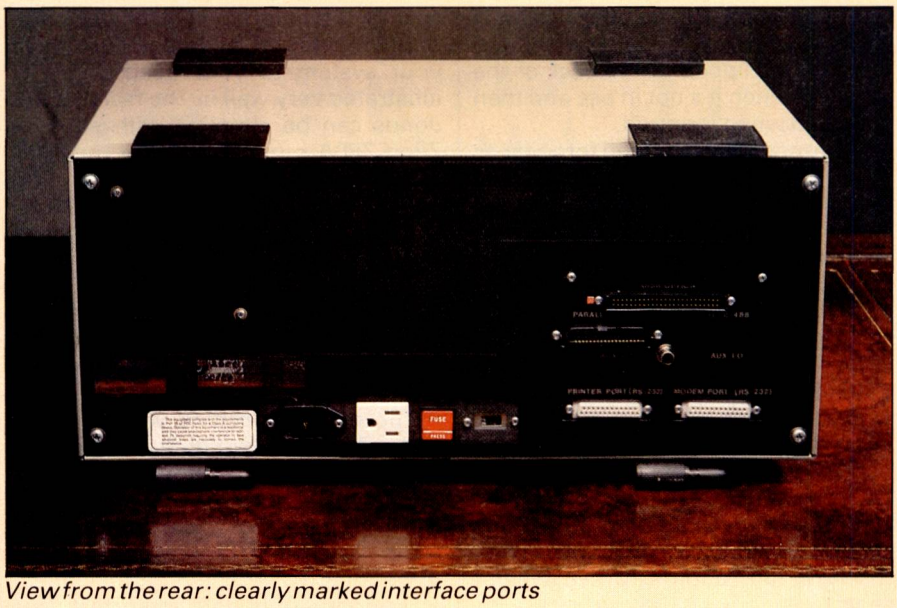
The review machine had one 320k Sony microfloppy and a 10Mbyte 3.5in hard disk. This is the first time I have used a machine with one of these new 3.5in hard disks and I am very impressed. If you look at the picture of the front of the machine, you'll see that the hard disk actually takes up less frontal space than the Sony floppy drive. It's hard to believe that it holds 10Mbytes of data.

Normally, it wouldn't be a good idea to put a hard disk in a portable machine because hard disks tend to be fragile. These new disks are supposed to be much more resistant to shock and are therefore more suited to portables — from my experience of the machine, this is certainly true.

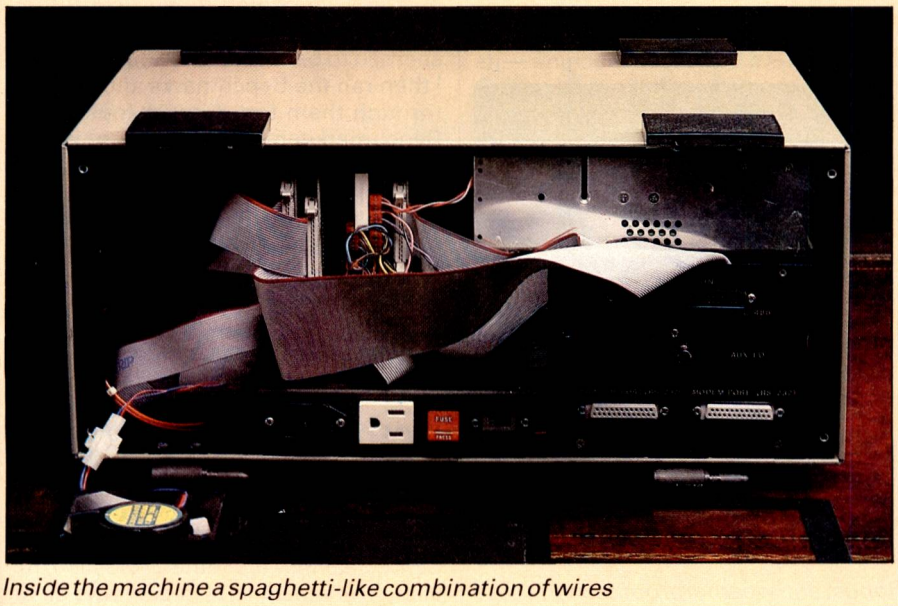
The Sony drives now seem to be becoming the standard for business machines. In use, I found the drive reliable but noisy, clicking away quite happily to itself in a manner reminiscent of the old Sirius disks — it sounds like a demented chicken.

The ACT Apricot, which also uses these drives, has a reputation for being slow when accessing the drives under WordStar. I tried this out on the Jonos and found the disk accessing fast — certainly on a par with 5.25in disks. Under other applications the disk access is even faster. It loaded CP/M 2.2 in 0.8 seconds and CP/M 3.0 in eight seconds (compared with six seconds from the hard disk).

The only disk problem I encountered was the automatic shutter mechanism. These shutters are designed to cover the magnetic surface when the disk is not in use. The problem is that on some disks it's necessary to slide the shutter back manually, while on others it's done automatically when you insert the disk into the drive. Both sorts seem to be interchangeable; obviously the automatic type is best.



View from the rear: clearly marked interface ports



Inside the machine a spaghetti-like combination of wires

Keyboard

The keyboard can be used in a number of different positions. The recommended method is to hinge it down with the carrying handle at the back. This forces the main unit to tilt up, making the screen easier to see. The other method is to unhinge the keyboard completely. This allows it to be moved around but means that the screen isn't so easy to read. The disadvantage is that you can't move the keyboard very far because it's connected to the main unit by a very short length of ribbon cable. If the screen is tilted up it's possible for the main unit to slide off the hinges and come crashing down. The first time this happened I was worried that the hard disk might be damaged, but it seems to be made of old boots.

The keys themselves have to be tightly packed in order to fit into the available space. They are divided up into two main areas: the main qwerty typing area is on the left hand side with ten function keys distributed above it; and the numeric keypad and the cursor control keys are on the right hand side. In best army tradition the keys are coloured in various shades of olive green. The qwerty keys and the numeric keypad are dark green and the rest of the keyboard is a paler shade.

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In use, the keyboard feels good. The keys have a very positive feel to them and there is no give in the keybase, something army touch-typists will appreciate. The 'F' and 'J' keys have sculptured tops so that your index fingers can find them easily. The '5' key at the centre of the numeric pad also has a pimple on the top to make it easier to find.

Whenever a key is pressed, the loudspeaker bleeps annoyingly. This can be switched off by calling a COM file called 'Mute'.

The keyboard has one or two odd keys. For example, it has a 'new line' key and a 'back tab' key which are rather old fashioned now. The Jonos also tends to hide some of its keys away. For example, when I was looking for the '>' and '<' keys for the Benchmarks, I found them right up at the top with the function keys.

On any machines, the shift and caps lock keys have LEDs built into them to show they're in use. The Jonos does not use LEDs, instead it prints either SHIFT or CAPS on the 25th line of the screen. This is preferable because the user is more likely to be looking at the screen than the keyboard when typing.

My only real criticism of the keyboard is that it can sometimes be uncomfortable to use. This is because the outer casing joins the inner casing just where the palms of the hands rest, so it's easy for the join to cut into your hands—very painful. If I were to use this system for a long time I'd be tempted to put some foam rubber over the join.

Screen

On any portable the screen is always a problem. Space is limited and something has to give — usually the screen. The Jonos boasts a 9in (diagonal) screen which is very easy to read.

The screen dimensions are the standard 80 characters by 25 lines with the 25th.line being used as a status line. If you use the high-res graphics option, the screen can display up to 640 x 250 pixels. It has an etched anti-reflective surface so that it doesn't glare. This works very well and is one of the best anti-reflective screens I've seen. The only control is one for brightness (a big rotary knob), but there's no contrast control. The characters on the screen are well formed and clear to read.

I have only two gripes with the display. First, the screen on the review machine had a slight sway to it. I hope this is not typical of all the machines.

The second gripe is one I always seem to be making — no tilt adjustment. The Jonos can either be flat on the desk or hinged up on the keyboard and that's it.

Systems software

There is a wide range of systems software. The choice ranges from CP/M 3.0 and MS-DOS, through BOS/5 and MBOS/5 up to Unix on the MC68000 board (the idea of a multi-user portable does seem rather strange).

The review machine was supplied with CP/M version 3.0 (2.2 was also available). Version 3 (also known as CP/M Plus) is the new all-singing, all-dancing creation from Digital Research. The main new points are that version 3 supports banked memory.

'The main claim to fame of the Jonos is that it's one of the first machines to use the new Rodime 3.5in 10Mbyte hard disks'

The main effect of this is that the normal memory limitations associated with 8-bit machines are removed allowing them to compete with 16-bit machines on better terms. CP/M 3 has also undergone technical modifications, including the use of hashing techniques to improve disk access speed. Another advantage is that the tedious routine of control-C'ing the drives, every time you change a disk, is no longer necessary.

This is the first machine I have reviewed that uses CP/M 3, and I was looking forward to having a long play with it. The trouble is that CP/M 3 manuals seem to be quite rare and Jonos couldn't supply me with one. As a result, I was forced to hack around the system looking for new functions.

In use

When you first boot up CP/M you are greeted by the usual 'A' prompt. A quick look at the utilities will show that most of the old favourites are still there, with the notable exception of 'STAT'. This has been replaced by two new utilities called 'SHOW' and 'DEVICE'. SHOW will provide all sorts of useful information about the status of the disks while DEVICE handles all the logical-to-physical device assignments that STAT used to deal with. DEVICE is much more flexible than STAT used to be, with the advantage that you can use it to set baud rates and XON/XOFF protocols on the RS232 lines.

CP/M 3 also supports up to 16 different user areas (numbered 0 to 15). This allows each user to have his own file directory. It's easy to switch between directories by typing the number of the new directory followed by a colon. For example, to switch to directory 10 type "10:" CP/M will then respond "10A>", informing the user that he's in directory 10. In addition to the 16 user areas there is also a system area which can be accessed directly by any of the users. This area usually holds the CP/M utilities.

I can't see a great deal of point in using different user areas. As far as I know it isn't possible to protect them (see below), so it would be easy for someone else to log into your area. The only justification I can see is that it does at least allow very large directories to be split into smaller sub-directories, making file-finding much more efficient.

Another new feature on version 3 is password protection for files and disks. If a password is set, it has to be entered after the filename. For example, if WordStar were protected and then 'WS' were to be typed in the normal manner, you would get a CP/M error message saying something like "CP/M error on A: Password error". If you want the program to run it's necessary to type "WS:PASSWORD".

If a password is to be set, it's necessary to use a utility known as 'SET'. This is a very wide ranging utility which can be used to set drives to read/write or read only, to initiate time stamping of files and/or to set passwords. To set the password for WordStar to 'Wombat', type "SET WS.COM [PASSWORD+WOMBAT]". Files can also be set to read only, read and write or delete only.

In addition to single files, it's also possible to set a password for a whole disk. This could be useful for protecting something like a data disk on a floppy based machine, but isn't much use on a hard disk system. A better idea would be to protect user areas, but as far as I can tell it isn't possible to protect just one user area on a disk. This means that if a user wanted to protect all his files, he would have to set up an individual

Benchmarks

BM1	0.8
BM2	2.5
BM3	6.7
BM4	6.7
BM5	7.2
BM6	12.7
BM7	20.1
BM8	34.4
Average	11.4

All timings in seconds. For a listing of the Benchmark programs see 'Direct Access'.

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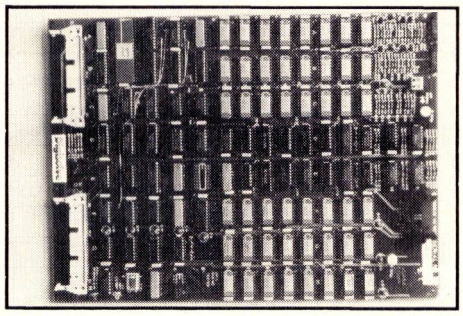

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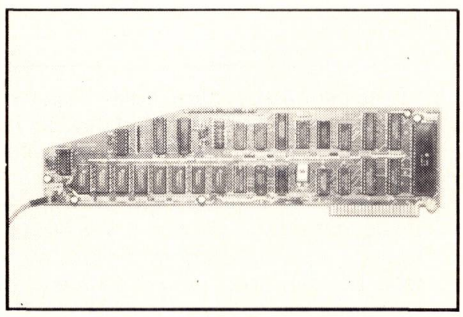

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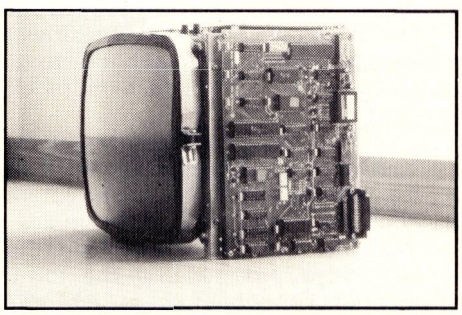

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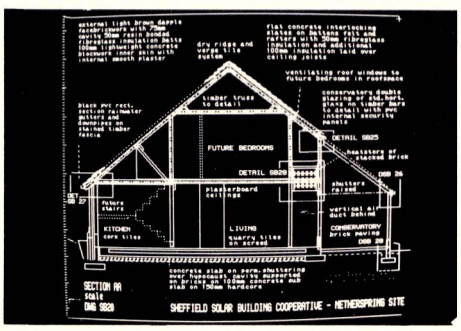

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password for each file.

Disk utilities

As it has both a hard disk and a RAM disk, the Jonos has some good utilities for formatting and copying disks. The Format/Copy utility for the Sony drive is known as 'FORMAT3'. This does the usual formatting and validating of the Sony disk, as well as allowing you to change the interleave factor. This doesn't normally change unless the access time has to be improved for a special set of software.

'available in two finishes — either aluminium cased for military/engineering use or leather-bound for executive environments.'

The hard disk utility is called 'FOCOROM'. This will happily format and verify as well as copy files from the floppy drive to the hard disk, but should only be used if something nasty happens to the hard disk.

The RAM disk doesn't need to be formatted, but files need to be copied from disk to it. To copy just a few files, it's best to use PIP. However, it's possible to copy an entire microfloppy onto the RAM disk by using a utility called RDLD. This can either load the contents of the floppy to the RAM disk or copy the RAM disk back onto the floppy. This utility is very fast — I filled a microfloppy with 320k of files and RDLD copied it to the RAM disk in 21 seconds. I then loaded it back onto the floppy again in 15 seconds.

Applications software

The Jonos is supplied complete with Microsoft's Multiplan spreadsheet, Lexisoft's Spellbinder word processor and Microsoft's Mbasic interpreter. Jonos is also in the process of implementing Software Limited's range of applications software, and Multiplan and Spellbinder are also available. A quick look at the Benchmark timings will show that the Mbasic implementation is very fast, especially when you consider that it's 'only' an 8-bit machine.

One of the user areas on the hard disk contains a range of games. This is unusual for a business machine but isn't as silly as it appears. Games are a good way of introducing the machine to new users who might otherwise keep away from the machine. One of the nicest games was called Aliens (very original) which runs in the best Space Invaders tradition. It seems strange watching aliens made out of 'O's and 'X's instead of the high-res graphics found on home machines, but I enjoyed playing it all the same.

Other games were mostly textual and included the obligatory version of Star Trek, and an interstellar trading game that kept me quiet for hours.

Jonos also seems to specialise in engineering applications software. From the hardware point of view the Jonos seems well suited to being interfaced with machinery. From the software angle, Jonos can not only supply standard engineering packages but is also able to write bespoke engineering software.

Documentation

The documentation consisted of the biggest ringbinder I have seen in a long time, containing the basic users guide and the Mbasic, Multiplan, Spellbinder and Spellcheck user manuals. These were all photocopies of the manufacturers' documentation.

The main problem, as I said earlier, was that Jonos wasn't able to supply a CP/M 3.0 manual. As it turned out this was not too much of a handicap, but it was a pity because I hear that this is the first understandable manual Digital Research has ever produced.

Prices

These machines aren't cheap — the review machine would set you back £4890 which is a lot of money for a single user 8-bit machine. Having said that, you do get a state of the art 10Mbyte hard disk and a 320k RAM disk. The entry level price for a machine with two 3.5in Sony drives is £2425 which is still on the high side. Remember that it's always more expensive to make a bus based machine than a single board micro — perhaps better value for money for the flexibility you gain.

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Conclusion

I like this machine — even in its 8-bit form it outperforms many 16-bit micros. The great advantage of the Jonos is that it's available in so many different configurations: from the entry level system with a Z80 processor and twin Sony drives to a Motorola 68000 machine with hard disks. There should be a model to fit every user's needs.

I'm not sure how relevant the portable aspect is to the average business user. As far as I can see, the main advantage of this type of 'portable' is that it takes up less desk space than a normal desktop — *not* that it can be carried around. However, I can see that the military/industrial version does benefit from portability.

I think it unlikely that the type of person interested in this machine will be worried about the odd few hundred pounds extra that it costs to buy. If you're looking for the cheapest machine on the market then there are many other 8-bit offerings that cost a good deal less.

The Jonos is apparently being aimed at specialist applications where performance takes precedence over price. This is emphasised by the fact that Jonos is looking for applications where the micro can be incorporated into other machinery and then sold as intelligent machine tools.

If you're looking for a high quality transportable micro where price is not too important, take a good look at this.

END

Technical specifications

CPU	Either:- Zilog Z80A running at 4MHz; or Zilog Z80B running at 6MHz; or Intel 8088 running at 8MHz; or Motorola 68000 at 8MHz; or Plus:- Intel 8085 to handle screen and keyboard.
RAM	Varies according to processor
ROM	8k bootstrap
Keyboard	92 Key qwerty
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Newcomers start here

The baffling jargon of the micro world can be very off-putting at first. Life gets easier once you've been initiated. So here's our user-friendly answer to everything you've ever wanted to know about micro computing but were afraid to ask.

Probably the first thing you noticed on picking up this magazine for the first time was the enormous amount of unintelligible-looking jargon. In the words of *The Hitch-hiker's Guide to the Galaxy:* Don't panic! Baffling as it may sound, the jargon does actually serve a useful purpose. It's a lot easier to say VDU, for example, than 'the screen on which the computer's output is displayed'. This guide is intended to help you find your way around some of the more common 'buzzwords' you're likely to come across in the pages of *PCW*.

For those completely new to computing, let's start with the question: What is a microcomputer? We can think of a micro as: a general-purpose device in contrast to a typewriter, which can only be used for typing; a calculator, for performing calculations; a filing cabinet, for filing information, to name just a few of its functions. A micro can do all these things and more.

If it's to be of any use, a general-purpose device needs some way of knowing what to do. We do this by giving the computer a set of logical instructions called a **program**. The general term for computer programs is **software**. Every other part of a microcomputer system is known as **hardware**: 'If you can touch it, it's hardware.'

Programs must be written in a form the micro can recognise and act on — this is achieved by writing the instructions in a **code** known as a **computer language**. There are literally hundreds of different languages around, the most popular of these being **Basic**. Basic is an acronym of **B**eginners' **A**ll-purpose **S**ymbolic **I**nstruction **C**ode. Although originally intended as a simple introductory language, Basic is now a powerful and widely used language in its own right.

Other languages you're likely to come across in *PCW* are **Forth, Pascal, Logo, C** and **Comal** to name but a few. These are known as **high level** languages because they approach the sophistication of a human language. You'll also see references in *PCW* to the **low level** languages, **assembly language** and **machine code**. We'll look at these in a moment.

The heart of a micro, the workhorse, is the **processor** or **C**entral **P**rocessing **U**nit (**CPU**). The processor usually consists of a single silicon chip. As with computer languages, there are a number of different processors available, the **Z80, 6502, 68000** and **8088** being just a handful (literally!) of the types in common use. The processor is nothing magical — it's just a bunch of electronic circuits. It's definitely not a 'brain'.

As it's electronic, the processor's circuitry can be in one of two states: on or off. We represent these two states by **binary** (base two) notation, the two binary digits (known as **'bits'**) being 0 and 1. It's possible to program computers in binary notation, otherwise known as machine code (or machine language) programming.

Machine code is called a low level language because it operates at a level close to that 'understood' by the processor. Languages like Basic are known as high level languages because they are symbolic, operating at a level easily understood by people but not directly understood by the processor.

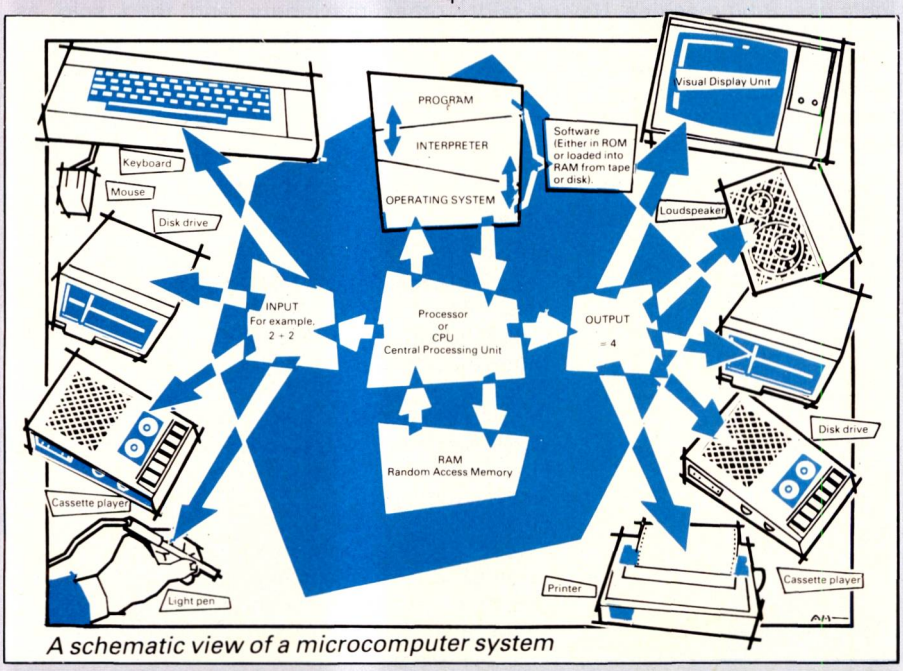
Between high level languages and machine code is a low level language known as assembly language or, colloquially, **assembler**. This is a mnemonic code using symbols which the processor can quickly convert to machine code.

Since everything has to be converted into binary form before the processor can make sense of it, we need some sort of code to represent each character to be processed by the computer. In order to simplify communication between computers, a number of standard codes have been agreed on. The most widely used of these codes is the **A**merican **S**tandard **C**ode for **I**nformation **I**nterchange, **ASCII**. This system assigns each character a decimal number which the processor can then convert to its binary equivalent.

A program written in a high level language must be converted into binary before the processor can carry out its instructions. We could of course do this manually, but since this is exactly the sort of tedious job computers were designed to do for us, it makes much more sense to write a program to do it.

There are two types of program to do this translation for us.

The first of these is a **compiler** which translates our whole program permanently into machine code. When we **compile** a program, the original high level language version is called the **source code** while the compiled copy is called the **object code.** Compiled programs are fast to run but hard to edit. If we want to change a compiled program, we either have to edit it in machine code (extremely difficult) or we have to go back to a copy of the source code. For this reason there is a second translation program: an **interpreter.** An interpreter waits until we actually **run** (use) the program, then translates one line at a time into machine code — leaving the program in its original high level



A schematic view of a microcomputer system

Illustration by Tony Hannaford

language. This makes it slower to run than a compiled program, but easier to edit.

There are two unusual Basic words you're likely to come across: **POKE** and **PEEK**. When you program in a high level language, you are normally unable to choose in which part of the machine's memory the processor will store things. This makes programming easier as you don't need to worry about memory locations, but slows down the program since the processor has to 'look up' addresses for you. Using the POKE command, however, you can 'poke' a value directly into a desired memory address. 'POKE 10000,56', for example, puts the value 56 into memory location 10000. PEEK allows you to examine the content of a particular memory address. If you were to follow the above poke with 'PEEK (10000)', the computer would respond by displaying the value 56. POKEing and PEEKing is normally done to increase program speed, but may also allow us to do things which could not be done through Basic.

So far, we have a processor and a program. Since a computer needs somewhere to store programs and data, it needs some kind of **memory**. There are two types of memory: **Read Only Memory (ROM)** and the badly-named **Random Access Memory (RAM)**. ROM is so-called because the processor can 'read' (get things out of) its contents, but is unable to 'write to' (put things in) it.

ROM is used to store **firmware,** the name given to software permanently available on the machine. An interpreter is a typical example of firmware (stick with it: it gets easier!).

RAM differs from ROM in two important ways. Firstly, you can write to it as well as read from it. This means that the processor can use it to store both the program it is running and **data** (information). The second important difference is that RAM needs a constant power supply to retain its contents: as soon as you switch the computer off, you lose your program and data.

There is a type of RAM, known as **CMOS RAM,** which requires only a tiny amount of power to retain its contents. This is found in portable computers like the Tandy 100 and the Gavilan MC. It is usually powered by small ni-cad batteries so that programs and data are retained even when the main power is switched off. At present, CMOS RAM is extremely expensive and is not likely to be used in desktop machines for a little while yet. (CMOS stands for **C**omplementary **M**etal **O**xide **S**emiconductor).

Memory is described in terms of the number of characters we can store in it. Each character is represented by an 8 bit binary number. 8 bits make one **byte** and 1024 bytes make one **Kilobyte** or **1k**. 32k, for example, means that the computer can store about 32000 characters in its memory. If 1024 sounds like an odd number, remember that everything is based on the binary system, thus 1,2,4,8,16 . . . 1024 being the nearest binary multiple to 1000.

While we're on the subject of bits, you'll often see computers and their processors described in terms of their **bit power**: **8-bit, 16-bit, 32:16-bit** and so on. This is a means of describing how large a binary number the processor can handle in one chunk. A binary number, incidentally, is known — confusingly — as a **word**. An 8-bit processor, for example, can handle 8-bit words, that is, up to 11111111 (255 in decimal). Anything larger than this has to be broken down into manageable chunks before it can be processed.

A 16-bit machine can handle bigger chunks of data at a time. This means it can handle ('**address**') larger amounts of memory at one time. This is why most 8-bit machines have a maximum of 64k RAM while 16-bit micros usually have 128k upwards.

As 16-bit processors can handle larger words than an 8-bit machine, they ought to be twice as fast. In practice, however, there is a little more to it than that. While it may take a 16-bit machine half as long to work out that 2+2=4, the actual processing is only part of the story.

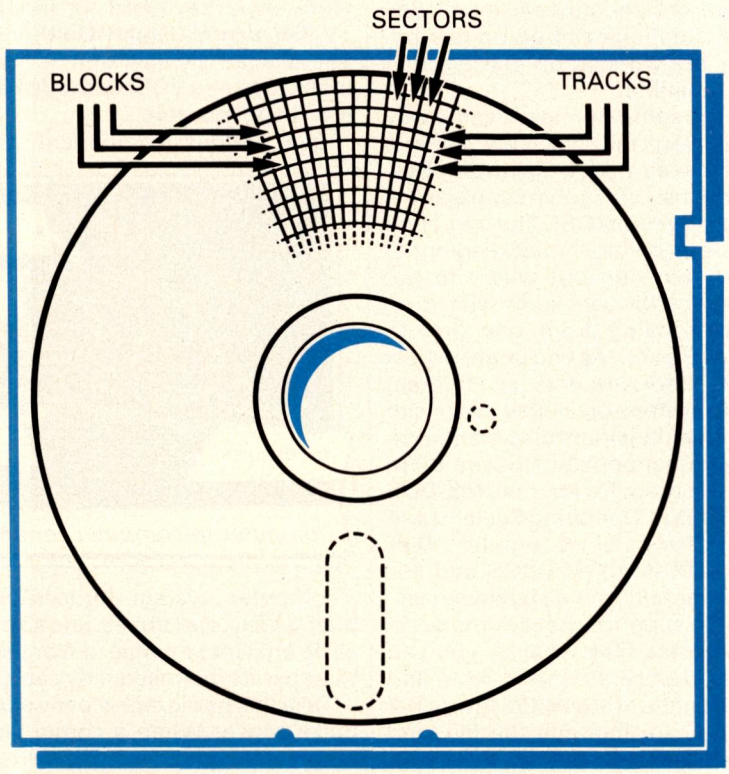
The result of the calculation has to be placed into the appropriate memory location, passed to the screen or whatever is required. The transfers to and from the processor are often made in 8-bit form; this is why you'll hear people arguing that certain processors are not 'true' 16-bit. If the problem has to be handed to the processor in 8-bit form, turned into 16-bit, calculated and then the result turned back into 8-bit for transfer elsewhere, there may be little or no saving in time over an 8-bit system.

The other factor affecting speed is that the actual processing may form only a small part of the overall operation. A word processor, for example, spends most of its time passing files to and from disk and waiting for the user to type the next character. The processing itself consumes very little time. And if you look at the Benchmarks summary (*PCW*, December 1983, pp. 238-241), you'll see some 8-bit machines beating their 16-bit rivals — even in processor-bound operations like the *PCW* Benchmarks.

Returning to the subject of RAM for a moment, a word of warning: Don't rush out with your new-found understanding to buy the machine offering you the most RAM for your money. Quite aside from the fact that the amount of RAM is by no means the only consideration when buying a micro (no matter how much manufacturers may stress it), different machines use differing amounts of RAM for things like graphics. Always check how much RAM is actually available to the user for program storage. Machines which proudly proclaim '64k' may well leave you with less than half of this in which to store Basic programs and data.

There are numerous forms of **permanent** or **back up storage**, but by far the most common are **floppy disk, floppy tape** and **cassette.**

Floppy disks or diskettes are circular pieces of thin plastic coated with a



Cross-section of a floppy disk

magnetic recording surface similar to that of tapes. The disk, which is enclosed in a protective card cover, is placed in a **disk drive**. Disk drives comprise a high-speed motor to rotate the disk and a **read/write head** to record and 'play back' programs and data.

The disk is divided into concentric rings called **tracks** (similar to the tracks on an LP) which are in turn divided into small **blocks** by spoke-like divisions called **sectors**.

There are two methods for dividing the disk into sectors. One method is called **hard sectoring**, where holes punched in the disk mark the sectors, and the other is **soft sectoring** where the sectors are marked magnetically. The reason that disks from one machine can't be read by a different make is that each manufacturer has its own way of dividing up the disk. Recently, however, manufacturers have apparently begun to acknowledge that this situation can't go on forever, and they are working on making their disks compatible.

Since the computer needs some way of organising the disk, we have a program called a **Disk Operating System (DOS)**, usually known simply as the **Operating System (OS)**. The operating system does all the 'housekeeping' of the disks, working out where to put things, letting the user know what is on the disk, copying from one disk to another and so on. As you might expect by now, there are lots of different operating systems available, each with its own advantages and disadvantages. The three most popular OSs are **CP/M** (**C**ontrol **P**rogram for **M**icros), **MS-DOS** (**M**icro**S**oft **D**isk **O**perating **S**ystem) and **PC-DOS** (**P**ersonal **C**omputer **D**isk **O**perating **S**ystem). MS-DOS and PC-DOS, incidentally, are all but identical.

Disks can support what are known as **random access files**. That is, you can randomly choose a point in a file and the drive head will move directly to that point. You can then edit the file, and only the blocks affected will be rewritten. The rest of the file remains unchanged.

Floppy disks provide a reasonably fast and efficient form of secondary storage and are cost-effective for business machines. For home computers, however, the usual form of program and data storage is on ordinary cassette tape using a standard cassette recorder. This method of storage is slow and unreliable, but is very cheap and adequate for games, for example.

Cassettes can support only **serial access files**. That is, whenever a file is to be edited, the whole file must be written back to the tape. This makes certain applications — word processing being a prime example — extremely tedious.

Floppy tape drives are a compromise between speed and cost. They use a small continuous loop tape which, like a disk, is divided into blocks. Floppy tape drives rely on serial access files, but by rotating the tape at high speed and using the block markers, they can simulate random access files. The Sinclair Microdrive is a floppy tape drive.

Another type of disk you'll see referred to is the **hard disk**. This is an extremely efficient method of storing large amounts of data. Hard disk capacity generally starts at around 10**Mbytes** (10 million bytes) and rises to . . . well, you name it. Besides offering a much greater capacity than floppies, hard disks are more reliable and considerably faster. They are, however, much more expensive than floppy drives.

Since computers need some way of communicating with the outside world, we need **input** and **output** devices. Input and output devices include all manner of things from hard disk units to light pens, but the minimum requirement for most applications is a typewriter-style **keyboard** for input and a TV-like **Visual Display Unit** for output. The Visual Display Unit is variously referred to as a **VDU, Cathode Ray Tube (CRT)** and **monitor**.

The various component parts of a computer system (processor, keyboard, VDU, disk drives, and so on, may all be built into a single unit or they may be separate, connected by cables.

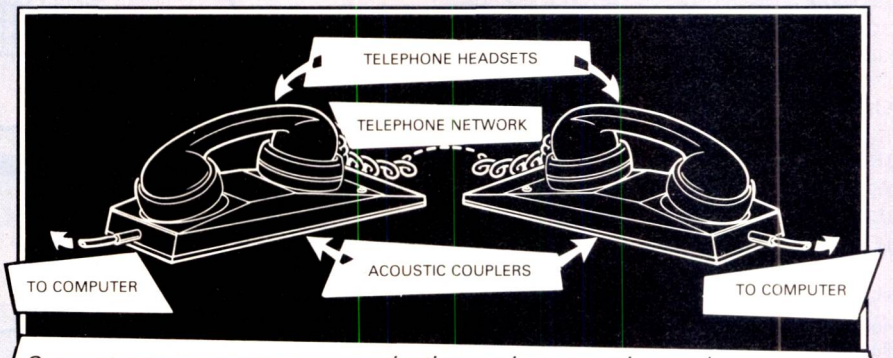
Take this paragraph slowly and it will make sense! When a computer communicates with an outside device, be it a printer or another computer, it does so in one of two forms — **parallel** or **serial**. Parallel **input/output (I/O)** requires a number of parallel wires. Each wire carries one bit, so with eight wires we can transmit/receive information one byte at a time (8 bits = one byte, remember). Serial 1/0, in contrast, uses a single wire to transmit a series of bits one at a time (that's why it's called serial), with extra bits to mark the beginning and end of each byte.

To enable different devices to communicate with each other in this way, standards have been agreed for different **interfaces**. An interface is simply a piece of circuitry used to connect two or more devices. The most common stardard serial interface is the **RS232** (or **V24**) while the Centronics standard is popular for parallel interfaces.

When two computers want to communicate with each other over a distance, there are again two ways of doing it (nothing is ever clear-cut in the world of micros — you'll get used to it). Both methods use the public phone network. The first is known as an **acoustic coupler**. This simply plugs into your computer, and has a receptacle into which you place your telephone handset. The acoustic coupler is convenient in that you can unplug it from one computer and plug it into another one in a matter of seconds. They are generally slow, however, and prone to interference.

The alternative method is to use a **modem**. Unlike an acoustic coupler, a modem is wired into the telephone system and you should get permission for this from British Telecom.

A term you'll hear used in connection with acoustic couplers and modems is **baud rate**. The baud rate is a measure of the speed at which a device can transmit and receive data. You can safely think of the baud rate as being bits-per-second, though the accurate definition is a little more complex. Therefore, a 300-baud modem can transmit/receive data at the rate of 300 bits (about 50 characters) per second.



Computer-to-computer communications using acoustic couplers.

A 1200/75 modem means that it receives at 1200 baud but transmits at 75. Most modems are 1200/75 and acoustic couplers 300/300. By way of comparison, saving programs to cassette is normally done at between 300 and 1500 baud.

Finally, communications between computers is either **full** or **half duplex**. Full duplex is when the machine receiving the data echoes it back to the machine transmitting it and says 'This is what I think you said — is that right?'. If it's wrong, the section will be transmitted again. Half duplex is where no checking is made. If you're ever unsure of which to use, start with full duplex. If everything you type appears on your display twice, then you should switch to half duplex.

Now that you know the jargon, you'll excuse me while I go and initiate a file transfer from secondary memory to RAM in order to engage in some real time interactive processing with 32k 8-bit micro, using a direct entry input device and cathode-based visual feedback system. I never could resist a game of Pacman.

END

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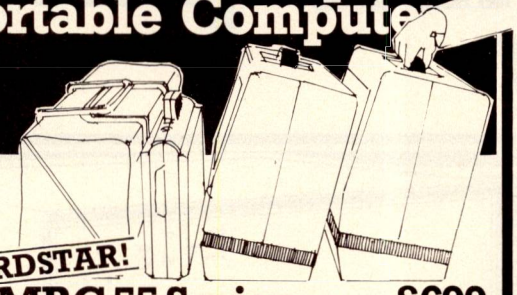

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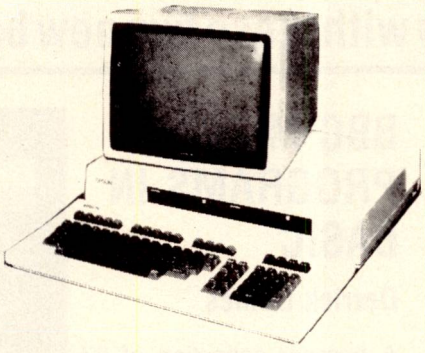

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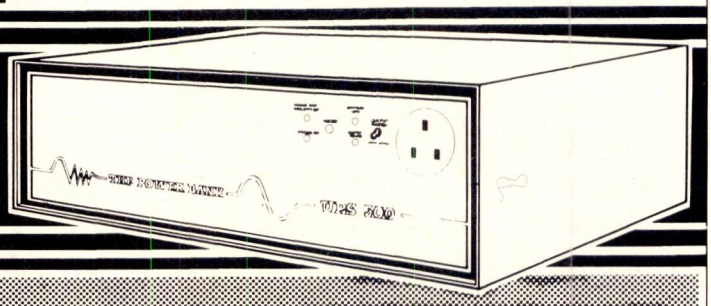

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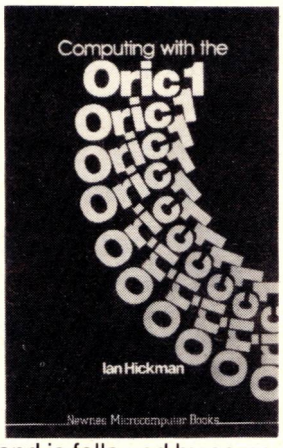

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This new book is for all users of the Oric 1 micro. It complements the Oric Manual and can be used alongside it. An introductory section covers the initial switching-on and setting-up and is followed by some simple BASIC programming. Later chapters introduce more advanced BASIC, high-resolution colour graphics, the sound feature and interfacing, with a special section on the printer and another on machine code programming. A number of original programs are included in this practical guide.

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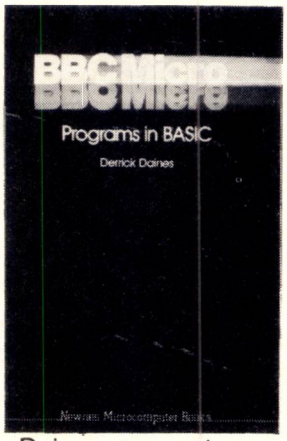

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Comshare's trio

Mike Liardet examines three business spreadsheet products from Comshare: the inexpensive PlannerCalc, the compatible and up-market MasterPlanner, and the business solutions library.

There's a popular story that old computer hacks love to recount when mulling over their pint of real ale on a cold winter's night, concerning an XYZ International Mainframe Company. XYZ sells two versions of a computer—one cheap and low capacity, the other expensive and high capacity, and for a huge fee you can upgrade from the low to the high capacity. 'Well,' they say, expansively blowing cigarette smoke in my face, 'the only difference between them is a small jumper-lead which slows the cheaper one down!'

This story springs to mind when looking at Comshare's two spreadsheet systems. Comshare offers an inexpensive spreadsheet, PlannerCalc, and a compatible up-market product, MasterPlanner. PlannerCalc (Review, *PCW*, May 1983) is obviously intended as a loss-leader, just to get the users moving the Comshare way. Then, when they become frustrated (or 'outgrow it', in marketing jargon) a simple upgrade to MasterPlanner should (hopefully) be the answer to all their prayers.

In practice, PlannerCalc has all the feel of MasterPlanner with a random sprinkling of 'jumper-leads', but does not hang together very well. I imagine that many users, frustrated by PlannerCalc, will be disinclined to opt for MasterPlanner. They might seriously consider taking their chances with an incompatible rival system, on the grounds that Comshare must have made an even worse job of the more complex product. In fact, they would be wrong to do this, since once Comshare lets out all those metaphorical jumper-leads (presumably put there by their marketing strategists), the software comes to life and works in the way the writers intended in the first place. PlannerCalc actually serves as a poor advertisement for Comshare's more up-market product.

The third product under review is a 'business solutions applications library', a suite of pre-written MasterPlanner models with accompanying documentation. MasterPlanner is supplied with a ring-bound 150-page manual, organised into 11 chapters, five appendices and an index.

MasterPlanner is billed as an 'advanced business planning aid' for micros. In fact, it's available for three operating systems: CP/M, MS-DOS and CP/M86 (as a guideline, my review copy was for CP/M).

Getting started

MasterPlanner makes use of six function keys, to move cursor left, right, up and down, and an 'execute' and 'help' command. Using the installation program, it's possible to choose your own keystrokes for these keys. The documentation always refers to the 'execute' keystroke, and you must remember what key this represents on your own VDU.

The disks supplied by Comshare are not copy-protected, so it's possible to make working copies using the normal procedures appropriate to your operating system.

Once you have MasterPlanner on your working disks and installed for your VDU, you simply type 'MP' in response to the operating system prompt and off you go! The initial copyright screen gives the option of going straight into a 'help' session or

Spreadsheets—a guide for beginners

Spreadsheet software is useful to anyone who regularly uses a calculator.

The VDU screen acts like a 'window' on a large 'sheet' of numbers—neatly laid out rows and columns, occasionally interspersed with text headings.

By using a few quickly learned keystrokes it is possible to shift the VDU window to the desired point of interest. It is possible to enter text, a number or a 'formula' which can, if required, be a complex calculation referring to several other positions on the sheet. The result of the calculation is displayed immediately with automatic recalculations throughout. Frequently an alteration on the top line of a spreadsheet can change everything from top to bottom in just two or three seconds—an exercise that would take several hours by hand!

Each month, the 'Which Spreadsheet?' series analyses and tests a different spreadsheet system. Further information for beginners can be found in the spreadsheet articles in the PCW February and December 1983 issues.

directly to 'command mode'. Choosing command mode causes the screen to clear and display 'status' information at the top, with a wide empty space in the middle and a 'command line' at the bottom. The empty space is reserved as a window on the spreadsheet itself, currently empty. The status information informs you of the amount of memory left, the name of the model you are currently working with, its 'width', and so on.

One of the most publicised features of MasterPlanner is its set of 'English'-like commands. Words like 'LINE', 'COLUMN', 'SUM OF', 'THRU' and 'CALCULATE' figure prominently in your dialogue with the system, but the usage of these words is very formalised and Comshare's claim is about as valid as the frequent but ludicrous claim that the Basic programming language is English-like. Nonetheless, a printout of the logic of a MasterPlanner model is eminently readable to the untrained eye. LINE 10 SALES = 100,200,300,400 causes two things to happen. Firstly, the word SALES appears at the top left of the VDU window with the numbers 100, 200 and so on to the right. Secondly, this text is retained in memory as part of the 'model'. The model and its spreadsheet display are maintained independently, and it's possible, by typing the MODEL and RESULT commands, to switch the display from one to the other. The use of 10 in 'LINE 10. .' has no connection with the tenth line of the spreadsheet but is used to determine the position of the LINE in relation to others in the model. If we now type LINE 9 COSTS = 30,40,50,60 the display changes with COSTS at the top and SALES immediately below it, because 9 precedes 10. The LINEs are always displayed in the order they occur in the model. How do we insert a line between COSTS & SALES? MasterPlanner to the rescue! We can use line numbers with decimal places (9.5, for example). This is very similar to the way Basic works, and as with Basic we can change a LINE by simply retyping it. We can change the 30 above to 31 by typing LINE 9 COSTS = 31,40,50,60 which is a tedious way of changing one digit, so MasterPlanner also provides an editing facility for making changes of this nature.

The essence of any modelling system is in the 'logic' — the way calculations are performed. With MasterPlanner we can enter LINE 11 PROFIT = LINE 10 – LINE 9, or alternatively LINE 11 PROFIT = SALES – COSTS.

The latter is preferable as it's comprehensible and doesn't need any modification if, for any reason, SALES or COSTS is moved to another LINE.

MasterPlanner provides a large number of facilities for building up the logic of your model and indicates shortcuts to circumvent excessive typing. LINE 24 OVERHEADS = 100, 200 FOR 10,300 will set up one 100, followed by ten 200s, and then 300s to the last column of the spreadsheet. LINE 3 INCOME = INPUT,30,40 requests the user to type the value for LINE 3 column 1 every time a calculation is made. This is especially helpful for what-if analysis: instead of entering values for every recalculation, the 'KEEP ON' command will temporarily override MasterPlanner's desire for INPUT. 'KEEP OFF' reverses its effect.

MasterPlanner also provides a GROW operation. LINE 38 COSTS = GROW LINE 3 [COLUMN 1] BY 10% results in a sequence of values each 10% greater than the previous. In this case, the first value is that contained in LINE 3 column 1.

For some models (for example, cash flow analysis) we need to introduce 'history' data for just a few lines of the model. With most spreadsheet systems whole columns need to be allocated for these few values, but not with MasterPlanner.

LINE 40 SALES (100,200,400) = 350,600,700
LINE 41 GOODIES = .70 * SALES [–1 COLUMN]
LINE 42 OKERS = .20 * SALES [–2 COLUMN]
LINE 43 SODS = .10 * SALES [–3 COLUMN]

LINE 40 specifies that SALES for the first three months are 350, 600 and 700, and that they were 100, 200 and 400 in the last three months of the previous period. LINEs 41 to 43 model our expectations of payments and show how row calculations can utilise 'offsets'. This model specifies that 70% of SALES will be paid for by the next month, thus the first value in the GOODIES line will be 280 (= .70 *400). On the other hand, the first value in the SODS line will be 10 (= .10 * 100) and the next two values will also be calculated on the basis of the SALES 'history'.

By substituting 'COLUMN' for 'LINE', most of the above examples can be used to build up 'column-logic', but most modelling tends to require predominantly line-logic. Most COLUMN statements are used for assigning names to columns and the occasional column total. For example:

COLUMN 1 JAN =
..etc..
COLUMN 12 DEC =
COLUMN 13 TOT = SUM OF COLUMN 1 THRU COLUMN 12

As with LINEs, COLUMNs are accumulated in the correct order in the model and always *after* the LINEs. In some cases, it is convenient to allow a certain amount of LINE calculation to assign the wrong value to a particular cell, knowing that a subsequent COLUMN calculation will correct it. Conversely, it is also possible to protect a cell from a COLUMN calculation by prefixing it with a '#'.

Reporting

There are a variety of commands for controlling the report formats. Many apply equally to the screen layout although there are some screen-only commands, such as split-screening, which have no effect on reports.

Fig 1 is a complete printout of the model which produces the report in Fig 2. It provides a general idea of the extensive formatting facilities available

```
Heading 1 = MASTERPLANNER
   DEMO
Skip 2 after Heading 1
Centre Heading 1
Heading 2 = PCW APRIL 1984
Skip 2 after Heading 2
Centre Heading 2
Line 1.0 REVENUE
   =200.,230.,250.,300.,
Underline Line 1.0 With –
Skip 1 after Line 1.0
Line 2.0 OPER'COSTS
   = 140., 145., 150., 160.,
Line 3.0 DEPRECIATION = 10.
Line 3.5 MISC = 25.,30. FOR 2,35.,
Line 4.0 INTEREST = 11. FOR 4,
Line 5.0 TAX = 15.,16. FOR 2,17.,
Underline Line 5.0 With –
Skip 2 after Line 5.0
Line 6.0 TOTAL'COSTS = SUM OF
OPER'COSTS THRU TAX
Underline Line 6.0 With —
Line 7.0 NET'INCOME = REVENUE –
TOTAL'COSTS
Column 1 AUTUMN'1983 =
Column 2 WINTER'1983 =
Column 3 SPRING'1984 =
Column 4 SUMMER'1984 =
Report 1 = L:1-7,C:1-4,H:1-2,F:OFF
   ,R:ON,W:OFF,A:ON
Size = 4
Space = 2
Decimals = 0
Width = 12
Show =
Significance = 6
```

Fig 1 Complete printout of report model

MasterPlanner Scorecard

Easy to learn:	**?**	**(poor)**
Easy to use:	**!**	**(passable)**
Reliability/ error handling:	**!!**	**(good)**
Facilities:	**!!!**	**(excellent)**

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in MasterPlanner.

It's possible to specify several lines of headings for the model using HEADING commands, optionally centering them (CENTER) and inserting spaces between them (SKIP). Lines or headings can be underlined (UNDERLINE), spacing between columns specified (SPACE), and numbers printed with decimal places (DECIMALS). These are just a few of the possibilities for designing a report. Note that a heading is centred on the page, not over the columns printed—thus the headings in Fig 2, printed on 132-character stationery, appear distinctly off-centre in this example.

	AUTUMN '83	WINTER '83	SPRING '84	SUMMER '84
REVENUE	200	230	250	300
OPER COSTS	140	145	150	160
DEPRECIATION	10	10	10	10
MISC	25	30	30	35
INTEREST	11	11	11	11
TAX	15	16	16	17
TOTAL COSTS	201	212	217	233
NET INCOME	−1	18	33	67

Fig 2 MasterPlanner demo

Most of the above commands are not only applied globally, but can also be written for individual LINEs or COLUMNs:

WIDTH FOR COLUMN 10 = 7
DECIMALS FOR LINE 8 = 5

will override the normal display requirements for the LINE and COLUMN indicated.

The PRINT command is used for making reports, not resulting in an instant printout but first presenting the user with a menu. The user can optionally exclude parts of the normal printout, printing direct to disk-file instead, change paper margins and so on. These options can be used to enable draft printouts to arrive that much quicker with headings excluded, and for printing models that are too wide for the printer in stages.

Spreadsheeting & editing

MasterPlanner's normal display is predominantly a window on the spreadsheet itself. By pressing the 'execute' key (control-E on my VDU), MasterPlanner closely resembles an orthodox spreadsheet system, referred to as 'display mode' in the manual. A cursor appears over one of the cells, and this can be moved from cell to cell by pressing the arrow keys. Like any other spreadsheet system, attempts to move off the edge of the area result in a realignment of the display to accommodate the new destination cell. This redraw is not as fast as I would like (see Benchmarks), but not slow enough to be frustrating.

Like some of the more sophisticated spreadsheet systems, MasterPlanner provides a split-screen facility: it also provides a quartering facility, where four disjoint areas can be on view simultaneously.

MasterPlanner provides several alternative methods of editing information. One method involves using the EDIT command applied to a LINE or COLUMN, which causes the original entry to be redisplayed on the command line. With a few keystrokes, characters can be deleted, added or overwritten. After pressing the return-key, MasterPlanner treats the new text as if it was entered from scratch. There are also DELETE and COPY commands for deleting and moving LINEs or COLUMN's. Unlike most spreadsheet systems, there is no relative-copy facility. Normal spreadsheets need to have relative-replication for copying formulae typically across several columns, but MasterPlanner does not work this way — all columns are handled by a single formula.

It is also possible to edit in display mode. Move the cursor to the cell to be changed, press the return key, and MasterPlanner allows the number to be edited and redisplays your modification. This aspect of the software is quite ingenious, since the number changed may have been the result of a calculation and MasterPlanner also modifies the underlying LINE to be compatible with the new display. For example, if the third column in LINE 55 TAX = LINE 32 * 0.3 is changed to 123.45, then the LINE becomes LINE 55 TAX = LINE 32 * 0.3 FOR 2, 123.45, LINE 32 * 0.3

There is one method of editing to which the MasterPlanner manual gives no prominence. Models can be saved on disk in either internal or external formats. If you save a model in external format, it can be read by a word processor program and edited in the normal way. If you work this way, there is no guarantee that you are typing legal MasterPlanner commands, but as most word processors have a faster interaction than MasterPlanner then large sweeping changes or additions can be achieved more quickly by working this way.

Consolidation

Consolidation is needed when we have

DIVISION A	1982	1983	1984
SALES	100	200	300
OVERHEADS	20	20	22
COSTS	90	120	150
PROFIT	−10	60	128
DIVISION B	**1982**	**1983**	**1984**
SALES	200	400	600
OVERHEADS	40	40	44
COSTS	180	240	300
PROFIT	−20	120	256
DIVISIONS A & B	**1982**	**1983**	**1984**
SALES	300	600	900
OVERHEADS	60	60	66
COSTS	270	360	450
PROFIT	−30	180	384

Fig 3 Merging information into corporate report

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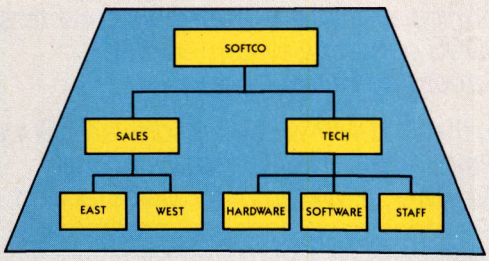

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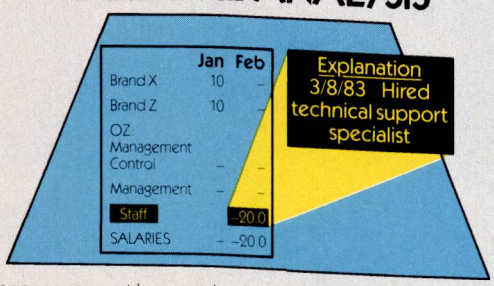

Business managers must know whether they are 'on plan.' OZ has a variance analysis system that will assist in understanding when and why performance is 'off the mark.' With OZ you can look at variances for all the line items by month and by department then, at the touch of a key, get the reasons which explain the variance. OZ gives you complete control over your costs.

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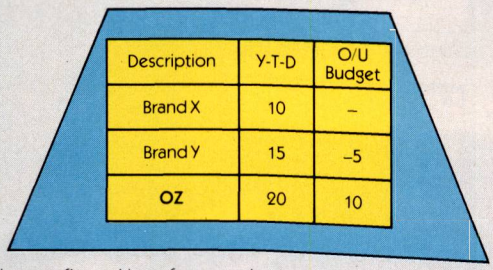

Description	Y-T-D	O/U Budget
Brand X	10	–
Brand Y	15	–5
OZ	20	10

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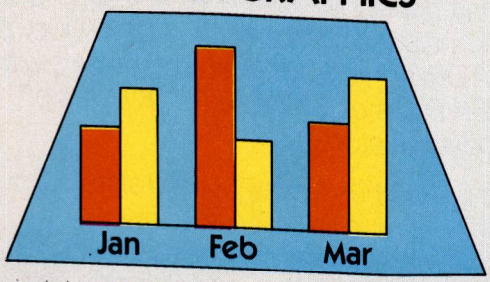

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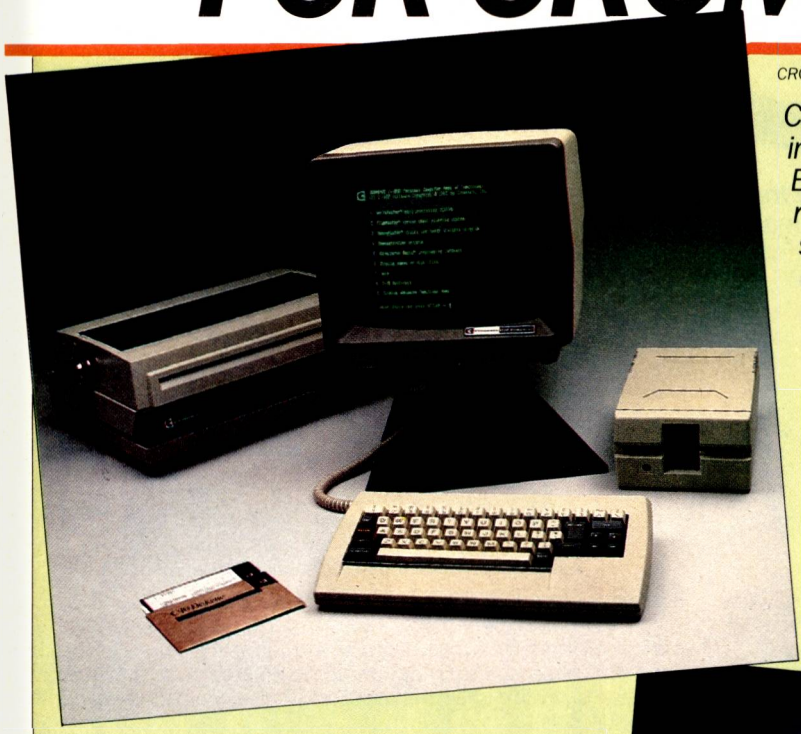


CROMEMCO C-10MP

Cromemco's C-10 personal computer includes a Z-80A microprocessor with 64K Bytes RAM, 24K Bytes ROM, high resolution 12" green phosphor 25 x 80 screen, detached keyboard, 5" floppy disk drive with 390K Bytes capacity, communications and printer ports, terminal emulation, graphical characters, CDOS operating system and 32K Structured Basic.

In the C-10MP we add a software "Super Pak": a full screen editor, WordStar, MailMerge, Writemaster, CalcStar and PlanMaster spreadsheet programs, Chess game, MoneyMaster financial analysis and InfoStar data base management system.

The System One Hard Disk computer, with an integral 21 Megabyte Winchester hard disk, includes Cromemco's dual 68000/Z-80A DPU processor (featured below), with 256K Bytes of RAM and 390K Bytes of floppy disk storage.

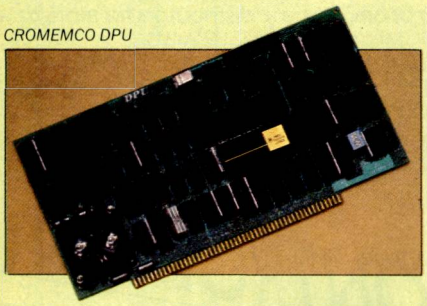
The S-100 bus has eight card slots, sufficient for expansion utilising Cromemco's range of interface cards for high resolution colour graphics, process control, analogue-digital data conversion and telecommunications.

A choice of operating systems includes CDOS, CP/M and CROMIX.



CROMEMCO CS-1HD2

CROMEMCO DPU



Cromemco's Dual Processor Unit is the ultimate professional micro-computer. It combines the flexibility of Z-80A 8-bit systems with the speed and versatility of 68000 16-bit technology and an address space of up to 16 Megabytes of RAM.

The DPU can be installed in several Cromenco computers, including the CS-1 featured above. For larger applications we recommend the CS-2, with up to 4 floppy disk drives, each of 390K Bytes capacity, an optional 21 Megabyte Winchester hard disk, screen and printer interfaces plus a 21 slot S-100 bus – sufficient capacity to cope with the most demanding industrial or laboratory requirements.

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```
Heading 1 = DIVISION A
Line 1.0 SALES = 100.,200.,300.
Line 2.0 OVERHEADS = 20.,20.,22.
Line 3.0 COSTS = 90.,120.,150.
Line 4.0 PROFIT = SALES -
   OVERHEADS - COSTS
Column 1 1982 =
Column 2 1983 =
Column 3 1984 =
Size = 3
Space = 2
Decimals = 0
Width = 10
Show =
Significance = 6
```

Fig 4 Logic for producing independent reports

several divisions in an organisation and we need to merge information into one corporate report (Fig 3 shows reports on Divisions A and B independently, and then on A and B combined). Both independent reports were produced using the same logic (Fig 4).

The consolidated report is produced by first loading the Division A model using the normal MasterPlanner command. Then the command CONSOLIDATE DIVIB reads in the Division B model and overlays it on the existing model, adding together values wherever they coincide. A quick change to the heading is all that's then needed to produce the consolidated report.

It is possible to consolidate more than two divisions by simply repeating the CONSOLIDATE command, and it's even possible to 'weight' divisions so that they don't all make an equal contribution to the final corporate report.

Complicated consolidation operations may necessitate a long sequence of commands to be typed in, leaving room for error (for example, consolidating the same division twice). If spotted, you will have to start again, and if not spotted — that's even worse! Ideally, MasterPlanner should accept input from command files, where the entire sequence of commands can be set up on a file once and for all.

- Financial Reports
- Cash Flow Forecast
- Acquisition Appraisal
- Financial Gearing
- Financial Projection
- Lease vs Purchase Analysis
- Net Present Value
- Mortgage Calculation
- Loan Amortisation Scheme
- Breakeven Analysis
- Depreciation Schedule
- Financial Reports
- Real Estate Analysis
- Banking Forecast
- Corporate Valuation
- New Product Introduction
- Pro Forma Financial Statements
- Consolidation — Planning Forecast

Fig 5 Models contained in business solutions applications library

PlannerCalc v MasterPlanner

PlannerCalc does not have a consolidation command and lacks some of the powerful file-handling commands of MasterPlanner. Parts of MasterPlanner models can be selectively written to disk files, and it's possible to write MasterPlanner models or reports to disk in a format that can be read or written by other programs, such as word processors.

MasterPlanner has more formatting commands, more sophisticated reporting facilities and a larger capacity for holding models, and in general I found the MasterPlanner manual better (or rather less bad).

As an optional extra there is an applications library containing 18 different models for use with MasterPlanner, and with a few exceptions, PlannerCalc also. This library can serve two purposes — as a source of ready-worked applications, and also as tutorial material demonstrating how to build up some of the more complex models. This library is analogous to the TK!Solver packs released by Software Arts (see TK!Solver review, *PCW*, February 84).

The 18 models cover a wide range of applications (see Fig 5). Each model is well documented, can be loaded in the normal way and freely modified.

Fig 6 gives a partial printout of a thirty year mortgage calculation. It's possible to build on this model to add mortgage extensions, tax concessions and so on, but the basic groundwork is already done for you.

Conclusions

The Comshare trio of products contains some very interesting features not found in any other spreadsheet products, but is somewhat let down by poor documentation and rough edges on the actual software design. The concept of two compatible products and an applications library is very neat, and (I believe) unique.

	1	2	3	4	5	6	7
Mortgage	61,000.00						
Int rate	0.14						
Annual cost	8,711.21	8,711.21	8,711.21	8,711.21	8,711.21	8,711.21	8,711.21
Month cost	725.93	725.93	725.93	725.93	725.93	725.93	725.93

Fig 6 Mortgage calculation (30 year term)

The nearest comparable product covered in Which Spreadsheet is Ashton-Tate's 'The Financial Planner' (*PCW*, December 83). I certainly preferred MasterPlanner to The Financial Planner in spite of its poorer documentation, but the world is still awaiting a properly engineered marriage of new spreadsheet technology with old financial planning techniques. Maybe a latter-day Lotus will come up with the goods! END

Benchmarks & contacts

These tests were run on a 56k CP/M system with a 2 MHz Z80 processor. 16-bit operating system versions should have considerably greater capacity.
Spreadsheet size: 1000 columns wide by 5000 lines.
Max column width: 30 characters.
Benchmark 1 (a) Maximum rows accommodated: 70.
1 (b) and 1 (c) Recalculation time: 33 seconds (2+ rows per second).
1 (d) Vertical scrolling: 0.3 rows per second.
1 (e) Horizontal scrolling: 0.5 columns per seconds.
Benchmarks 2 & 3: Not tested.
PlannerCalc: £85 + VAT
MasterPlanner: £245 + VAT

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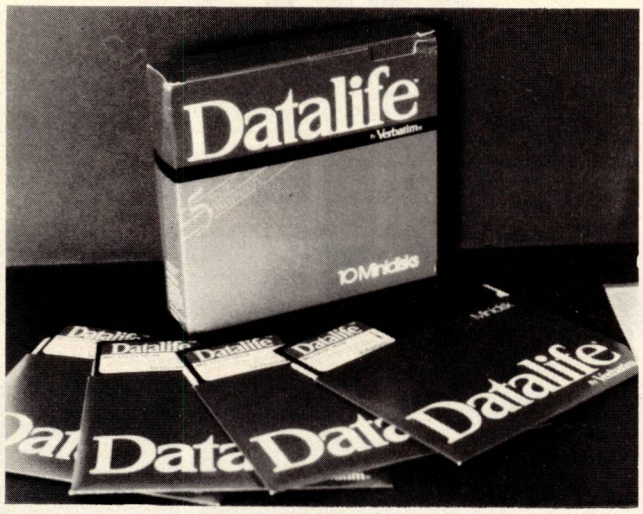

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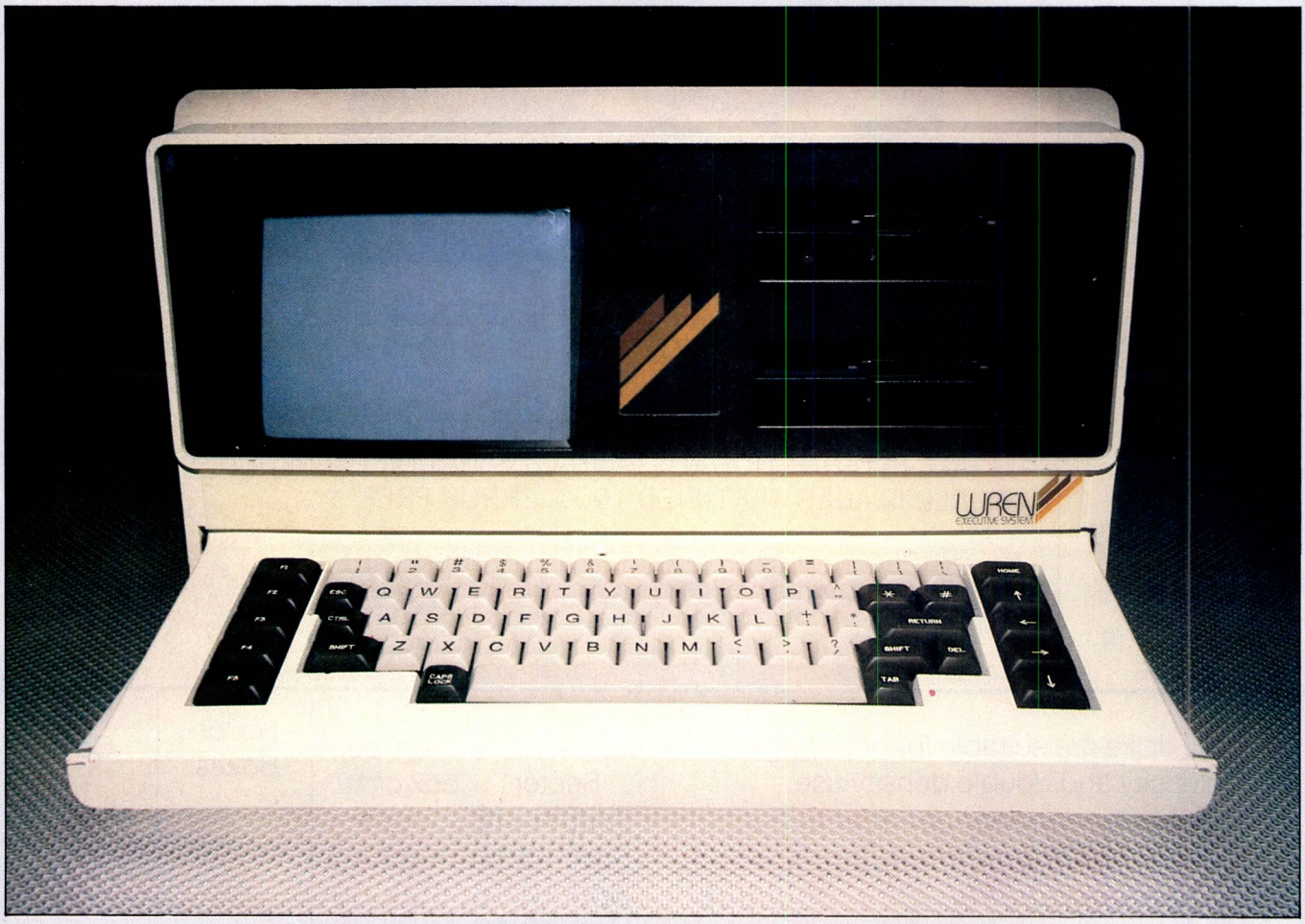
Wren

UK company Wren Computers has adopted the tried and tested method of proven technology rather than leading edge innovation in the design of its business micro, the Wren. This £1000 transportable boasts something for everyone. David Tebbutt reports.



The Wren personal computer sets out to be all things to all men and, astonishingly, it seems to have succeeded.

At first glance it appears to be a good-looking, compact, transportable business machine. It has two disk drives, a proper keyboard and a normal 24 line by 80 column display. It runs a version of the CP/M operating system and is supplied with a range of useful business programs. Look below the surface and you discover that it has high resolution graphics and colour capabilities, although you'd need a separate colour monitor to take full advantage of these. Look even deeper and you'll find a version of BBC Basic and four sound channels. Finally, you discover a three month free subscription to Prestel and Micronet 800 and a built-in modem which allows you access to these, and other, services.

Adam Osborne, the man who created the transportable market, once said: 'Those who operate at the cutting edge of technology shall be sacrificed upon it.' Wren Computers appears to have taken this advice to heart. In a sense the Wren is very traditional because it uses proven hardware and software components but has merged these in what I believe to be a unique and potentially sucessful way.

Wren is a new company jointly funded by Transam and Prism, who between them designed the machine. For those new to the personal computer business, Transam is a well established London dealer and distributor which has also designed and sold its own computers. Prism is probably best known for its Sinclair distributorship although it has recently ventured into the home robot business too. The Wren is being manufactured by Thorn EMI and distributed by Prism.

Hardware

The Wren is a very good-looking machine in terms of size, layout and colour scheme. It is robust and well made. The pleasant blend of cream and dark brown somehow contrives to make the machine look light. It came as something of a shock when I picked up the prototype and found that it weighed

26lb. The production machine is expected to weigh a more healthy 20lb.

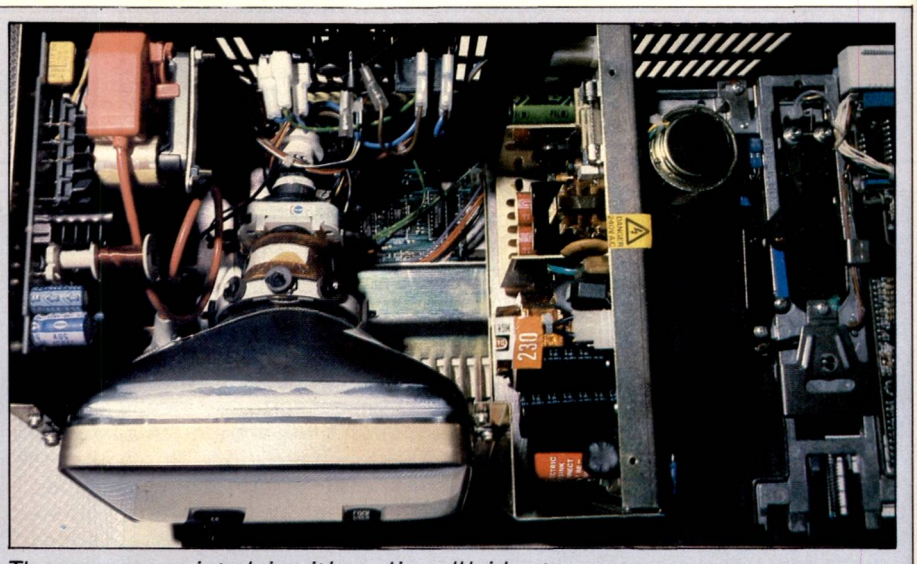
The machine is really in two parts, although you'd have a job to separate them. The flat base encases an enormous printed circuit board which contains all the central computer circuitry. The sloping keyboard is mounted at the front of this base, and a full width carrying handle at the back. A number of connectors are visible on the rear edge of the base. Reading from left to right, they are: modem, paddle controls, RS232C, winchester, printer and colour output. A tiny reset button is tucked between the last two ports.

The top part of the machine contains a 7in Toshiba flat-faced display screen and two half-height, horizontally-mounted 5¼in disk drives. The power supply lead enters the machine at the rear of this upper unit. A novel feature of the Wren is that the entire top part of the machine slides forward to cover the keyboard at the front and to reveal the carrying handle at the rear. A clip-over cover fits on the front of the assembly and there is enough space inside for your working papers and disks. The telephone and power supply cables fit nicely under a hinged cover at the rear when in transit.

The screen displays characters in a pleasant amber colour on a grey background. Eight shades may be displayed or, using an external monitor, eight colours. Most business applications would use the normal amber/grey built-in screen. In addition to the normal 24 × 80 layout, the screen can emulate Prestel's 24 × 40 characters or give 256 × 512 graphics pixels (picture elements or dots). A television adaptor is available as an optional extra which would be useful, for example, if you wanted to get the benefit of Prestel's colour displays but without the expense of a monitor.

The screen automatically blanks if the keyboard is inactive for more than ten minutes. (You may vary this duration between one and 34 minutes with the CONFIGUR command.) A red light on the keyboard will remind you that the machine is still active. The prototype machine wasn't properly adjusted, a light band ran down the left hand side of the screen and the display was a little 'pin cushiony'. I also noticed that if column sixteen contained a character then a single column of the character matrix would repeat itself in the first column of the previous row. No doubt these problems will be resolved in the production machines. Brightness and contrast controls are under the cover at the back of the screen housing.

The disks are very compact units and they worked well. The catch on each drive was rather peculiar in use but Wren assures me that different ones will be used in the production models. The only other odd thing I noticed was that despite all the ventilation space inside the machine, the top disk drive did get rather hot. Each 40-track, single sided, double density disk has a usable capacity of 190k and the drives can read SuperBrain format disks, something I found particularly useful because I run such a machine at home. I transferred a number of programs to the Wren with complete success. For some reason, and I suppose it could be seen as an advantage, the drive light stays on even after the motor has stopped.



The enormous printed circuit board is well laid out

Moving down to the keyboard, there is a perfectly pitched set of keys which at first feel rather toy-like because their travel is limited. It's like the difference between a conventional electric typewriter (remember them?) and a portable machine. The keys are not nearly as proud of their surround as is usual, but unless you are a real keyboard connoisseur, I don't suppose this will bother you. 67 keys are provided, comprising the normal qwerty set plus five function keys, two Prestel control keys (hash and asterisk), home and the four arrow keys. I don't do much mathematical work so I didn't feel the absence of a numeric keypad. Dispensing with the pad is a good way for transportable computer makers to keep the width, and therefore the weight, down.

A light shines on the CAPS LOCK key when it is locked into position — an unusual refinement in such a low cost machine. The function keys may be accessed in conjunction with SHIFT or CTRL giving a total of 15 user-definable functions from these five keys. The HOME and arrow keys are also user-definable and there's no reason why you should not use these as function keys too. The only restriction is that they have the same meaning regardless of the position of the SHIFT and CTRL keys. The only really peculiar thing about the keyboard is that it does not have a '£' keytop although, as with many machines, it can be displayed using the hash sign. In fact, the entire character set may be redefined and alternative sets stored on disk.

An autodial modem is included inside the machine and using this I had no problems connecting up to Prestel and Micronet 800. Prestel transmits at 1200 baud and receives at 75 baud. Although



Aesthetically pleasing and hardwearing: the transportable Wren

I didn't try it, the Wren can handle 1200/1200 speeds as well. A supplied cable connects the Wren to the modern style of BT (British Telecom) wall socket. It is even possible to get application programs to make your phone calls for you. For this you would need a double socket — type 600 I believe —, one for your Wren, the other for the telephone.

The two DIN paddle sockets can be used for any type of analogue input to the computer. Up to six such inputs are catered for by this machine. The Centronics parallel printer port worked a treat and I almost managed to get my printer working from the RS232C serial port. I did send stuff down the line but I couldn't get the handshaking right. I ended up with gibberish on the paper and my first disappointment with the documentation.

At first I had trouble figuring out the CONFIGUR and DEVICE programs, both of which are necessary to set up the serial port. Incidentally, you can get this port talking at speeds from 75 to 19200 baud. More or less by trial and error I got all the software tuned up to my printer's requirements, but then I discovered that a much needed appendix was missing from the draft manual. This is the one which is going to explain what signals are expected on the various wires at the Wren end of the RS232C link.

Without that I was stumped and at 10pm on a Sunday evening there was no way I could be rescued by Prism or Transam. Get your dealer to show it working with a serial printer if you're worried. I'm certain that it will work. A winchester disk socket promises hard disks to come and the DIN RGB (Red, Green, Blue) socket gives splendid results when connected to a colour monitor.

Inside

Opening up the machine was simplicity itself. Two screws hold the metal base in position. Once removed it was a simple case of grabbing the carry handle and sliding the base off to reveal the enormous PCB. Three more screws hold this down and their removal allows the PCB to be swung up (if the machine is upside down). The board is well made and very neatly laid out although there were quite a few extra wires taped around it. This is often the case with a prototype machine. I noticed that all the ports mentioned earlier are attached to the rear edge of this PCB and they have no other means of support. In other words, be gentle if you tend to plug and unplug printers and the like regularly.

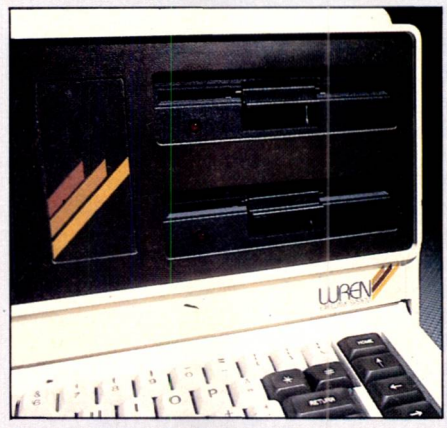
For the technically minded, the Wren is driven by a 6MHz, Z80B processor which makes it very fast. Most machines of this type run at 4MHz. It is delivered with 64k RAM with an option for 256k and a separate 32k of video RAM gives the high resolution colour graphics without robbing the user of memory. 8k of ROM provides diagnostics which check the machine each time it is switched on. 50 bytes of battery-backed CMOS RAM are used to store the time and date.

The review machine had a grotty piezo-electric speaker sellotaped to a couple of the chips. The sound generator provides three sound channels and a noise channel. In this respect the Wren ceases to be a business machine and begins to feel more like an up-market home computer. And why not? Since it's transportable, who knows what its owners will get up to out of hours? I suspect that the musically-minded could have some fun with the eight built-in envelope shapes. Wren itself decided to use its sound facilities to implement a 'bell' which sounds when invalid keys are pressed — it's an impressive effort but it sounds ghastly.

The top casing of the machine is even easier to remove than the bottom. Two screws hold it in place and when these are removed a nudge forward and a lift



Neatly designed keyboard, even if the keys feel rather toy-like



Integrated and compact disk drives

are all that's required to reveal the power supply, disk drives, screen and associated circuitry. Once again this is impressively constructed and extremely clean and airy.

Applications software

Transam, joint designer of the Wren, has been selling computer software for several years now and it has found Perfect Software's range of products particularly popular. Not surprisingly, it has chosen three of this company's products to give away free with each Wren. Perfect Calc, Perfect Writer and Perfect Filer give the popular spreadsheet, word processing and file management applications. Add to this a communications package, the CP/M Plus (alias CP/M 3) operating system, BBC Basic and Quantec's Executive Desktop and you begin to see what an impressive package the Wren represents.

I didn't try all of Perfect Software — the review would have taken months. I did, however, have a look at Perfect Writer and, despite my known addiction to Spellbinder, found it a very acceptable package. According to the manual, Perfect Writer can handle up to seven documents concurrently with two visible at the same time. It can create indexes and help concoct contents pages with the correct page numbering according to the content of your document.

Commands are mnemonic and, providing you know your way around the keyboard, are easy to find and use. Letters are used in conjunction with either the CONTROL or the ESCAPE key and you will find, for example, that 'F' is used for forward movements and 'B' for backward ones. Deletion is done with 'D' and so on. The letter 'A' was chosen to go to the beginning of things and Perfect Writer suggests you remember this by thinking of 'A' being the beginning of the alphabet. Corny perhaps, but it works.

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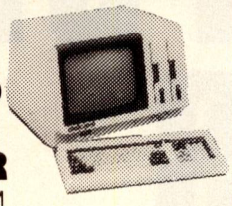

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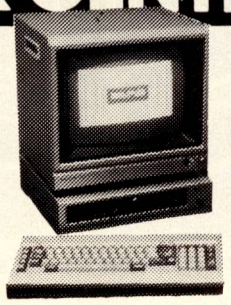

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A nice touch is the 'Yank back' facility (would you believe control-Y?). This brings back stuff you've accidentally deleted. Perfect Writer happily exchanged data with BrainStorm (see *PCW* January) which I was using to develop the Benchtest. All in all, I was impressed with my limited exposure to Perfect Writer which is more than I can say for my first sessions with WordStar.

I had a go at using the communications package and I found it excellent. I live outside London and it was a simple matter to change the telephone numbers of the various Prestel locations. Getting into Prestel was a doddle too, but what a disappointment once I was there! Unless you need bang up to date information I reckon Prestel is a pain. Even at 1200 baud it is a bit slow in operation. It's about 18 months since I last used Prestel in earnest and I must say that my impressions have not improved any. But then again, it is not expensive to use it occasionally and, who knows, it might get better.

I turned to Micronet's Bulletin Board hoping to find inspiration but, no, that was little better than graffiti. Nerds were leaving nerdy messages and, I regret to say, the staff of the service were adding almost nerdier replies. Finding that a big turn off, I thought I'd have a go at the lonely hearts mailbox. It was funny in parts but was really just the same sort of drivel but on a different subject. Still the link worked and for those of you who need to access Prestel or who have faith in it improving, you will encounter few problems using the Wren as your terminal. I was almost relieved when I left a magnetised screwdriver near the comms disk and zapped the terminal program.

Of course the 1200/1200 link has far more uses and that is supplied with the machine too. Domestic users pay £5 per quarter to belong to Prestel, £8 per quarter for Micronet and connect time costs 5p per minute during working hours (8am-6pm Monday to Friday and 8am-1pm on Saturday). At all other times there is no access charge. In addition you will pay the cost of a local telephone call for the duration of your connection and, occasionally, you will want to access a frame which will cost you money. In these days of electronic mail, I think we're all going to be hooked into using comms facilities sooner or later.

The Executive Desktop package was written by Quantec to Wren's requirements. It is an interesting suite of programs designed to be running on the user's desk pretty well at all times. Accordingly it contains many functions considered essential to a busy executive's well-being.

The suite is in seven parts: Time Management, Addresses, Deskfile, Filing, Calculator, Typewriter and Utilities. At first glance it's horrendously complicated but, like most packages, if you take your time and read the instructions you soon get the hang of it.

Time management is a diary system which can cater for appointments, events and straightforward notes.

Deskfile lets you design forms for different occasions. For example, you may have memos, letters, reports, budget forms or expense claims. With this system you simply enter the design once and every time you want to fill in a form, call it from this file.

The Filing system gives you an unusual arrangement of headings so that you can easily code each document for filing under a particular heading.

The Addresses file keeps your addresses in three categories: Business, Personal and Places. Since each directory is limited to 152 entries, this gives a total of 456 names and addresses online. This means the Deskfile is limited to 152 pages of information too but each page could be a different design. It also means that the diary is limited to around 30 working weeks.

None of these limits would bother the average executive. What might bother him is the effort needed to learn how to use Executive Desktop fully. The end product is not as slick as many programs you see on the market but it is definitely usable and I must admit that the more I used it and discovered short cuts, the more I enjoyed it. Executive Desktop can even make phone calls for you and tell you when to pick up the handset.

Finally, the Calculator facility emulates a simple four function calculator with memories and the Typewriter actually lets you use the machine and printer like a typewriter. This is great for the swift memo. There were a number of aspects of the package which could best be described as untidy but then it does come 'free' with the Wren and I really don't think I should complain.

Other programs I ran were Microsoft's MBasic and Caxton's Cardbox. These worked perfectly which bodes well for other suppliers of standard CP/M packages. The Wren's comprehensive set of graphics characters were easily implemented to give smart screen displays. In general the screen attributes are compatible with the Televideo TVI 910.

Systems software

A Wren menu is supposed to be on every disk. This displays the programs available at any time and, using a combination of SPACE and RETURN keys, you can quickly and easily load and start running the program you want.

CP/M Plus is a vast improvement on the old-fashioned CP/M 2.2. It allows you to work in the old ways but is far more forgiving of errors and understanding of the user's needs. With the utilities provided you can design new character sets and switch between them. You can change the details of the function keys and access some of the more arcane aspects of CP/M through

CONFIGUR	sets up system characteristics
COPYSYS	was SYSGEN
CRAM	loads different character set
DESIGN	designs new character set
DEVICE	replaces device assignment aspects of STAT
DIR and DIRS	directory and directory of system files
DIR (options)	greatly enhanced DIR
ERASE	as ERA but with confirmation option
FC	format and copy
GET	can treat a file as console input
HELP	variety of explanatory notes on CP/M Plus
INITDIR	activates time/date stamp capability in directory
KEYDEF	defines function and home/arrow keys
PIP	good old PIP
PUT	diverts console output to printer or disk
RENAME	as REN but allows wildcards
SET	sets time/date and file/disk attributes. NOTE: timestamping reduces the directory size to 47 entries (from 64)
SETDEF	sets drive search sequence for program loading and sets display modes on and off
SHOW	displays drive information
SUBMIT	as old version but accepts parameters and data
TV	switches on TV 40 column mode on CRT or monitor
TYPE	as old TYPE but with page mode option
USER	as old USER

Fig 1. CP/M Plus overview

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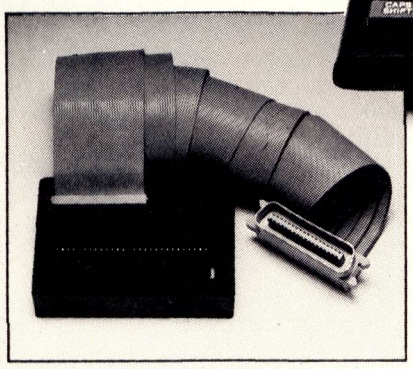
FULLY MICRODRIVE COMPATIBLE



From £39.99 Inclusive



At last you can have real print performance from your ZX Spectrum with the Kempston Centronics Interfaces. As the Interfaces allow you to link your ZX Spectrum to any of a vast number of printers with an industry standard centronics input, you can choose the printer that suits *your* needs – from high speed dot matrix to professional letter quality printers.

We recommend Epsons, NEC, TEC, Seikosha, OKI Microline, Tandy GP115, Star DP 510, Shinwa, Brother HR15, etc.

NEW **INTERFACE E** – ONLY £55.00
Simply plug in and it's ready to use. All operating commands are held in an EPROM so LLIST, LPRINT and COPY can be used at any time without using up valuable user RAM. COPY will allow the reproduction of high resolution graphics with Epson (or derivatives) and Seikosha 80, 100 and 250 Series printers. Print width selection from 32 characters to full width depending on printer used.

INTERFACE S – ONLY £39.99
Visually identical to Interface E but without the EPROM, Interface S also recognises the LLIST & LPRINT commands and will allow print width selection from 32 characters to full width.

However, software routines will need to be loaded before use. Full screen dump to reproduce high resolution graphics is also possible and supporting software is supplied to operate this facility with Epson and Seikosha printers. The software routines that are necessary to initialise the interface are held in the printer buffer so valuable user RAM will not be used up. There is a growing range of Business/Utility software that includes these routines. Details available on request.

Either interface simply plugs into the ZX Spectrum expansion port or interface and is supplied fully cased with a one metre ribbon cable which connects to the printer of your choice. Full instructions are included and driving software is supplied with Interface S.

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ADDRESS MANAGER (OCP) – Simple index filing system ideal for names, addresses, etc. Various search facilities. **£19.95**

FULL SCREEN EDITOR/ASSEMBLER (OCP) – Allows you to write Z80 assembly code using standard mnemonics on full screen. **£19.95**

WORD PROCESSOR (TASWORD TWO) – (TASMAN) A professional word processor allowing 64 characters per line and incorporating all usual editing facilities. **£13.90**

OMNICALC (MICROSPHERE) – The only spreadsheet written entirely in machine code. The easy and fast way of solving any numerical problem. Ideal for cash flow forecasting to concrete stress analysis. **£9.95**

MASTERFILE (CAMPBELL SYSTEMS) – Filing and retrieval system for domestic or business use. Files can be loaded and saved independently. Microdrive compatible. **£9.95**

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EPSON RX-80 F/T – A dot matrix printer allowing full graphics dumping and a choice of printing styles. Speed: 100 C.P.S.
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Interface S Available from
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VISA

For ZX Spectrum

plain English commands. For example, 'SHOW' and 'COPYSYS' are more meaningful alternatives to 'STAT' and 'SYSGEN'. Some things never change — 'PIP' is the same as it always was. (See Fig 1 for a summary of CP/M Plus.)

BBC Basic is the supplied language with the Wren. Although the processor is a Z80, a special version of the language has been written by RT Russell and published by M-Tec Computer Services. It follows standard BBC Basic but with a few variations to reflect the facilities available on the Wren. In particular the graphics, sound, analogue input, clock and direct access to CP/M facilities are covered by the new version.

Documentation

Four manuals are supplied — one for each of the 'Perfect' programs plus a Wren User Guide. I had a draft User Guide which lacked an index or diagrams but in other respects appeared complete. Its tone is certainly friendly and, in places, almost too conversational. For example, 'This may not be very creative, but you wanted a simple computer!' Until you get to the heavier parts of CP/M and Executive Desktop it is quite a good read. It certainly covers the ground for an ordinary user. If you want to get technical or start programming then you will need to buy extra manuals. A technical guide is available from Transam and a BBC Basic manual from M-Tec, its publisher.

Everyone should copy their master disks before starting to use a new system. It was interesting to read in the User Guide that on this system you need to spend a couple of hours on this job because it involves reorganising the distribution of programs as you copy them to your new disks. I know that to push a machine out for a thousand pounds, Wren must have agonised over whether to use a couple of extra disks or make life more difficult for the user. Perhaps kind-hearted dealers could take note and reorganise the disks before parting with the machine. It need only cost a few pounds and would save a lot of frustration just at the time the user really needs encouragement.

The other thing I noticed was that you shouldn't leave disks on top of the unit in case the TV tube magnets zap them. If that really is a serious risk then it should be emblazoned on the unit or at least given more prominence in the manual.

The 'Perfect' manuals supplied with the review machine were the original Perfect Software manuals as supplied with the unmodified product. Perfect is currently rewriting its manuals for the Wren versions of its programs. If the quality of the new manuals is anything like the existing ones then they will be large, clear and comprehensive. The Filer, Calc and Writer manuals together comprise a massive 940 pages.

The technical manual had not been finished at the time of the review but I was given a copy of the BBC Manual as it is currently supplied for the unmodified BBC Basic. It is definitely a reference manual and if you need to learn BBC Basic then you will need to find a book with a more tutorial approach.

Prices

There's only one price worth quoting and that's £1000 plus VAT for the Wren, Perfect Filer, Perfect Writer, Perfect Calc, BBC Basic, CP/M Plus, Communications and Executive Desktop. Additional memory, a carrying case and the TV adaptor are the only extras I know of but the prices were not available at the time of writing.

Conclusions

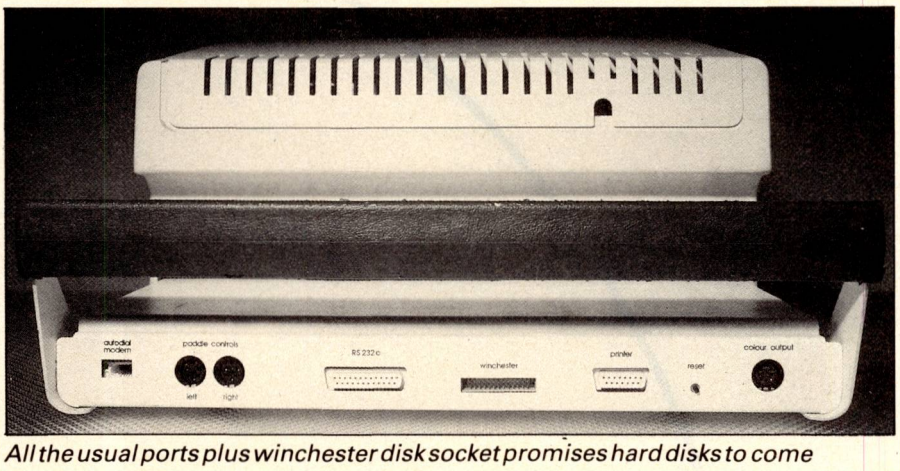
If you are the sort of person who doesn't mind proven technology rather than leading edge stuff then this has got to be a machine worth considering. At £1000 (plus VAT) it appears to offer the best value for a twin disk, full screen transportable computer. And inside are plenty of hidden goodies such as the integral modem, the graphics and the colour capabilities.

It comes supplied with three popular business software packages: Quantec's Executive Desktop suite, a communications package; BBC Basic; CP/M Plus; and a three month subscription to Prestel and Micronet 800. Most CP/M packages will run on the machine which gives the user an enormous range of ready written applications from which to choose.

The prototype machine was very well made and I've no doubt that Thorn EMI will maintain the same standards, if not better, in the production models. As I had a prototype, I noticed the odd glitch but nothing which rang alarm bells.

My verdict? Good value for money and pretty, too.

END



All the usual ports plus winchester disk socket promises hard disks to come

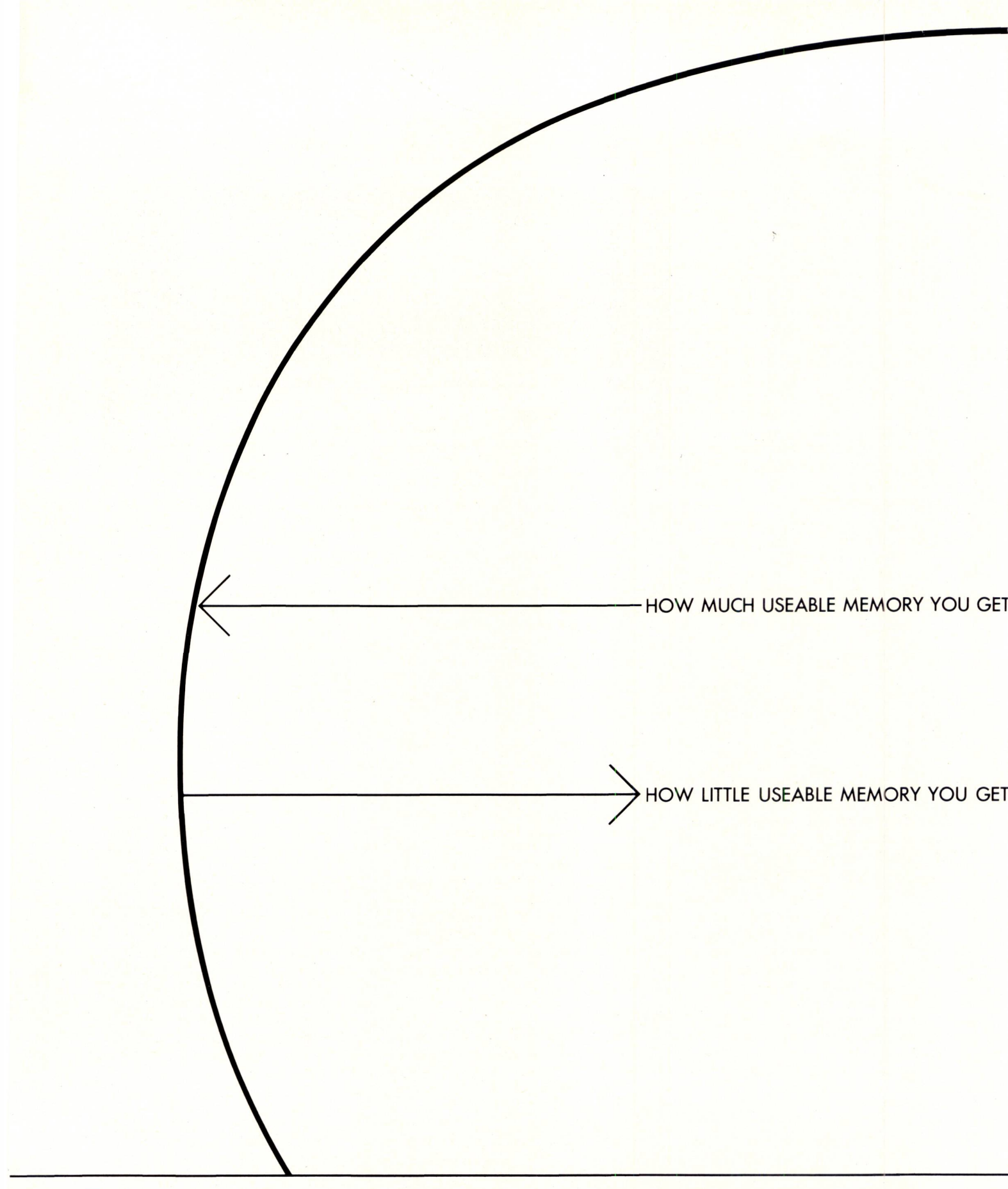
Benchmarks

BM1	1.2
BM2	3.1
BM3	7.6
BM4	7.5
BM5	8.4
BM6	15.3
BM7	23.8
BM8	3.9

The Benchmarks were run using interpreted MBasic. All timings in seconds. For a full listing of the Benchmark programs see 'Direct Access'.

Technical specifications

CPU	Z80B, 6MHz
RAM	64k (256k option), 50 bytes CMOS
ROM	8k
Display	7in flat faced, amber, 24×80, 24×40, 256×512
Keyboard	67 keys including arrows, home and five function keys
Disk	Twin half height 5¼in drives, 190k each
I/O	RS232C serial, Centronics parallel, six analogue channels (or two paddles), winchester, modem and RGB
Operating system	CP/M Plus
Languages	BBC (Z80) Basic, any CP/M-based language
Dimensions	235mm × 420mm × 430mm, 470mm with cover



If you saw a computer labelled 32K, 48K or 64K you'd assume it had a large memory. Right?

Wrong. These figures bear little relationship to the actual amount of useable memory left once the computer is performing functions like text, colour, sound and even more importantly, high resolution graphics.

The Commodore, for instance, claims an "elephantine" 64K memory, yet uses up 26K producing high resolution graphics.

Under the same conditions, the Dragon 32K leaves 24K of useable memory, the Lynx 48K just 14K.

And the BBC Micro and Acorn Electron leave the operator a miserly 9K to play with.

However, there is one computer specifically designed to cope with these normal working functions as a matter of course.

The new Oric Atmos 48K.

Why, even when you add peripherals like the new micro disc drive unit and colour printer (see technical details overleaf), its useable memory is never less than a healthy 37K.

Which not only caters for all the standard applications you'd expect from any home computer, but also for advanced

WITH THE NEW ORIC ATMOS.

WITH OTHER HOME COMPUTERS.

programming and very sophisticated games.

Talking of games, the new Oric Atmos starts off with a major advantage over most new computers, since it takes most of the software already written for the Oric-1.

And like the Oric-1, it has a powerful loudspeaker and amplifier inside its case.

The same unit, in fact, that prompted "Which Micro" (November) to quote... "At full volume this machine can compete with most arcade games. Its sound facilities have more in common with the £400 Beeb, than the rather pathetic beep of the Spectrum..."

Yet the Oric Atmos 48K costs a modest £170, including all the leads and adaptors you need to get it going.

But then what else would you expect from a British Company recognised for offering so much for so little?



The new Oric Atmos 48K. ORIC

Now we've whetted your appetite, here's something to get your teeth into.

Printer Technical Specifications

Printer/ Plotting system	Ball Point Pen, 4 colour
Plotting speed: (horizontal) (vertical)	52 mm/sec (2.05ips) 73 mm/sec (3.08ips)
Printer Speed	12 characters per second
Resolution	0.2 mm/step (0.00787 inch)
Effective plotting range	96 mm (3.804 inch) x axis, divided into 480 steps. (No limit in y direction)
Characters per line	80 or 40 text mode (determined by software in graphics mode)
Characters per line	INT (480/n+1) *6) for 0=n=15
Accuracy (repetition) (movement) (distance)	0.2 mm max 0.3 mm max 0.5% max (x–axis) 1% (y–axis)
Pen life	250 metres (825 feet)
Parallel interface	8–bit parallel Uses STROBE and ACKNOWLEDGE
Temperature range storage	18.3 to 35°C (65 to 96°F) –40 to 71°C (.40 to 160°F)
Humidity range	10% to 80% relative non-condensing
Power supply	Switching power supply input 100–120 VAC 200–240 VAC
Dimensions	10¾" wide 6⅞" deep 2½" high

Atmos Technical Specifications

CPU	6502 A
Memory	Choice of 16K or 48K RAM
Memory (48K Model)	Minimum 48K RAM, max 64: 16K ROM external control signals allow use of full 64K RAM or maybe used externally to increase ROM/RAM
Language	Extended Microsoft basic
Keyboard	Typewriter style and pitch, 57 keys, standard computer layout, additional cursor control keys, autorepeat facility, tactile and acoustic feedback
Display	Output for B&W or colour TV, RGB output for colour monitor.
Text format	40 line x 28 rows
Character set	Similar to Teletext format, standard ASCII double height, flashing, 80 user definable characters
Graphics	240 x 200, 8 colours
Graphic Facilities	Points, lines, circles
Sound	Internal loudspeaker and amplifier. 3-Channel sound synthesiser envelope control, amplitude control 8 octaves, noise channel
Storage	Most cassette recorders via DIN socket 300 or 2400 BAUD. Disc Drive.
Interface	Centronics, expansion port, Hi-fi, RGB Monitor, UHF TV, cassette recorder
Other	Warm reset to regain control without clearing program or data

Micro Disc Technical Specifications

Formatted Capacity	160K bytes per side (double density as standard)
No. of Tracks	40 (80 available as option at a future date)
No. of Sectors	16
Bytes per Sector	256
Transfer Rate	250K Bits/Sec

Supports up to 599 files per side, four drives single or double sided, 40 or 80 track. User definable configuration allows mixing of drive types including 5 ¼" (five and a quarter inch)
Extensive wild card facilities
Copy allows merging of basic and machine code files

Utilities

The Utilities are as follows:

1. Backup	Copy a whole disc
2. Copy	Copy a file to another
3. Del	Delete a file allowing wildcards
4. Dir	Display directory listing
5. Drv	Set the default drive number
6. Format	Format and initialise a disc
7. Load	Load a file (code data or basic)
8. Protect	Change protect status of file
9. Recall	Recall a basic array from a file
10. Ren	Rename a file
11. Save	Save a file (code, data or basic)
12. Store	Store a basic array as a data file
13. Sys	Change system configuration

Prices and data correct at time of going to press.
Specifications on the above models may change without notice.

Available at Dixons, Laskys, Comet, Wigfalls, Rumbelows and all good computer stockists.



ANSWERS



Send your queries to Peter Bright, PCW, 62 Oxford Street, London W1. Please note that Peter cannot answer questions on an individual basis, so please don't send an SAE with your query.

Sinclair QL

I have seen the Sinclair QL advertisement in your February issue, I think I'd like to buy one but two things worry me. Is it as good as the adverts say, and if I purchase it by mail order will I be letting myself in for a long wait like the Spectrum and the BBC?

Also, how can Sinclair get away with calling the 68008 a 32-bit processor?

David Campbell, London

At the time of writing no-one has seen a production QL. The only machines I've seen were pre-production models at the press launch. The specification certainly looks impressive. The only question mark for business use is the speed and reliability of the microdrives, but for £400 who can argue? Availability looks as if it may be a problem. Sinclair are already saying that demand is exceeding expectation so I'd treat the quoted 28 days delivery with some scepticism.

Calling the MC 68008 a 32-bit processor must be regarded as artistic licence on the part of the ad-men. The 68008 actually has an 8-bit data bus but many of the internal registers are 32-bit. Motorola (the chip manufacturers) call it a 16-bit chip, so depending on your criteria you could call it an 8-, 16- or 32-bit. You pay your money and make your choice.

Peter Bright

?????

TRS-80 software

I recently bought a Tandy TRS-80 Colour Computer for home use, but I'm finding it very difficult to locate suitable software—the Tandy shops have a limited range. Where else can I purchase colour software?

Also, what is your opinion of this machine as a 'good' computer? At present we are using it as a learning tool for our children, who are becoming frustrated when they see the wide range of software available for the more common makes.

D. Sutherland, Merseyside

Official Colour Computer software is restricted to what Tandy are prepared to supply. Very few third party software authors have taken to the machine. The only independent company I know of which supplies Colour Computer software is Softek (tel: 01-240 1422). All is not lost, however; you should be able to run a lot of Dragon cassette software on your machine. The only problem is predicting which programs will work and which ones won't. Neither Dragon nor Tandy will tell you, so it's simply a question of trial and error.

The Colour Computer isn't the machine I would choose because of the lack of software. Generally, it's a better idea to stick with the mainstream manufacturers unless you have a specialist need that they can't fulfil.

Peter Bright

?????

Graphics grappling

I am grappling with graphics on my Commodore 64, but having problems with POKE.

I understand the theory of the thing and POKE colour locations (I think). However, according to my handbook if I POKE 1524,81 I should get a ball in the middle of the screen. I don't—and can't seem to POKE any other image into any other location either. What vital piece of information am I lacking?

I know from bitter experience that handbook programs tend not to work as they should, but this seems too simple to be bugged.

Bridget Clarke, Norwich

As with most irritating problems posed by computers the answer is simple—the only missing piece of vital information is how bad computer manuals can be. When you diligently POKEd location 1524 with the correct code for the ball it was indeed printed on the screen—you couldn't see it because it was printed in blue on a blue background. This is particularly confusing as anything typed from the keyboard appears in white. This is an unfortunate 'feature' of the 64 which we have to live with.

The answer is either to change the colour of the screen to RED by the command POKE 53281,2 or to print the ball in a different colour. The colours that characters are displayed in are held in a memory map (or 'array') called the colour memory map. This, along with the screen memory map (where you poked the ball) is the 64's archaic version of the PRINT AT command found on other micros.

To solve your problems you should use the following subroutine to print any characters at any screen position and in any specified colour:

```
10000   REM Print AT
        subroutine
10010   POKE 1024 + 40*
        ROW + COL, COD
10020   POKE 55296 + 40 *
        ROW + COL, CLR
10030   RETURN
```

Obviously, before you use the routine you must assign the required values to the following variable:

ROW— row number
COL — column number
COD — character code number
CLR — colour number

Tony Hetherington

Extra printer speed

I have recently purchased an ACT Apricot with Wordstar and an ACT 120 character per second matrix printer with a centronics connector. My problem is that in Wordstar, the printer does not operate at anything like 120 cps: my estimate is nearer to 40 cps. Why is this and can anything be done about it, as I need the extra speed.

Name and address withheld

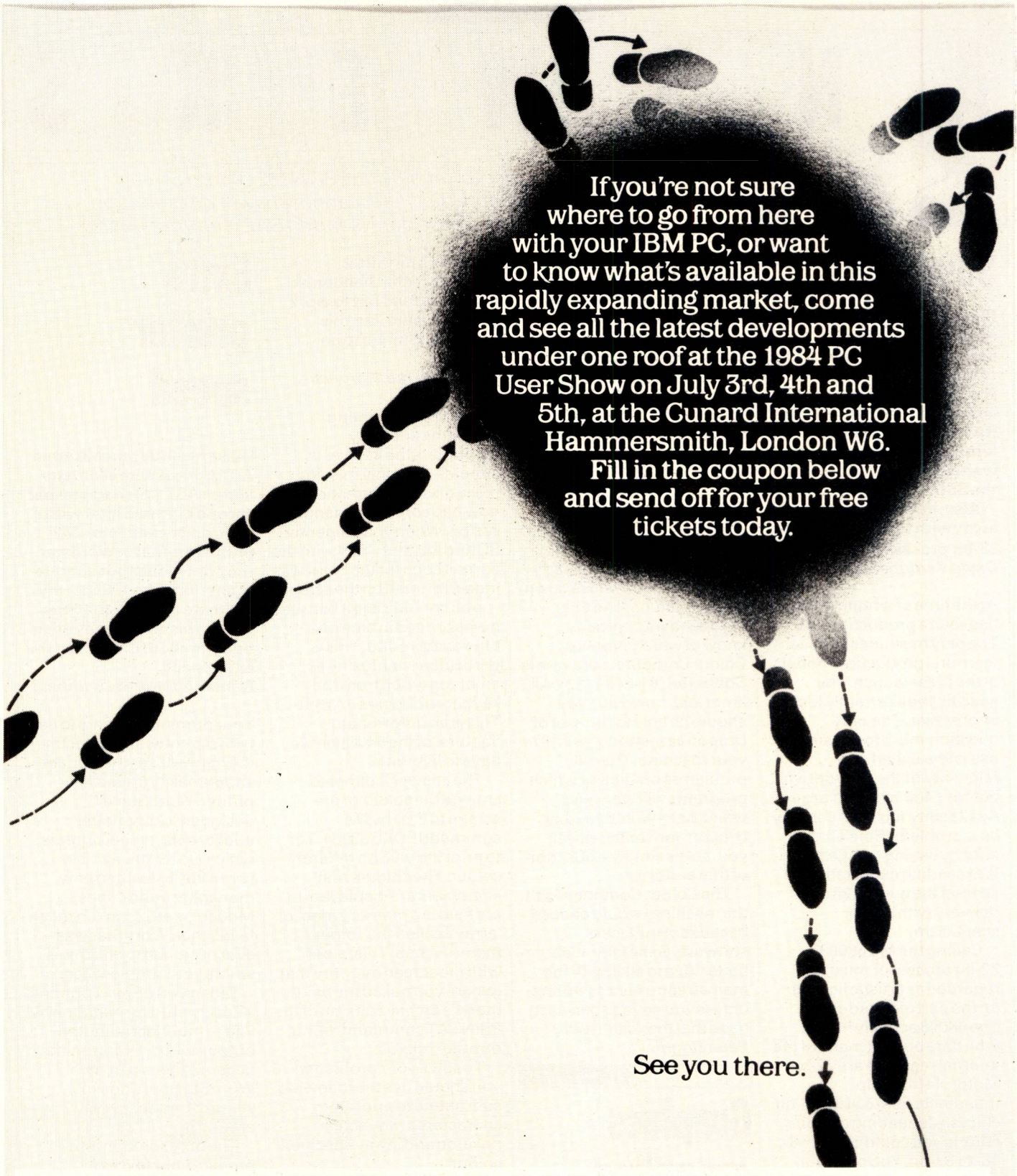
Your problem appears to lie with the software rather than the hardware—the Apricot should easily drive a fast printer. WordStar is designed to drive letter quality daisywheel printers, which are relatively slow (even the fastest can only manage around 40 cps). Modern matrix can run much faster than WordStar was ever designed to and this is where your problem lies.

When WordStar is printing a document it formats line by line—the effect is limited output speed. Unfortunately, because this is part of WordStar there doesn't seem to be an easy way around it.

The only solution is to prepare your text as a non-document file, then, when you want to print the document use the print to disk option to save the document as a formated disk file. Use CP/M or MS-DOS's Ctrl P to turn on the printer and TYPE the formated document file.

The only problem with printing this way is that you lose the fancy printing options associated with a normal WordStar print. All you'll get is a straight printout of the document.

Peter Bright



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ANSWERS

UK101 in France

Having moved on to greater things some time ago, I have an old UK101 computer gathering dust. I would like to give it to a talented but impecunious young computer enthusiast, but my problem is that the said enthusiast lives in France. There are no power supply problems in France but the TV system is not compatible. Am I correct in thinking that it will only be necessary to change the modulator? If so, can you advise me where to get one?
Colin Bignell, Littlehampton

You're right about the differences between the two standards. We use what is known as the PAL standard while the French use two systems, SECAM and PERITEL.

Many people have the same troubles when they take their micros abroad. The most straightforward solution is to send an old PAL TV along with the UK101. The only company I know of selling its machines in France is Oric. The French Oric importer sells a kit which will convert a 625-line PAL signal into either SECAM or PERITEL depending on the system your friend uses.

Further information about the converter box can be obtained from:
Mr. Dennis Taiaed
Zi
'La Haie Drielle'
BP48 94470
Boissy-Saint-Leger
Paris
France
Peter Bright

?????

User group liability

After four months of steady growth a Spectrum user group now meets each week in Gloucester.

As organiser I'm pleased, although I make no charge and invite visitors at their own risk. What liability am I and others like myself actually undertaking?
B G Ledbury, Gloucester

Unfortunately, insurance is one of those areas where there are no clear-cut answers. I spoke to two insurance companies about the problem, and both said they would need full details of the individual circumstances before they would be able to comment.

However, they did confirm that the first thing to do is to contact the company covering your ordinary household insurance and ask them to find out if you are covered. If the answer is no, then I suggest you contact a solicitor to seek legal advice. Although no insurance company will sell you unnecessary cover, they are in business to (a) make money and (b) protect you, so they are likely to err on the safe side and recommend additional cover where there is any doubt.

Third party cover is normally covered by a minimum premium of perhaps £60 or £70, so is an expensive option. If you also require cover for accidental damage to machines while in your house, you will have to ask your individual members to check their own policies. If they are not covered it will be cheaper for them to arrange additional cover, which will probably only cost a few pounds per year on an ordinary household contents and personal effects policy.

Part of the problem with insuring computers is that insurance companies still apparently think of them as huge, expensive and vulnerable pieces of equipment. I was recently quoted an exorbitant premium for cover for a Tandy Model 100—I think they were afraid the valves would get broken in transit.

Perhaps the simplest (and possibly cheapest) solution is to ask a solicitor to draw up a simple disclaimer which all members will be obliged to sign on joining the club. This is perfectly reasonable so long as you make no charges to members.
Surya

?????

Electron operating system

I own an Acorn Electron, and although I'm very pleased with it I've been told that it should have a level 1·00 operating system, but when I type *HELP the computer responds with OS 1·00, indicating that I have a 1·00 OS.

Should I have an OS 1·00 or OS 1·20? If I press 'BREAK' and type 'REPORT', (C) 1982 Acorn is produced, which indicates a Basic II ROM. If this is correct and I should have an OS 1·00, can I get an OS 1·20 and fit it in the Electron? Where are they available and how much do they cost?

Keep up the good work.
George Brown, London E14

When Acorn launched the BBC Micro it had a temporary MOS which was labelled 0·1. When the full MOS was released, it was called 1·0 and Acorn got itself into trouble with BBC owners who objected to being charged a tenner in order to receive a fully-working machine (the charge Acorn made for the new MOS).

Shortly after the release of MOS 1·0, it was found to contain a number of bugs: these were supposedly corrected and version 1·1 was produced. This didn't work either, hence MOS 1·2—a theoretically bug-free MOS.

Meanwhile, Acorn was also rewriting BBC Basic to produce Basic II. All new BBCs are therefore fitted with MOS 1·2 and Basic II.

When it came to the Electron, Acorn rewrote BBC MOS 1·2 slightly to produce the Electron MOS. As this was the first Electron MOS release, it was called 1·0. Basic II, however, is still called Basic II on the Electron. To anyone who understands the strange workings of Acorn Computers this will doubtless all seem perfectly logical. To me, it seems slightly silly.

Anyway, the upshot of all this is that, yes, you should have MOS 1·0 and Basic II on your Electron.

One last point worthy of note: the Electron cannot be expanded to a 100% BBC-compatible micro, merely what an Acorn spokesman described as an 'equivalent spec'.
Surya

?????

Super Expander

I recently bought the Super Expander cartridge for my VIC 20. I have written many programs for the unexpanded version, so is there any way I can improve my programs with the Super Expander?
Paul Michaelidis, Athens, Greece

When memory expansion is added to the VIC 20 the memory map changes: the values you POKE for the screen and colour displays alter. Therefore, if you want to expand a program written for the unexpanded VIC so that it will run in your expanded machine you'll have to change every POKE in the program.

It would be ideal if there were a machine code program to alter these addresses for you, either on its own or as part of a toolkit, but such a program doesn't exist yet so you'll have to change them one at a time.

To add to the confusion, the new addresses you'll have to enter will vary depending on the available memory expansion. Consequently, you should look these up carefully in the documentation provided with your expander.
Tony Hetherington END

'THE COMPANY COMPUTER' VS THE PERSONAL COMPUTER

Businessman Smith wants a microcomputer system for his smallish but buoyant company. He buys a typical Personal Computer to start things off. It costs him about £3000.

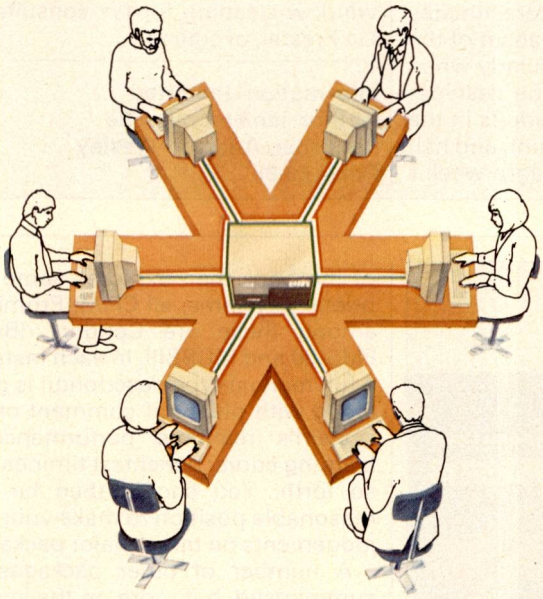
Businessman Brown, with a similar problem and a prudent eye on the future, opts for the SAGE. It costs him £5500, but it does have 4 times the capacity and can handle up to 6 users.

In no time, Smith's staff have taken to computing and want a second machine – another £3000.

Brown too organises a 2nd work-station – he only pays £595 for an additional screen and keyboard.

Both bosses are asked to supply printers. Smith has to buy two for his PC's, Brown only needs one because his SAGE was designed for sharing.





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Business is good for both companies, but whilst Brown's bill for a 6 user system is £11,000, poor Mr. Smith has forked out just over £21,000.

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TDI SAGE
THE COMPANY COMPUTER

BIBLIOFILE

Linnet Evans' selection from the bookshelf this month features database management and a revealing biography of wartime code-breaker Alan Turing.

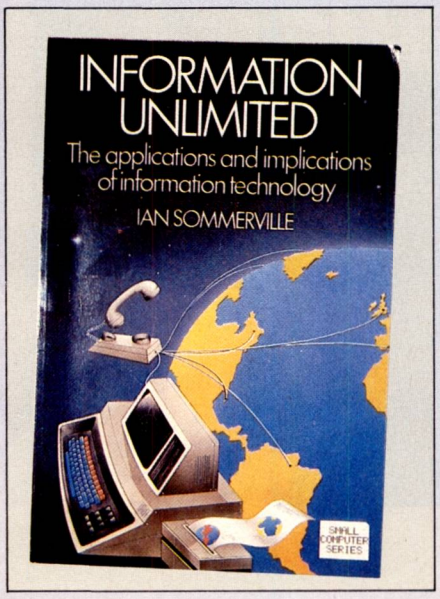
Information Unlimited

Much water has rolled under the silicon bridge during the thirty-odd years since Alan Turing's time, as this book bears witness.

With *Information Unlimited*, Ian Sommerville has provided a well-rounded summary of the state and status of microchip technology today in home and High Street. His main concern lies with applications, even more so with implications: the market forces that really enable computerised medical systems, for example, and the potential effects across the board on society.

If this sounds rather formal, let me add that it's written in tidy bite-size chunks and the kind of light, versatile style to suit any man and his dog in the High Street; at the end of each chapter the author even provides a summary. It's a nice gesture, even if smacking of those O-level revision crammer cards.

Most of what Sommerville presents is entirely good sense. A reasonable coverage, it's also sufficiently up-to-date to stay valid for a season or two.



Even so, he probably underestimates the unfathomable conservatism of the Great British public, particularly when hitting a target such as the cashless society. Forty per cent of adults in the UK don't have a bank account, and half of them — I'll bet *my* meagre week's wages — will be privileged or smart enough to sidestep the great god EFT (electronic funds transfer) for a long time yet.

There's also the various flies in the ointment. The cash dispensers around any shopping centre have *always* run dry by 4pm on Saturdays.

Information Unlimited doesn't attempt to be a whole study of the subject, though it tries quite often to be a holistic one. Slightly annoying is the constant use, when looking to the future, of 'will' when 'might' or 'could' is the rightful mode.

But it's food for thought. For example, the black economy — the casual bar job, and so on — could this anarchically block the whole cashless society fandango? After all, at the end of the line we'll all be too isolated and lost for words after being locked up with our TV monitors for years to be able to barter window cleaning for tax consultancy. On Prestel, of course.

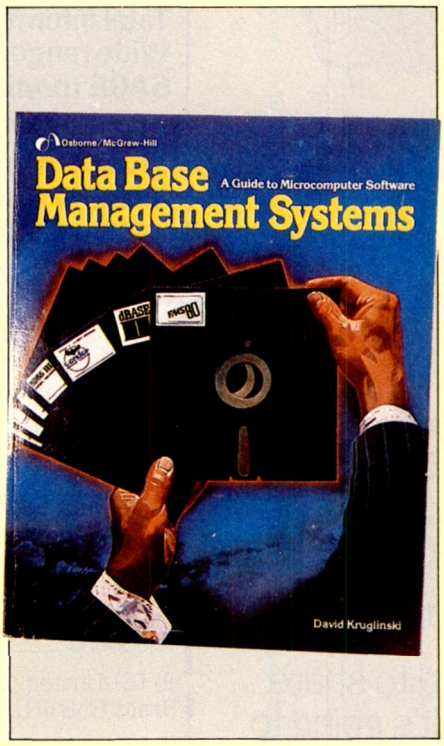
Information Unlimited
Author: Ian Sommerville
Publisher: Addison-Wesley
Price: £6.95

Data Base Management Systems

Perhaps, if you had a Zenith instead of an Apple, you might be buying Mr Kruglinski's book instead of Mr Wadsworth's (see below). You would then find yourself with a slightly fatter volume for the same price, despite the truly minimalist dollar exchange rate. You'd very likely already be on the thought-path to spending a few dollars more on the genuine branded product.

Before that particular fate-worse-than, you'd have found again a neat and nimble intro to databases in principle. The author firmly believes that All Good Readers Deserve Databases, but since his scope runs from simple file management systems upwards, it's a democratic assumption.

His eye is now turned more to extended/business usage in the sense that questions of security, fail-safes and query languages come before the first utterance of 'zip code'. Equally, the reader is guided through the relative merits of file management, relational and network/hierarchical DBMS's (yup!) before the first 'social security number' shows its chilly face. This



section includes notes on some general points such as access time and disk capacity, with a sensible sideways glance at the hardware environment.

With this backdrop, the greater part of the book then explores some proprietary systems, all CP/M. Prominent among these are Condor, dBasell, FMS-80 and MDBSIII. In each instance, a full manual-type description is given along with plenty of comment on the system's real-time performance — learning curve, Benchtest timings, and so forth. You should then be in a reasonable position to make your own judgements on these major packages.

A number of other packages are summarised, but more on the level of the DBMS overviews that appear in the glossy monthly business computing mags. Omitted altogether are Perfect Filer, now making inroads in this country, and the UK-grown Superfile. Meanwhile, The Quad and Selector V have not, to my knowledge, been seen on these shores at all (and would probably be taken for hangover Mod revival bands if they were).

These are minor criticisms, however, and shouldn't sully the real purpose of this business-like but very readable book.

Data Base Management Systems
Author: David Kruglinski
Publisher: Osborne/McGraw-Hill
Price: £12.95

BIBLIOFILE

Database Management for the Apple

Tubthump time. Why do publishers need to put a name (and a picture) of the particular computer on a book jacket? It's to sell a dedicated title to one group of dedicated owners, of course. This then means that all other punters go elsewhere.

Not that there's anything amiss with having a lle on the kitchen table. There's a lot of them about. Some Apple owners are going to feel cheesed in any case about shelling out £13 for what's at root a bumped-up program listing. The listing — the DBMS — is in Applesoft Basic, including (not surprisingly) the odd POKE and CALL. However, there's ultimately a great deal more that's general than specific to the great big red-and-green one.

That apart, *Database Management* is an entirely accurate title. Nat Wadsworth writes a pithy, punchy and



personalised intro to the subject of using *your* computer to organise and manipulate information. Enough is offered on file structures, soft/search routines and the like to give the operation some credence for the casual user. However, he more actively 'sells' the subject with some real-time illustrations: the perennial glories of household budgets and mailing lists. He also spends quite some time checking through the detail, options and handling of these and other areas.

Centre stage sits The Listing (that is, line-by-line documentation), so it shouldn't be too difficult (given the correct addressing) to translate it to any other appropriate dialect. As the author clearly notes at the beginning, an FMS scripted for simplicity of workings and presentation — which is true — will hardly meet everyone's requirements for speed and smartness, never mind any other criteria. But as a DIY kit job it provides a useful baseline for Higher Things, and it's got to be a bit of fun as well.

So the Apple's just jam on the bread.

Database Management for the Apple
Author: Nat Wadsworth
Publisher: Hayden
Price: £12.95

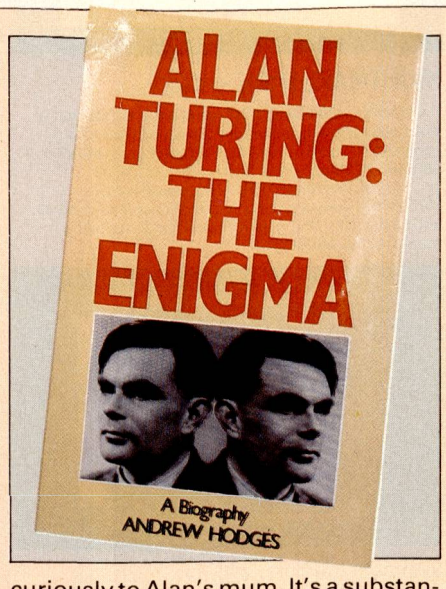
Alan Turing: The Enigma

A straw poll among colleagues revealed that, of those who'd even heard of Mr Turing, not one had much idea of who he was or what he'd done. Hence the title of this book, which also refers punningly to the one project he is usually known for — breaking the coded messages generated by the German Enigma machines.

Alan Turing was born in London in 1912, and died in 1954. He was (not only by this account) a wayward, awkward figure: blunt, scruffy, politically naive, a great lover of the natural world as well as a mainline mathematician and a fine amateur athlete. His working career was as chequered as his private life, with an exhausting jumble of hostility and support, triumph and neglect from start to finish.

The Enigma project, with its utter urgency (and underfunding and red tape), was an almighty bootstrap to the emergence of electronic data processing, culminating in the Colossus. A backdrop to this was a paper that Turing wrote before the war, *On Computable Numbers,* which resurrected an interest of the long-gone Charles Babbage: if you construct a (initially mechanical) device to handle one set of mathematical operations then it should be possible to extend this in principle to handle any set — in other words, to be universal.

The Enigma is not the first biography of Alan Turing, that honour going



curiously to Alan's mum. It's a substantial book of over 500 pages, a fact which mitigates Andrew Hodges' rather annoying love of finding common themes and imagery at every turn. It's also a substantial story told with both freshness and great attention to detail. Vox-pop quotations are kept to a minimum, but the author very clearly followed an immense number of leads and talked with dozens of colleagues and contacts.

Hodges judges, I feel rightly so, that a certain amount of mathematical and cryptoanalytical background is necessary at certain points to illustrate the moves in Turing's life. Generally these are sensibly and sensitively handled and shouldn't be a problem for non-mathematicians reading the book, either as a straight biography or as a history of computer science. If anything, it might have been helpful to have a little more straight historical/political background in the main body of the book, instead of banking up so much for the final chapter, the *denouement.*

Probably only now is it possible to tell this kind of story with anything like the 'truth'. This is not only because wartime records are now declassified, but also because we have a quite different attitude towards nonconformity.

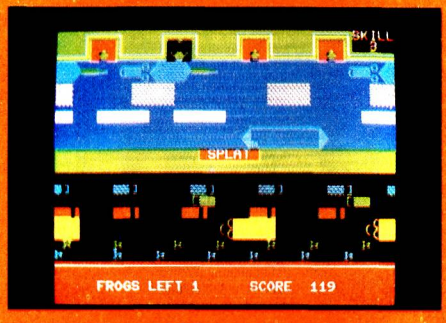
Turing had intimate knowledge of British and foreign intelligence methods just a few years earlier. At one point he had acted, incredibly, as the sole go-between from this country to the States. Accepting Turing's homosexuality today makes possible a sting in Hodges' scorpion's tail: in those witch-hunting years, was Alan Turing a security risk for the British Government ranking with Burgess and Maclean?

Whether Turing's death shortly afterwards, apparently from arsenic poisoning, was mishap, suicide or the proof of some mathematical law of probability, remains a pure enigma.

Alan Turing: The Enigma is a major work at any level. Recommended.

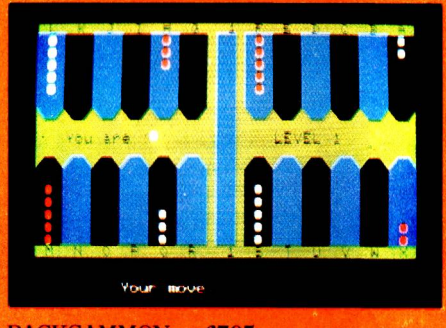
Alan Turing: The Enigma
Author: Andrew Hodges
Publisher: Burnett Books
Price: £18.00 (hardback)

A SUPERB RANGE OF GAMES SOFTWARE FOR SHARP MZ-700 SERIES



FROGGER — £6.95

This most popular of arcade games has been totally recreated for the Sharp computer. Superb graphics and as fast as you like from beginner's level up to 'Super-human'. Get each of four frogs over the busy motorway, then hop from boat to raft to log to crocodile until safely home sitting on a lily pad. Terrific fun.



BACKGAMMON — £7.95

Now available for the MZ-700, this traditional board game can now be played against the computer. Simple to follow instructions for the beginner — higher levels available for the more experienced player.



CHESS — £9.95

Suitable for the rank beginner through to the more experienced player, this Chess program may be used in three different ways.

1. As a referee between two players, checking for valid moves, CHECK and CHECKMATE situations.
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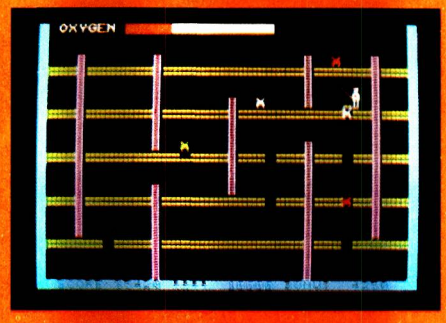
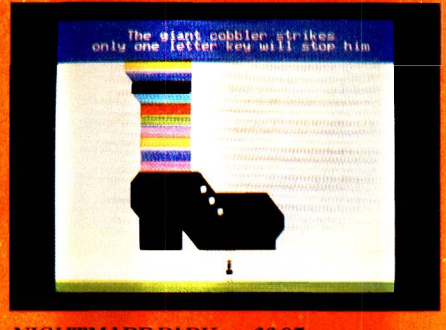
3. As a teaching aid when asked to play against itself or show you the best move if you get into difficulties.

Long games may be saved on cassette for completion at a later time and a print-out of all moves made is available.



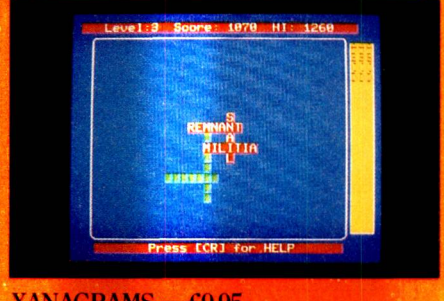
SPACE PANIC — £7.95

How long can you survive in the multi-storey building filled with alien bugs. This machine-code programme accurately simulates the arcade game where you climb ladders and dig holes to catch the aliens then fill them in again once they are caught. The red ones must fall through one floor, the green ones, two floors and white ones, three floors. Red aliens who have time to dig themselves out get rather cross and become green. PANIC!! Joy stick or keyboard control.



NIGHTMARE PARK — £6.95

If you have never played this type of game before, you're in for a treat. As you make your way along the intricate pathways to the exit, you are constantly given tasks to perform or games to play. Each of these must be successfully completed before you are allowed to continue. It takes a lot of doing. You must remain quick and alert at all times. A little luck is handy. Amazing graphics and sounds!!!



XANAGRAMS — £9.95

Not only a terrific spelling test but also a great game. You are asked to guess up to five words, represented by blocks on the screen in a crossword format. All the letters that you need are shown on the right of the screen in alphabetical order and the computer will give you the first letter if you ask it nicely. Suits almost any age with 3 skill levels and from 1 to 5 words to be guessed. Really habit-forming!!!



GALAXIANS — £7.95

A high-speed machine-code version of the popular arcade game where the massed space invaders must be cleared from the skies. After a few seconds they will begin to swoop and dive at you, showering you with scatter bombs as they go. The game becomes progressively more demanding as you kill more and more of the marauding aliens. Very entertaining — hours of fun!!! Joy stick or keyboard control.



FIGHTER COMMAND — £6.95

A mission flown completely on instruments where you are pursuing a fleet of ten enemy aircraft fleeing from you. They will show on your long range radar screen and you must manoeuvre your craft to get them within range of your missiles. If you get too near, they will fire at you and warp away to safety. You only have one chance to destroy incoming missiles with your lasers.



LIGHTNING PATROL — £3.95

Choose your rank in the RAF and you are immediately sent on a mission to catch and shoot down ten enemy Mirage jets that are fleeing after their attack on your airbase. You must manoeuvre your plane to get them in your gun-sights whilst they are weaving about the sky to avoid being hit. Limited ammunition and fuel available so efficiency and accuracy are all important to your completion of the mission. Promotion for the successful but poor performances can mean you are asked to leave the air force. Joy stick or keyboard control.

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Keyboard Facilities	10 programmable keys
Character Set	256 in ROM
Method of Display	TV, RGB, Comp/Sync colour or monochrome monitor
Display Facilities	Full screen handling, 4 screen paged
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Colours Available	16
Graphics Facilities	Scroll, reverse image
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Operating System	Built-in ROM
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Now you are on your own and you must decide how to proceed to Highsville Mainstreet to find the various establishments to enter and .....

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The object of the game is to collect treasure from a maze without losing lives and thus to achieve the highest score possible. Each item of treasure is worth a number of points, the more treasure collected, the higher the score. There are a number of hazards within the maze, pitfalls, trapdoors, portcullis and wandering **SKULLS**. The **SKULLS** will attempt to guard the treasure by catching you but you may find within the maze a green cross which will give you a period of safety during which you may attack the **SKULLS**..
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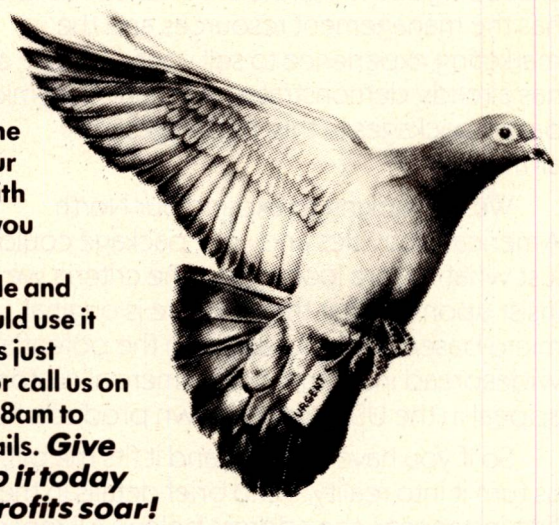

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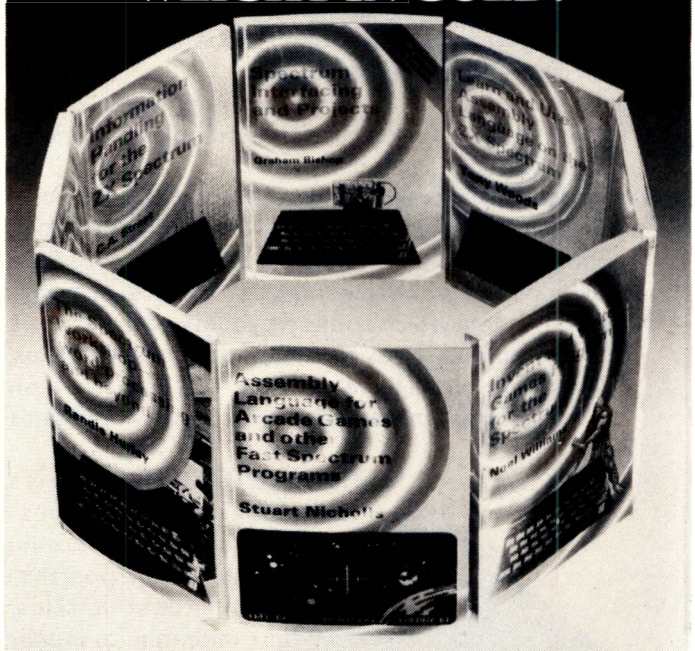

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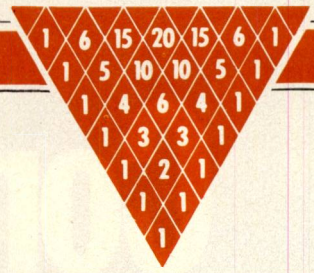


Repunits

This month Mike Mudge takes a long look at Repunits and Repdigits

The first part of this month's problem, although very simple to formulate, should encourage the development of certain general integer length arithmetic routines. See, for example, DE Knuth's, *The Art of Computer Programming*, Vol 2, Semi-numerical Algorithms, Addison Wesley, 1969; such algorithms once optimised will prove invaluable in any future empirical number theory.

The second part, somewhat tenuously related to the first, is in response to numerous requests for further problems relating to Prime Numbers; and is an opportunity to mention the possible sinister significance of such numbers in 1984, hinted at by A Berry, *The Daily Telegraph*, 9 January, 1984 together with the paper *The Fascinating Hunt for Prime Numbers* by C Pomerance in *The Scientific American*, December (1982).

1) Defining a Repunit by $R_n = (10^n - 1)/9$, an integer consisting of a string of n 1's. The problem is to factorise R_n completely for a given n. Thus $R_2 = 11$, $R_3 = 3.37$, $R_4 = 101.11$, $R_5 = 271.41$.
2) Noting that Repdigits (defined in the obvious way) other than Repunits are always trivially composite (not prime), it is known that in common with Repunits they can occur as long strings in primes. Thus R_{317}, 2222222222 2222222222 39, 33333333333333333333 01, 1733333333 3333333333 33, 4444444444 4444444444 51 are all primes!

Furthermore, $10^{564} + 10^{282} - 1$ consisting of 1 followed by 282 0's and 282 9's is also prime.

Find primes containing lengthy Repdigits 5,6,7 and 8.

It is likely that this section will involve considerable library work and hopefully not too much computing, as a variation on the usual balance between these two activities in Numbers Count.

A prize of £10 will be awarded to the 'best' entry received by 1 June, 1984. Please address all entries to Mr MR Mudge, Room 560/A, Department of Mathematics, University of Aston in Birmingham, Gosta Green, Birmingham B4 7ET.

Note. Criteria of judgement include limitations imposed by hardware and the programming language chosen, so details of these should be supplied.

The Persistence of an Integer Review — November 1983

The Persistence of an Integer provided a popular challenge: with typical results to (c) examining powers up to 2^{9764} radix 3 in about 32 hours of Basic on a BBC Micro.

Parts (d) and (e) are still very much closed books and results relating to them would most certainly be of interest to myself and to this month's prizewinner, Mr Alan Prior of 41 Walnut Tree Road, Shepperton, Middlesex.

Alan used Basic on his Sharp MZ-80A with 48k and a 2MHz processor, having first rejected Pascal and Forth: the former due to the limitations of his version; and the latter due to lack of time to become familiar with the language.

In six hours two minutes (and eight seconds) he established 2777777 88888899 as the smallest number with persistence 11 using a program which handles 78 digit integer input and 255 digit integers internally.

Attempts to find the smallest integer with persistence 12 have so far been unsuccessful, although tables of persistence of n for n = (1) 24999, if extended, may shed light on this problem, should some underlying pattern be revealed.

The origins of this problem, to the best of my knowledge, are to be found in NJA Sloane's *The Persistence of a Number, Journal of Recreational Mathematics*, Vol 6 1973 (pp 97-98).

Note. Submissions will only be returned if a suitable stamped addressed envelope is provided.

LEISURE LINES



by J J Clessa

Quickie

If 250 players enter a darts knockout tournament, how many matches will have been played by the time the tournament is finally won?

Prize puzzle

Can you complete the 3×3 grid shown

	C	P	S
S			
P			
C			

here so that the row and column marked 'P' contain a prime number, those marked 'C' contain a perfect cube, and those marked 'S' contain a perfect square.

January prize puzzle

A very mediocre response to the January puzzle, about 50 entries only. Perhaps it was more difficult than usual, or maybe my readers are spending their time on the puzzles to win the Apricot.

However, many of those who did submit entries found quite a lot more to the puzzle than I realised. Clearly, there are many solutions, the smallest of which (with 7 digits) is 1000146, whose divisors total 2286144 (1512^2). The largest is 9998508 which is 5040^2.

The winner was chosen by a draw, and the lucky entrant was from Milan, Italy — Mr Giorgio Vincenti. He only submitted one solution, 1380527, whose divisors sum to 1176^2 but it was enough to win the prize. Congratulations, Giorgio, your prize is on its way.

Incidentally, solutions should always be submitted on postcards or the backs of sealed envelopes. Normally solutions on letters are ineligible for prizes, but since we forgot to state this in the January puzzle we let it go by this once. But don't forget — letters if you want to correspond, postcards for the puzzle entries.

Computer Puzzles

Tired of completing The Times *crossword in no time at all? Looking for the greatest mental challenge since the Rubik Cube? Tony Hetherington presents a new breed of computer programs designed to test and tantalise your puzzle-solving abilities.*

The claim to fame of computers is their ability to solve problems and puzzles thousands of times faster than the average human. So it is strange to find a family of programs which enables computers to set problems for humans to solve.

Man has been obsessed with puzzles for generations, ranging from why toast always falls on the carpet jam side down to the infuriating Rubik Cube, so perhaps computer puzzles are just a natural progression in man's quest to boggle his mind completely.

It is important to establish the range of programs mentioned since one could argue that many of the so called 'adventure games' are little more than a series of puzzles. The problem is confounded by the many solo games which are little more than simple puzzles.

In this article I shall attempt to concentrate on the true breed of computer puzzles: digital developments of puzzles, usually wooden, which occupy coffee tables with the sole ambition of annoying people at cocktail parties.

The main drawback in transferring brainteasers to computer is that the hopeful solver only has a screen to stare at. The absence of something tactile means that such puzzles must and can only be solved while the user is in front of the screen. This is unfortunate since puzzles enjoy great popularity among travellers, and it's uncertain that the same interest will remain in a less portable medium. Although portable computers may well be the answer, at present the gamut of puzzle software is only available for the more popular and stationary micros.

What are the advantages a computer can offer to a resourceful puzzler? The following reviews illustrate the main advantage of a digital puzzle — the use of more than two dimensions. The three dimensional crossword puzzle, for example, is easily programmed into a computer while it is totally beyond the resources of newspaper presentation.

Computers tend to hide the solution from 'accidental' glances, therefore almost eliminating cheating. I say 'almost', since cheats are a particularly innovative breed. Besides, at least one of the puzzles below can be solved with the aid of a video recorder.

So what should you look for if you want to buy a computer puzzle? As with computer games, you should first look for an original idea that captures your imagination, otherwise you will tire of the product rapidly and will feel you have wasted your money. The puzzle should use the facilities of the computer well: the graphics and sound should enhance the program rather than hinder it. It should also be interesting and challenging while not impossible to fathom out: only a few eccentrics enjoy pursuing the unobtainable.

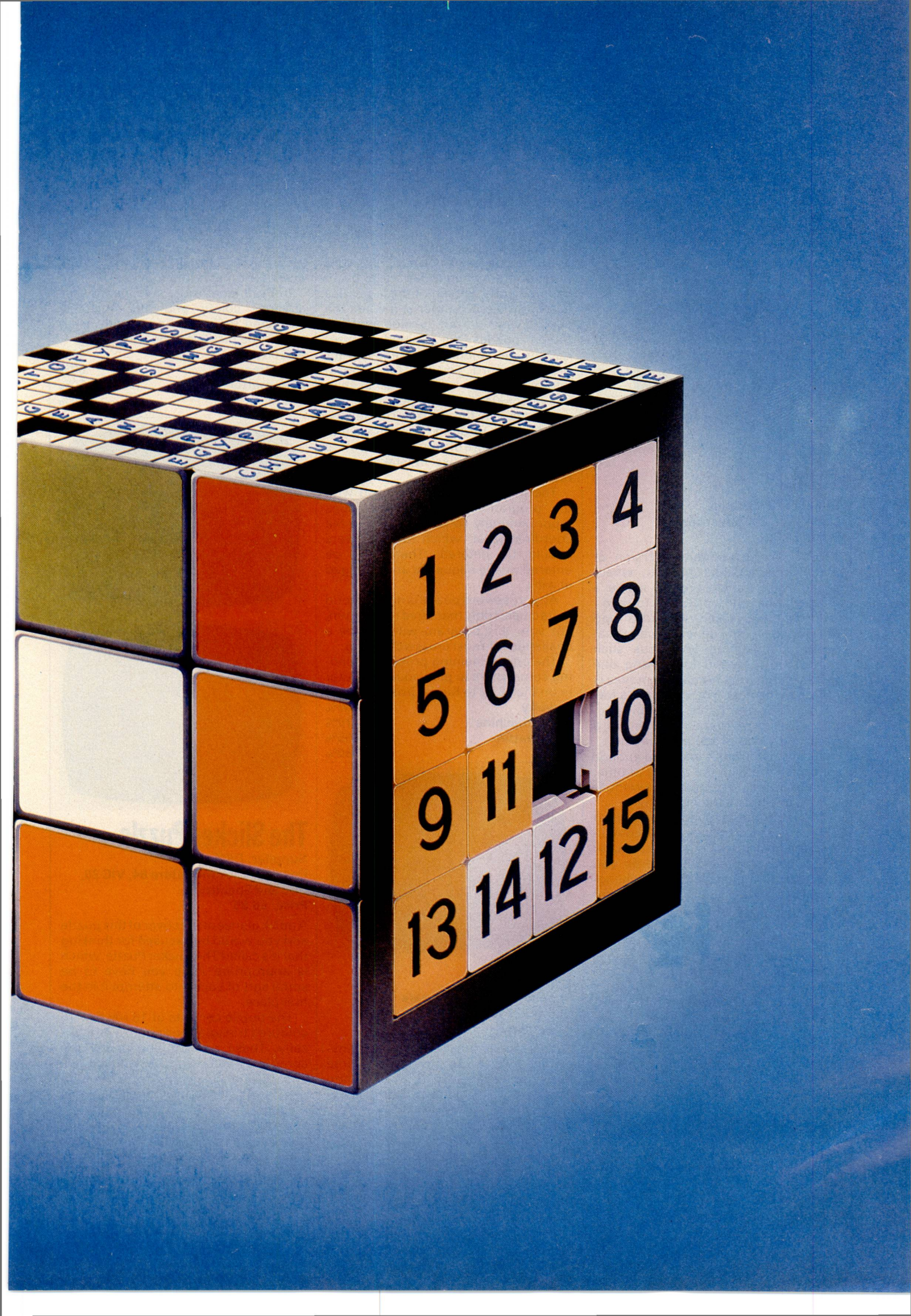
Finally, the program should be good value for money, particularly as a computer cassette is about ten times the price of a standard puzzle book. Consequently, it is an advantage if the puzzle is still a challenge after several attempts.

It is difficult to put a numerical value to these requirements, but in order to present meaningful reviews I shall attempt to do just that. Following each review is a series of marks, expressed as percentages. These ratings summarise my opinion of that particular computer puzzle. Here is an explanation of the scoring:

Novelty: an indication of the originality of the idea behind the puzzle.
Use of machine: how well the computer's abilities have been utilised.
Grey matter: a measurement of the percentage of 'intelligence' required to solve the puzzle.
Value: taking everything into account, is it worth the money?



Illustration by Brian James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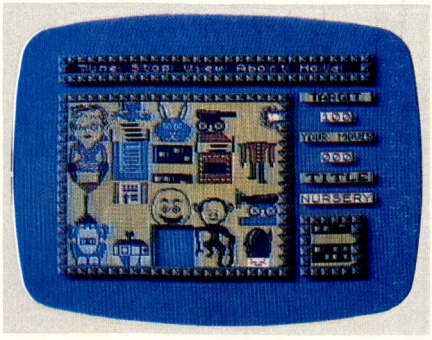
9 11 10
13 14 12 15





Jumbly

Supplier: DK'tronics
Computer: ZX Spectrum
Price: £6.95

Jumbly is the computer version of those squared-slider puzzles, where squares are moved around inside a plastic frame until a picture is formed.

Jumbly has taken this idea and developed it into an extremely neat package containing numerous such puzzles. The reward for solving one puzzle within a set number of moves is access to the next. You can jump a few by guessing the name of future pictures, but in my experience this is a particularly non-productive pursuit.

Luckily, DK'tronics was kind enough to furnish me with the names of other pictures so I could sample them without having to work up the hierarchy.

The later ones proved to be impossible, since not only do they contain animated pictures but some scroll across the screen. In other words, you are trying to match continually changing pieces. To help you, only pieces that are correctly placed are displayed in full colour, the others appear in inverse or only two colours. Be warned, however — in some screens the entire colour scheme changes, throwing you completely off the track.

The graphics, particularly the animation and screen scrolling, are reason enough to buy this excellent program.

Novelty	**65%**
Use of machine	**100%**
Grey matter	**70%**
Value	**80%**

The Ultimate Crossword

Supplier: Alien
Computer: BBC B, Commodore 64 and Spectrum
Price: £14.95

If you've ever stared with envy at the commuters who complete *The Times* crossword in no time at all between London and Brighton, then The Ultimate Crossword is for you.

Humble crosswords have been the source of many ideas as the market has been bombarded with interacting word products — from crossword wallposters to toilet rolls and jigsaw puzzles. This is not the first computer crossword puzzle, but it does put the computer's powers to good use as it's a three dimensional crossword.

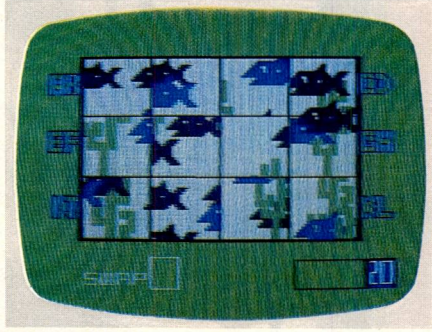
The puzzle is 30 normal crossword puzzles intertwined to form a 15 by 15 squared cube. Fifteen of these puzzles lie on top of each other and when the cube is viewed from the side a further fifteen puzzles are formed. Consequently, as solutions are entered for one crossword, you will be filling in letters in the others. A ten letter answer will affect eleven of the puzzles — the one containing the word and the ten the word passes through. This means that you must be sure of your answer before entering it because mistakes have drastic effects.

The instruction book supplied with the program contains all the clues (approximately 40 per puzzle) and the coordinates at which the answers should be entered. These can be entered in any sequence and changed at will.

Any crossword puzzle is only as good as its clues: I only managed to solve ten. I'm sure this program will provide a challenge for most crossword buffs.

The only remaining problem is finding somewhere to plug your computer in on the 08.22 to Kings Cross.

Novelty	**60%**
Use of machine	**70%**
Grey matter	**95%**
Value	**80%**



Puzzler

Supplier: Shards Software
Computer: Dragon 32
Price: £8.95

Puzzler is another unscramble-the-picture style puzzle and contains three different versions with a common theme. A two-colour picture is displayed on the screen for a few moments before it is jumbled up for you to solve. By means of swapping pairs of pieces the picture is unscrambled.

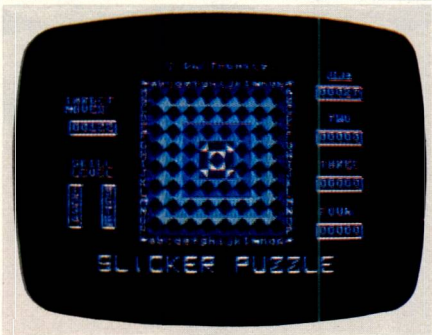
The choice of pictures is disappointing — only four to choose from. The graphics are also a let down: fuzzy and very slow. The different versions must be loaded in separately, and have the inspiring titles Puz1, Puz2 and Puz3.

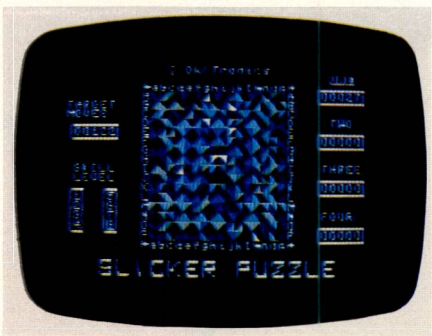
In Puz1, the picture is divided into 12 pieces and a choice of four skill levels determines the number of swaps available to solve the puzzle. You are only given a set amount of time to enter your move, otherwise the computer will do it for you. Obviously this time limit is generous in level 1 of Puz1, but as the levels rise it becomes a challenging feature of the puzzle.

Puz2 divides the pictures into 24 pieces and drastically reduces the time available for entering moves.

In Puz3, one of the swapped pieces changes colour and this must be corrected (by swapping it with itself) before the puzzle can be solved.

Novelty	**40%**
Use of machine	**60%**
Grey matter	**50%**
Value	**55%**





The Slicker Puzzle

Supplier: DK'tronics
Computer: Commodore 64, VIC 20, BBC and Spectrum
Price: £6.95

A quick glance at the cover of this puzzle and you would be excused for thinking that it's called The Sucker Puzzle, which is appropriate since you have to be some sort of sucker to attempt it in the first place.

The puzzle consists of 16 rows of 16 coloured triangles arranged symmetrically. These are jumbled up by the computer which moves whole rows and columns, and it's up to you to unscramble it within a target set by the machine.

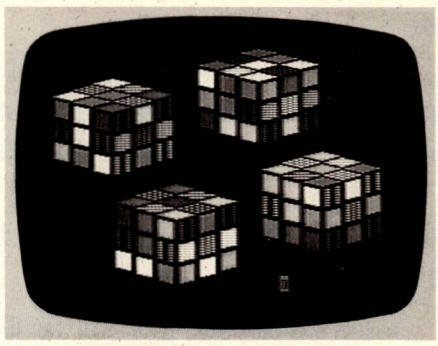
Should you be successful then a garbled message is displayed on the screen. This remains garbled until you successfully solve a puzzle at level 8 which, believe me, is almost impossible.

The rows and columns are moved in

the Commodore 64 version either by pressing the required key letter or by moving the joystick and pressing the fire button. Each press of the button shifts a row or column along one piece. To give you some idea of how the puzzle's difficulty increases as you go through the eight levels, level one requires approximately 10 moves whereas level eight puzzles must be solved in around 160 moves.

To make this program completely irritating the program actually demonstrates how to solve the puzzle before you attempt it. This is unfortunately performed at warp factor six and impossible for the human eye to follow, so in general you're on your own.

Novelty	**85%**
Use of machine	**80%**
Grey matter	**90%**
Value	**85%**



Romik Cube

Supplier: Romik Software
Computer: Dragon 32
Price: £6.99

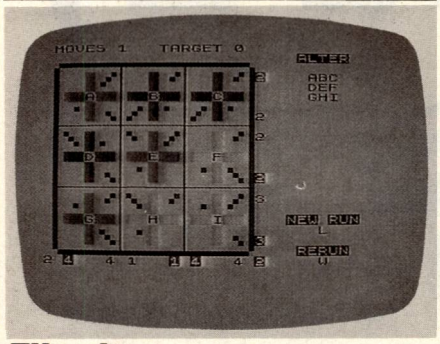
No survey of puzzles, computer or otherwise, is complete without the inclusion of the Rubik Cube. This puzzle has been the cause of more brain and finger mangling than all the others put together. The computer version extends the puzzle to impossible limits. Included in the package are three offerings: a standard or practice cube, a time cube and a four dimensional version.

The practice option is a standard Rubik Cube and is supplied to enable you to learn the necessary commands in order to rotate the faces and thereby solve the cube.

Once you have mastered the practice cube you are ready to tackle the time cube. Initially this seems deceptively simple, as it only has three colours instead of the usual six, but whenever you're about to solve the cube (approximately every 80 seconds), the faces change colour. The object is to solve the puzzle in such a way that it stays solved, even after a colour change.

When you're ready to move on from the time cube, either because you've solved it or you've pounded your Dragon to death, you should try the 4D or 'space' cube. The 4D cube is four standard cubes that must be solved simultaneously. However, they are interconnected so if you move a face on one cube then the same movement will be performed on the others. You can also move segments from one cube to another which may or may not help.

Novelty	**80%**
Use of machine	**70%**
Grey matter	**75%**
Value	**70%**



Flippit

Supplier: Sinclair
Computer: ZX Spectrum
Price: £9.95

Flippit is Sinclair's deceptively simple entry into the mind-boggling market. The puzzle consists of nine Flippit pieces which are divided up into three groups of coloured pieces: red, blue and green. Each piece has arranged around its corners 0, 1, 2 or 3 dots, and the object of the puzzle is to arrange the pieces so that every row, column and main diagonal adds up to exactly nine dots.

To enable you to do this, pieces can be swapped, turned clockwise and anticlockwise and even flipped around any of four axes.

I should warn you that each colour group of pieces has a unique arrangement of dots and no amount of turning or flipping will turn a blue piece into a yellow piece.

Each piece has a single letter code by which it is flipped and turned through a series of simple commands. For example, AM turns piece A clockwise by 90 degrees. These commands are permanently displayed on the right hand side of the screen, as are running dot totals for each row, column and diagonal. These indicators show the difference between the row total and the required nine dots: red numbers if there are too many dots, inverse for too few.

Should you find a correct solution then all the pieces turn red and the computer bleeps at you as a reward for all your efforts.

Flippit can also be played competitively, with the players solving the puzzle in turn within a target set by the first player. This is displayed on the screen alongside the running total of moves taken.

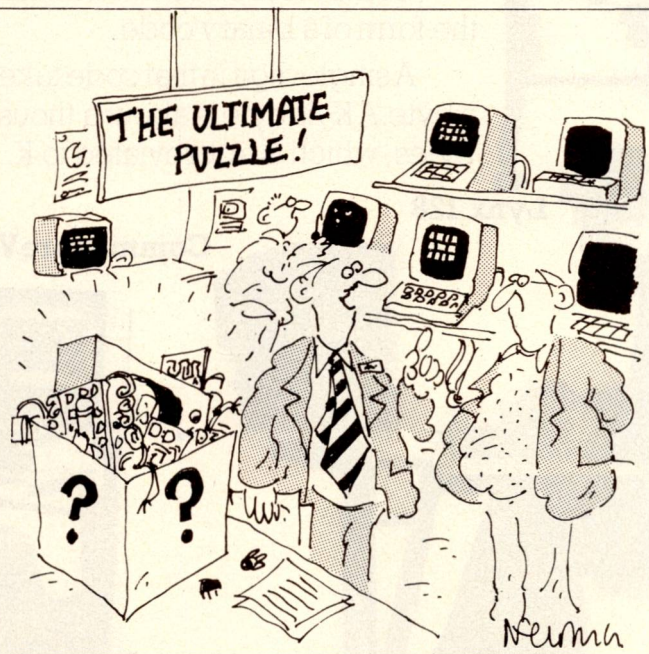
Should you not only solve the puzzle but also beat your opponent's target, you are given the ultimate in Flippit accolades: red pieces, bleeping noises and a new colour border!

To add to the excitement, you can choose between re-running the puzzle with the same initial piece positions or starting afresh with shuffled dots—you can even swap the dots for numbers.

The graphics are sufficiently quick and smooth so as not to distract the concentration needed for success. Incidentally, don't be too surprised if Flippitees indulge in strange gesticulations while in the depths of concentration: they will merely be trying to determine the resulting dot pattern after a piece has been flipped.

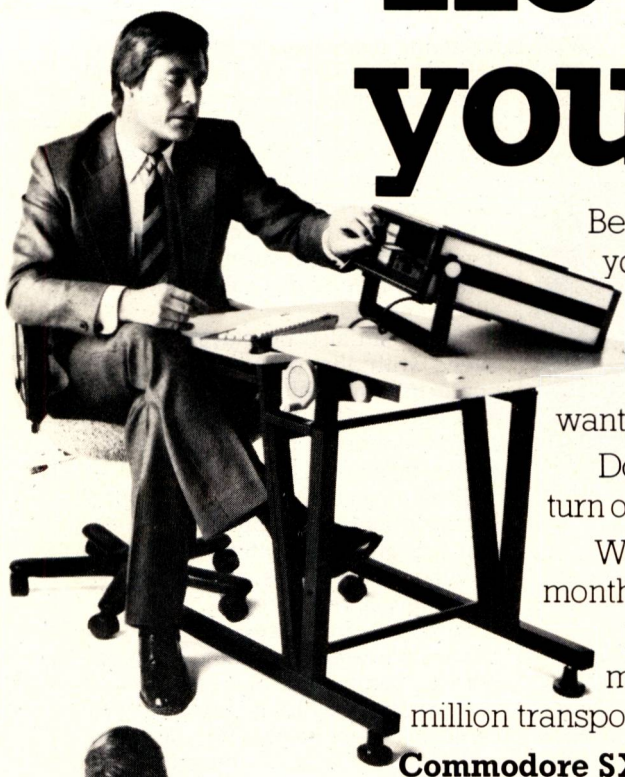
Although Flippit is enjoyable to solve and is well implemented on the Spectrum, I can't help feeling that it would be more at home on a coffee table in a more tangible format.

Novelty	**50%**
Use of machine	**55%**
Grey matter	**50%**
Value	**50%**



'First you have to work out how to assemble the computer, then you solve the anagrams for the manual, and finally you have to guess what the puzzle is!'

How many mi you try before All of



Before you buy a micro, you'll need to ask yourself some searching questions.

Exactly why do I want one?

Do I want my kids to turn out like Mr. Spock?

Will I get bored in six months?

Do I want to develop my taxi into a multi million transport corporation?

Commodore SX 64

Have I got enough in the bank this month or do I need credit?

You'll need to ask some equally searching questions of the salesmen you're likely to encounter.

First snag. You may find they know less about the machines than you do.

In case you know less than them, here's a quick grounding in the jargon.

Sinclair Spectrum 48

Computers store information in the form of a binary code.

A single digit in that code takes up a byte. A Kylobyte is about a thousand bytes, which is abbreviated to K.

A 1K computer would have a memory big enough to store about 25 lines of text, not really enough to be of any use.

And not all of that memory would be available for your use.

Read Only Memory (ROM for short) is the part of the computer's memory that you don't have access to.

Instead, it is used to store the information the computer needs for its operations.

The memory you're interested in as a user is RAM or Random Access Memory.

You use this part of the memory to load your information onto.

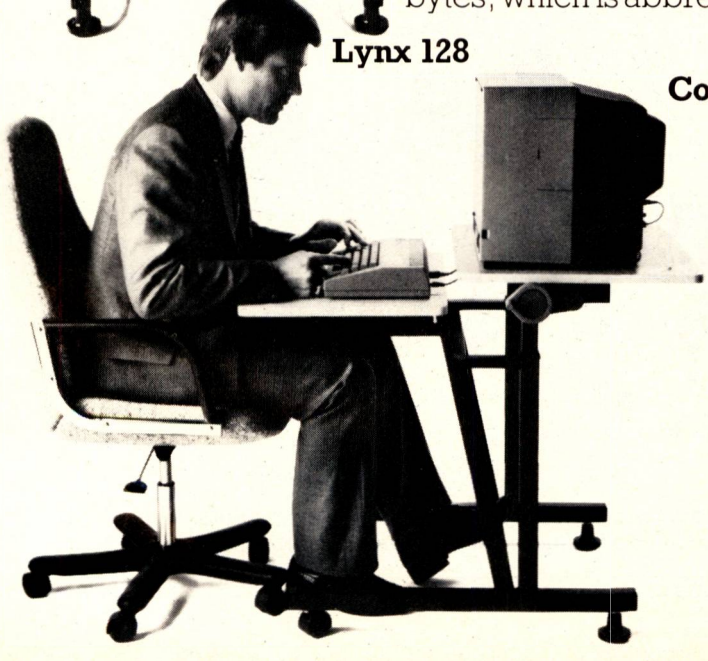
But when you switch the machine off, it promptly forgets all the information you spent ages typing in.

You need to be able to store it somewhere.

The easiest and cheapest way to do this is on an audio cassette recorder.

More information can be stored

Lynx 128



Commodore VIC 64



cros should you buy one? them.

on floppy disks. The normal 5¾" size can store more than 100K.

If that information was news to you, you'd probably be interested in trying the Sinclair Spectrum, or the Atari 600XL.

Both are ideal starter computers, with 16K memories, and both can be upgraded with add on memory packs and a wide range of hardware. And, most important of all there's already masses of software available.

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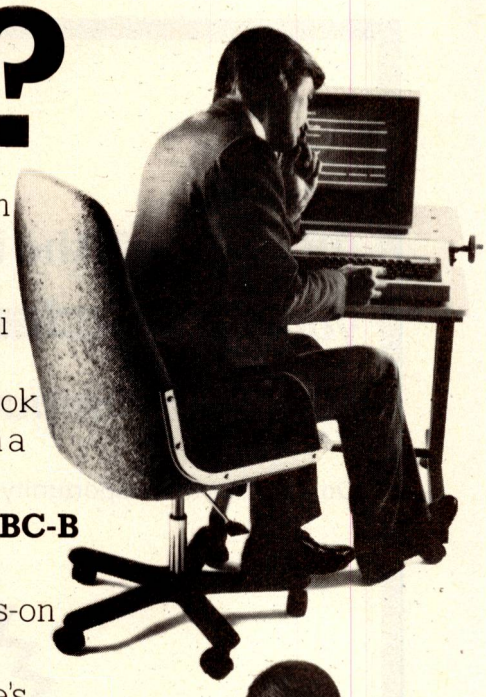

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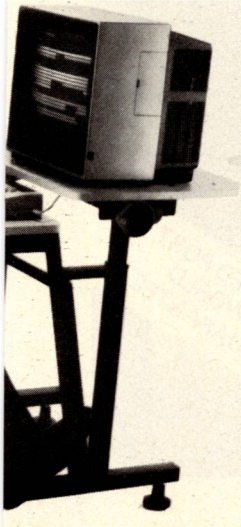
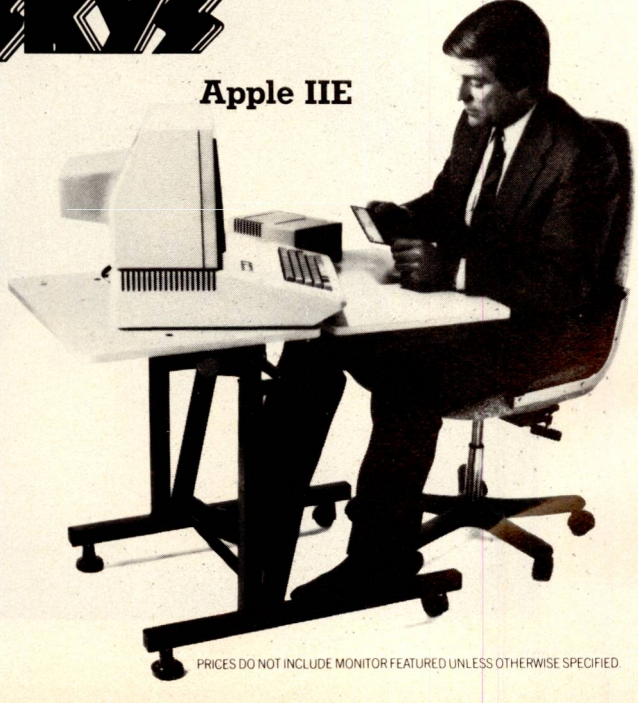


Atari 800 XL



Apple IIE



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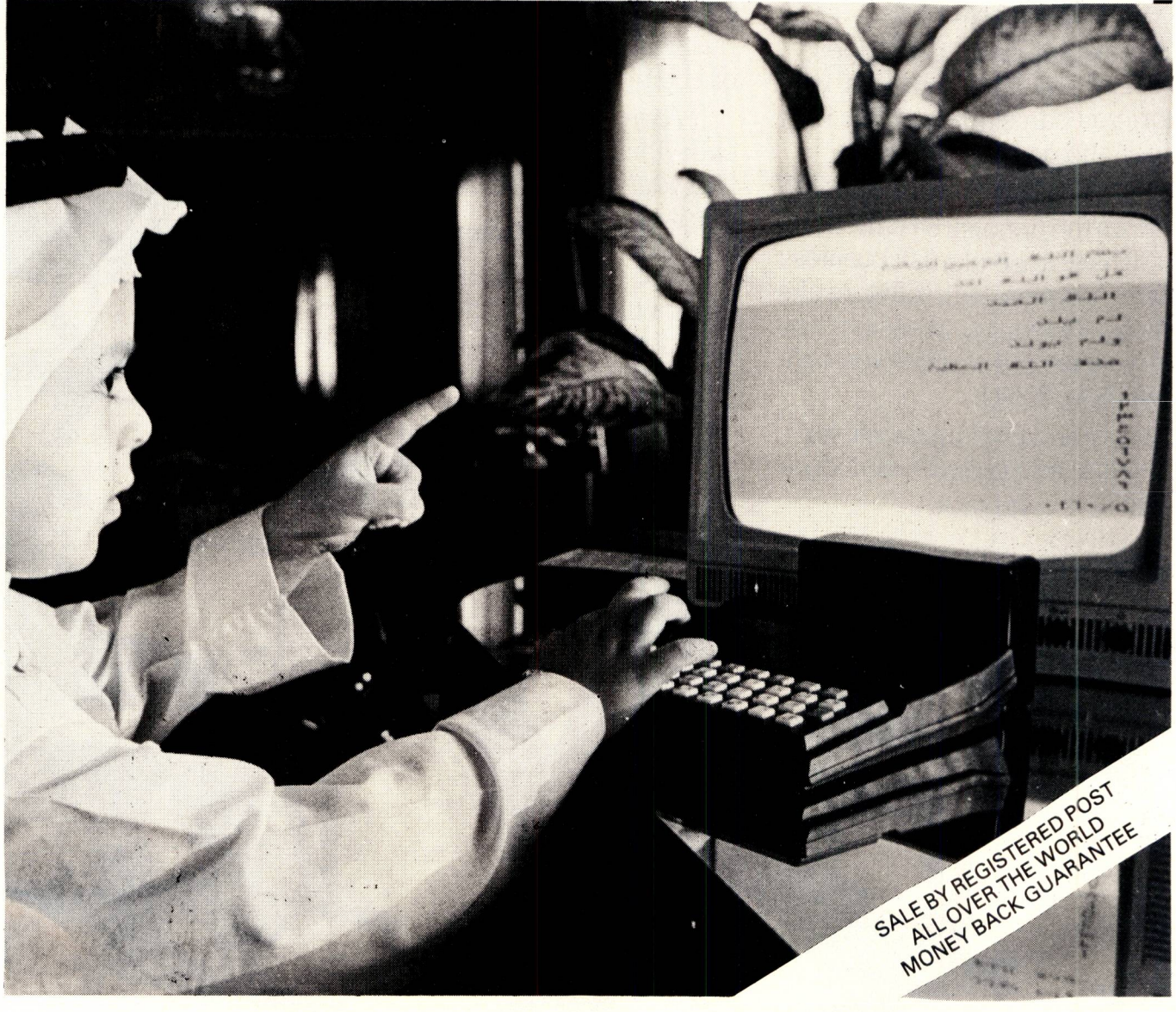

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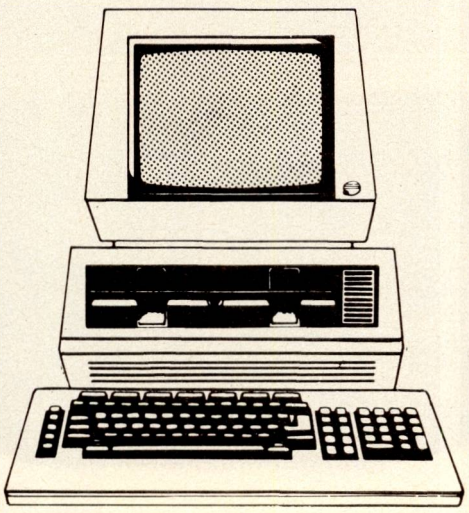

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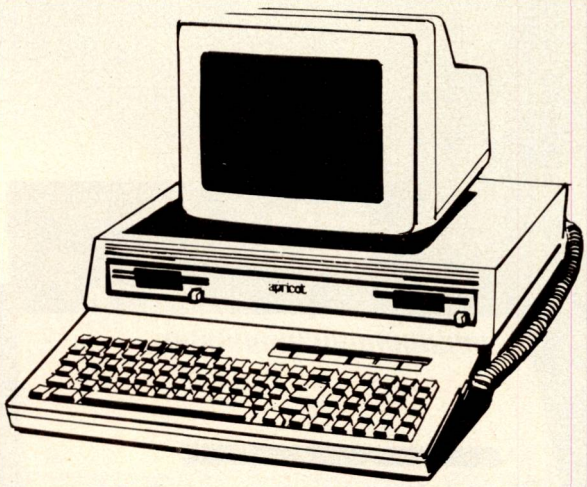

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Coleco Adam

Some time ago, Atari realised that it wouldn't take a lot of work to turn its games machine into a micro. Now Coleco, the company which produced Cabbage Patch Kids, has done the same for its ColecoVision home entertainment centre. Surya takes a look at its Adam computer module.



There are probably three main routes into the home computer manufacturing business: the electronics companies like Sinclair which moved naturally into computing; the business computer companies like Commodore which moved downward into the home market; and finally the electronic games companies which have expanded into the home computing market as we have seen with Atari. Coleco belongs to the third category. The company has recently gone the same way as Atari and produced an 'add-on' system to turn the ColecoVision TV games console into a standard microcomputer.

A standalone Coleco Adam system is expected to be available later on this year. To begin with you will buy the ColecoVision Computer 'Module' add-on, which is the product reviewed here.

Hardware

The add-on system presupposes that you already have the ColecoVision games console. If you don't have this, add £150 to the price and become the proud owner of a games console.

Everything else you need comes in a single, very large box. It contains the 'memory module', keyboard, daisy-wheel printer, power-pack, three manuals, a frame for connecting the memory module to the games console together with all the necessary connecting leads and a clip-on joystick holder. The memory module incorporates a digital cassette drive, and three cassettes are supplied for use with this. Connecting the individual units takes about ten minutes the first time, but is a two-minute job once you know where everything goes.

The keyboard is slightly smaller than an Electron. It is connected to the main unit via a 75cm long coil cable. The connector is like a scaled-down telephone jack. The keyboard has 75 keys, and one of the ColecoVision joysticks can be clipped onto the right hand side of the keyboard to provide a useful numeric keypad too. I liked this arrangement, since it gives the choice of an extended keyboard with the convenience of a numeric keypad, or a more compact one without.

The feel of the keyboard is spongey. I've used far worse, but the Adam keyboard doesn't compare with something like the BBC. But the layout is well designed. All the standard keys are where you'd expect to find them, and special-purpose keys are sensibly placed. Cursor-control keys are laid out in a diamond shape, with the HOME key in the centre. The six keys dedicated to the built-in text editor are in a block above the cursor keys, and the programmable function keys run across the top of the keyboard. The keyboard is colour-coded: the qwerty keys are white; SHIFT, RETURN, TAB, are grey; and the programmable keys are black. The programmable keys are labelled using Roman numerals to avoid confusion with the ordinary numeric keys. The RETURN key is well-placed and adequately sized.



'... like splintering bamboo canes' — the SmartWriter printer

The system has two reset keys. The first is the games console reset, which selects and initialises the ColecoVision system. The second is located on the top of the memory module. This initialises and selects the Adam, autoloading whatever happens to be in the data drive or, in default, dropping into the built-in text editor. Either reset is fatal if you are in the process of creating either a program or text file, but both are well away from the keyboard and therefore unlikely to be pressed accidentally. The Adam's reset switch has an additional safeguard in that it is recessed and must be pulled towards you rather than pressed.

Digital data packs

The data drive differs from a standard cassette player in two ways: firstly, it uses preformatted tapes so that it can simulate random access files; and secondly it records data in digital rather than analogue form. It is very similar to the Ikon Hobbit (reviewed in *PCW* January), except that the Adam drive uses standard-sized cassettes whereas the Hobbit uses minicassettes.

Unlike the Hobbit or Microdrive systems, Adam data cassettes are not formatted by the system but are supplied preformatted by Coleco. This is less than ideal in that — as with Microdrives — users are dependent upon a single supplier: both price and availability are correspondingly uncertain. Coleco's justification for this policy is that users would otherwise be tempted to buy poor quality tapes which are not data-certified in order to save money — and then blame the system when they find that subsequent loading and saving prove unreliable.

The total formatted capacity of a data cassette is 500k. On Coleco's estimate of an average 2k text per A4 page, this equals 250 pages per cassette — a respectable capacity even by disk standards. The system has room for a second data drive, though this is not available as yet.

The data drive has reasonable access times — a file directory takes about ten seconds to read in from tape. Second and subsequent file directories take only two or three seconds. I assume from this that the Adam stores the last directory and tape identifier in RAM and simply checks whether the tape has been changed. I say 'assume' since none of the supplied documentation comes anywhere near being a technical reference manual, and details such as how the system works are obviously not intended for the likes of you and me.

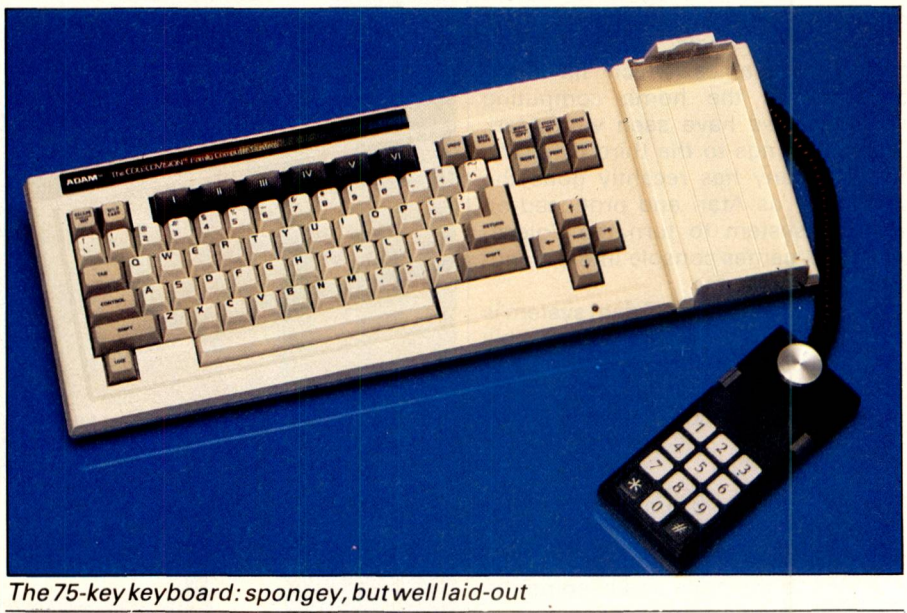
The memory module and ColecoVision system together give — according to Coleco — a total RAM capacity of 80k. While 64k of this is available to machine code programs, 'PRINT FRE(1)' in Basic responds with 28k.

Printer

Coleco is, to my knowledge, the only manufacturer to supply a printer as a non-optical part of a complete home computer system. The policy is an odd one: the home computer market is a fiercely competitive one, and this printer probably accounts for about £200 of the total price. Though a printer would be essential to some users and is always a useful thing to have around, to most hobbyists a printer is a luxury to be considered once their bank balance has recovered from the purchase of the computer itself. This policy perhaps is evidence that Coleco believes that it can make its mark on the business as well as the home market — a bundled printer would not be out of place in a business system.

I don't think I'm doing the 'SmartWriter' printer any injustice by saying that it is apparent from both appearance and operation that the designers were told to come up with a printer which could be produced as cheaply as is humanly possible. It works. That's the only thing I can honestly find to say in its favour. The 'SmartWriter' is slow (8-10cps) and extremely noisy. It sounds like someone splintering about half a dozen bamboo canes excrutiatingly slowly. The company comments: 'It's no more noisy than a typewriter would be.' The print quality is more on a par with a cheap electric typewriter than a letter-quality printer.

The whole system takes its power via the printer. A single lead connects the printer to the system unit, carrying power via the printer to the computer, and data from the computer to the printer. The dual-purpose lead is a good idea. Provided the two sets of wires are well-insulated from each other — as they appear to be — it's an effective method of cutting down on the number of leads wandering around. The problem is that the power goes via the printer to the Adam, and not the other way round. This means that the computer cannot be used without the printer attached. The printer is quite large — measuring 37×35×14cm — and the connecting lead is not long enough to allow the printer to sit underneath the desk holding the computer. By the time you've got the games console, memory module, keyboard, printer and TV onto your desk, there's not a lot of room for anything else.



The 75-key keyboard: spongey, but well laid-out

There are no parallel or serial interfaces. You have a printer already, of course, and Coleco promises an add-on modem, but in either case you either like the one Coleco supplies or do without. The only uncommitted interface is the edge-connector at the right hand side of the memory module, though if Coleco produces the 64k RAM pack, modem and disk drive as promised, this interface is going to be kept pretty busy.

The display, too, is limited to a TV: there are no sockets or leads to allow any form of monitor to be hooked up. This is a pity, since the Adam's graphics are quite impressive. It also belies the idea of the machine being used for business use: I can't see business users putting up with the quality of a TV display.

Software

The Adam has an advantage over most new machines in that it already has an established library of games software: since you have to buy the ColecoVision games console as part of the system, you can, of course, run any of the ColecoVision games cartridges. The catch is that you are buying games console software designed to be operated using a joystick with fire buttons, a numeric keypad and no more. Consequently, there is no shortage of all-action, arcade-style, machine code games with flashy graphics and impressive sound affects, but that's it. 'Donkey Kong' may be fun, but it very quickly grows tiresome.

The Adam comes supplied with three pieces of software: a Basic interpreter, an arcade-style game 'Buck Rogers' and a text editor built into ROM. The text editor has a similar name to the printer: 'SmartWord'.

When you switch the machine on, the system checks for a tape in the data drive. If the tape is either blank or contains text files, the system assumes that you want to use SmartWord. If the tape is a machine code program, it loads and runs it. If the tape contains the Basic interpreter, it loads this. If there is no tape in the drive, the Adam defaults to SmartWord. This is the first justification I've seen for the word 'Smart' which is plastered over practically everything.

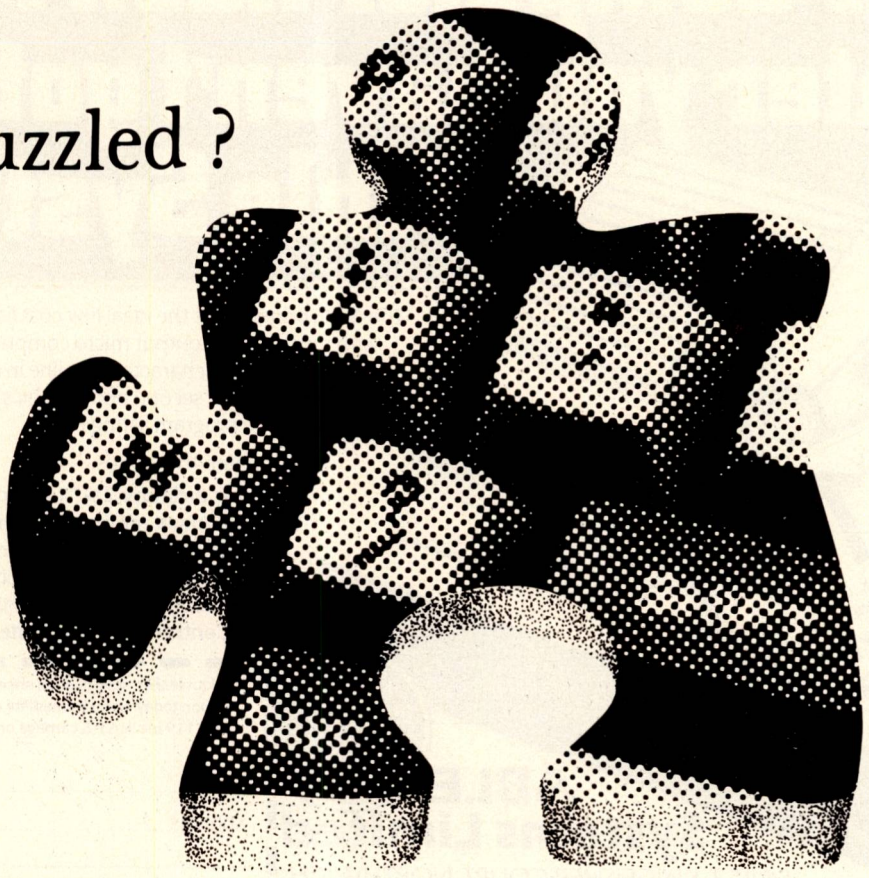
SmartWord

Assuming you have either nothing, a blank tape or text files in the data drive, the system calls SmartWord from ROM. The printer resets itself, noisily, and the 'Adam's Electronic Typewriter' display appears on the screen.

'Adam's Electronic typewriter' is just that. You press a character on the keyboard, and it is immediately printed on the printer. To enter the full text editor, you press the ESCAPE/WP key.

Since the 'SmartWriter' screen is only 36 columns by 20 lines, it cannot work on the 'what-you-see-is-what-you-get' principle. It overcomes this handicap remarkably well, tackling the problem by displaying both horizontal and vertical rulers. These rulers indi-

Puzzled ?



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cate the current margin and tab settings, and give a graphical indication of the current cursor position as it will appear when it is printed.

When you first enter SmartWord, the display shows horizontal and vertical rules, a 72-character 'current line' window at the bottom of the screen and the functions assigned to the programmable function keys. You are automatically in a new, as yet unnamed, file. All you have to do to begin your document is start typing.

As you enter text, it appears in the black 'window' at the bottom of the screen. This window is designed to look like a typewriter platen which I tried to think of as just part of the wonderful variety of life. It didn't make it any less silly, but it helped. By default, the line-length is 60 characters. When you reach the right hand margin, SmartWord automatically wordwraps and scrolls the text upwards.

Editing is straightforward, and you can edit any part of the document: the highlighted window has no significance other than to indicate the part of the document you are working on. As you use the cursor keys to find the text you want to edit, the screen scrolls upwards or downwards until the line to be edited appears in the window. To overtype, you simply position the cursor using the arrow keys and type in the new text. The old text is overwritten. To insert text, you press the INSERT key. The prompt 'Insert/Type text' appears on the screen, and text entered at this point is inserted at the cursor position. The function key definitions change to allow you to insert page breaks and subscript/superscript control codes. When you press function key 'VI' to indicate that you are 'DONE', the auto-wordwrap sorts itself out, reformatting as necessary.

The procedure for deleting text is much the same. You position the cursor and highlight the text you want to delete. Function key 'IV' toggles the highlighting on/off, 'V' cancels highlighting (so that you can change your mind) and the DELETE key then performs the deletion. When you press the DELETE key, it will check by displaying an 'Are you sure?' prompt. If you press DELETE to confirm, the deletion is carried out. If you do not want to proceed with the deletion, ESCAPE cancels the command.

Be warned, however! If you press the DELETE key before highlighting the text, SmartWord assumes that you know what you are doing and does not present the 'Are you sure?' prompt.

If you do accidentally delete text, though, all is not lost provided that you realise your mistake before pressing anything else. For the Adam has that most wondrous of keys, UNDO! SmartWord has two dangerous options: delete text; and clear text from memory. When the program performs either of these operations, the text is not actually deleted from RAM, but merely cleared from the screen and marked as OK to overwrite. The UNDO key simply removes the 'OK to overwrite' flag and restores the text to the screen.

Function key 'I' takes you into the print-format menu. This allows you to set vertical and horizontal margins, tabs, line spacing and insert page breaks. Line spacing is set to single by default, and stepped up or down in increments of ½ by keys 'IV' and 'V'. The minimum line spacing is 1, but there appears to be no upper limit.

Key 'II' allows you to configure the display to your own tastes. The three options set the 'paper' colour, the sound, and change the window. The default colour is black text on a light blue background; other options are black on white, green or grey, and white on black. The sound option allows you to select from 'full' sound (a short beep when each key is pressed, and a 'ping' for the CR or function keys), 'partial sound' (pings only!) and, thankfully, no sound.

The windowing option allows you to switch off the 72-character window and use the whole screen as a window onto the document. The difference is that in the default mode, words wrap around so that whole lines are visible on the screen — the second half of the line appears underneath the first half, and is reformatted when it is printing. In full window mode, only a 36-character wide section of the line is visible at one time, and the cursor keys are used to scroll the screen left and right.

Key 'III' allows you to perform a literal (that is, ignoring case) search for specified text, once only or repeatedly. A 'find-and-replace' option is also offered. Searching is fairly slow, but not staggeringly so.

Key 'IV', as we have already seen, toggles highlighting on/off, while key 'V' cancels highlighting. Finally, key 'VI' inserts subscript or superscript control characters. Since the printer is a daisy-wheel, all this does is to move the roller ½ line up or down to print the text.

Loading and saving files is both easy and friendly. The Adam checks that you have a suitable tape in the drive before attempting a save, asking you to insert a tape if necessary. If you are loading a file, SmartWord gets the file directory from the tape and asks you to use the four arrow keys to select the file you want. If you load a new file while you still have text in the workspace, SmartWord sensibly appends the new file to the bottom of the existing one.

SmartBasic

A manufacturer producing a new home machine has a choice of two main paths when it comes to the Basic interpreter. The first is to design a completely new and original one — as Acorn did with the BBC Micro — and the second is to use one of the old 'tried-and-trusted' varieties with whatever modifications are necessary for the machine in question, as do most manufacturers. Coleco took the latter route and came up with SmartBasic.

SmartBasic bears a great resemblance to Applesoft Basic. The commands, statements and functions appear to be 100% identical in purpose, format and syntax — right down to shape tables, a notable Apple peculiarity. Even the graphics-handling is the same. I'm quite sure that — with PEEKs, POKEs and other address-dependent statements removed — you could show a SmartBasic listing to any number of Apple programmers without any of them suspecting that the listing was anything but an Apple program. Even the prompt is an Apple one!

The strange part about Coleco using such an Applesoft-like Basic is that it has only gone halfway: the monitor is different. This means that the memory addressing is different, and hence any

Technical specifications

Processor	Z80
RAM	16k video, 64k storage (28k Basic program storage)
Permanent storage	500k digital data drive
Interfaces	Proprietary; non-standard
Interpreter	Applesoft Basic (loaded from data cassette)
Expansion	Disk drive; 64k RAM expansion and modem planned

There was no time to do the Benchmarks at the time of writing. These will be given in a future issue.

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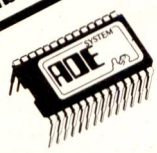

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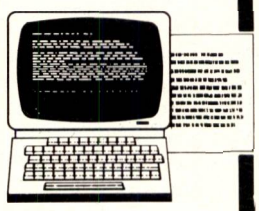

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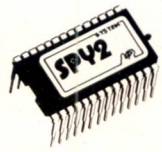

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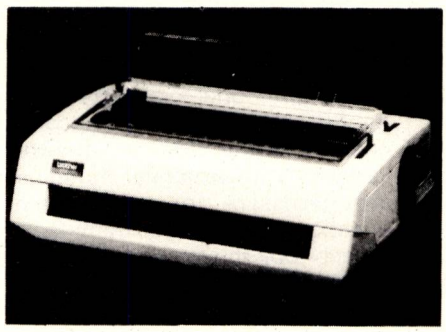

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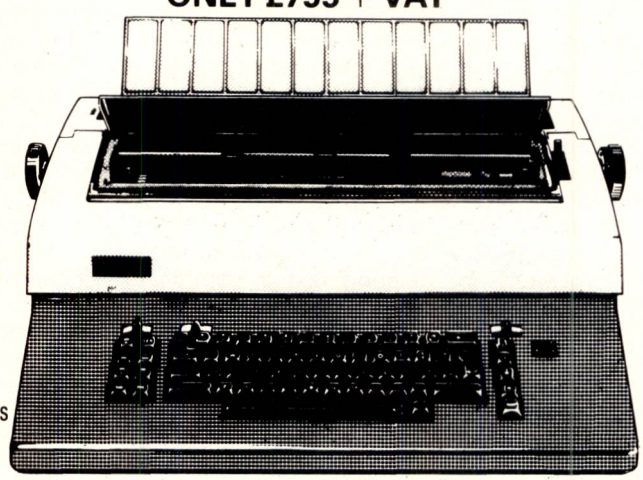

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BENCHTEST



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Apple listings involving POKEs, PEEKs, assembly or machine code will not run on the Adam, and visa versa. And as Apple programmers will know all too well, it is difficult to persuade an Apple to do anything useful without a fair sprinkling of POKEs and PEEKs.

The graphics are impressive: the high-res screen has a resolution of 256×159 and 16 different colour shades available using the standard Applesoft graphics statements.

There's not a lot I can say about the Basic. As far as I can see, it's Applesoft by another name.



The joystick acts as a numeric keypad

Documentation

The documentation supplied with the Adam is written in an overbearing, patronising, American style, which I find infinitely worse than terse, unfriendly prose. Some of the demonstration programs in the Basic tutorial almost defy description, though puerile and infantile come close.

The authors seem to work on the principle that if a three-sentence explanation is clear, then a thirty-sentence one must be ten times as clear. On the positive side, I don't think anyone would have any difficulty understanding how to use the system!

Conclusions

During this review, the Adam was running continuously for 26 hours. The power pack grew too hot to touch, but the machine ran without error performing a variety of tasks.

In general, I tend to view upgrades to TV games machines as a less than ideal way to buy a computer. If the computer has to adapt to the games machine rather than the other way about, it is very easy to end up with a system which is clumsy, limited and overpriced. The Adam appears to be neither clumsy nor limited, though I think it is likely to be overpriced.

The built-in text editor is an idea which seems to be catching on among micro manufacturers. SmartWord is friendly, easy to learn and easy to use. As a general text editor for correspondence and similar tasks, it is ideal. Given an 80-column monitor output, I think it would also be suitable for more ambitious tasks. As it stands, the 36-column by 20 line display limits its usefulness. For someone needing an easy to use text editor for general correspondence and so on, the Adam could well be a worthwhile investment for this purpose alone. The data drive does not compare to a disk system, but is certainly adequate for home and semi-professional use.

As an arcade-style games machine, it is impressive, but then you only need the games console for this! The only advantage of the rest of the system is that you can also load games from cassette.

As a programmers' machine, Applesoft-like SmartBasic is a reasonably pleasant implementation of the language and — thanks to the popularity of the Apple — there are a wealth of books available to help you. The graphics resolution of 256×159 compares well with all but the BBC, and the graphics statements are quite powerful. The digital data drive, too, is attractive, offering reasonable access speeds and reliability.

However, the Adam does have a number of serious drawbacks. The main one is the total lack of standard interfaces, particularly a serial port of some description. The UK price is as yet unknown, but is likely to be £600-£700 plus the cost of the ColecoVision games console (£150).

The BBC, as ever, is strong competition; a model B with a Hobbit data cassette and one of the £200 daisy-wheel printers which have recently begun to appear on the market gives an equivalent system for about the same price. The BBC, however, offers parallel and serial interfaces, a superior keyboard and a more powerful and elegant Basic. You also have a fairly wide range of single-disk micros to choose from which with a £200 printer could cost the same or less.

The Adam should be available in High Street shops in April or May. Details from CBS Electronics on (0734) 698188. END

C·H·E·C·K·O·U·T

Nucleus

Is Acorn attempting to justify the price of its upgrade Z80 processor for the BBC Micro by bundling in a comprehensive selection of business software? Tony Harrington begins his in-depth series by looking at Nucleus, a package which allows users with no programming knowledge to create their own database applications.

When Acorn won the BBC contract back in November 1981, part of the agreement was that it would make available a business upgrade to future BBC Micro users. The Z80 processor, due to be released in late April or May, is that long-promised upgrade.

At a price of £399, the Z80 box is designed to offer all users a cheap route into the vast treasure-house of CP/M-based programs.

Of course, the real cost of upgrading your Beeb is considerably more than this. You will need twin floppy drives (currently nearly £800), a monitor and a printer.

This pushes the cost of upgrading the BBC Model B into a realm where users are likely to consider buying one of the many existing business systems instead. After all, for £1500 there is a fair range of business machines from which to choose.

To stop such thoughts from entering their minds, Acorn has put together a seductive bundle of free software to accompany each purchase of its Z80 second processor.

One of these packages is Nucleus, the program generator from Compact Accounting Services, which won the Rita Award for the best software program of the year at the Which Computer? Show.

The full list of goodies supplied with the Z80 is shown in Fig 1 (the estimated retail value of the software is £3000).

Nucleus is the only applications program to have carved out a name for itself so far in this country. 'The main difference between Nucleus and other program generators is that you don't need to know the first thing about programming to use it,' David Parson, director of Compact, maintains. In general, Nucleus is accessible to the beginner. One of the major reasons for Acorn's interest in Nucleus, according to Parson, is that it offers a route for people who have progressed beyond the rank beginner stage and want to experiment with more advanced Basic programming. Hitachi apparently agrees, since it has bought the licensing rights to Nucleus for its new micro.

The attraction for the fledgling programmer is that Nucleus-produced programs can be listed and amended. Acorn feels that this will allow users to see how simple programs are written: the idea is that these programs will provide them with a starting point, but this can only be true for certain kinds of Basic programs.

It is important to realise that Nucleus is designed to produce business-related programs. It is not a graphics generator: it won't write computer games for you and it won't build a financial modelling program. What it will do is build almost any sort of file-oriented business system. It can create procedures for adding transactions to files and updating related files, and you can carry out a range of arithmetical operations on data.

Background

A little history might help to clarify this. Nucleus was designed by Compact to satisfy two different kinds of demand. As a program generator running on 16-bit machines like the Sirius, it was designed to give Compact dealers a swift and easy way of 'writing' one-off applications for customers. Dealers are continually being asked for such systems: it could be the secretary of the local golf club wanting a membership and handicapping system, or it might be the local garage wanting a spares indexing system. In either case, if a Compact dealer, with minimal training, could whip up a system in a few hours to meet needs as diverse as this, he would have a powerful sales tool.

Nucleus was designed to be compatible with Compact's standard range of business software; this means that as a report writer (or more strictly, as a program generator capable of writing tailor-made programs to extract and

1. **Graph Plan**: a spreadsheet financial modeller with a colour graphics extension (supplier: Chang Laboratories, US. Digital Research supplies the colour graphics extension).
2. **Fileplan and Mailplan**: a database package with mailmerge (supplier: Chang Laboratories).
3. **Memoplan**: a word processing package (supplier: Chang Laboratories).
4. **Nucleus**: a program generator and report writer (supplier: Compact Accounting Services).
5. **Accountant**: a business system cum cash book (supplier: Compact).

Languages

6. **BBC Basic**: runs under CP/M (supplier Acorn).
7. **CIS Cobol** (together with Animator): a debugging program.
8. **Forms 2**: an interactive programming aid.

Fig 1. Free software packages and languages supplied with Z80 processor upgrade to BBC Micro.



Illustration by Nick Davies

present data from existing data files), Nucleus gives Compact's existing user base a way of generating special reports. Any data file from any Compact package can be accessed by special report programs written using Nucleus.

Once Nucleus had been designed and tested, it occurred to Compact that there might be a reasonable demand in the computer market-place for an easy-to-use program generator cum report writer. The Acorn and Hitachi contracts endorse this theory.

BBC Micro users will find that instead of Nucleus programs being written in MBasic, as they are in the 16-bit version, the language used is Mallard Basic by Locomotive Systems. This is because Acorn failed to get what it considered to be a decent licensing price from Microsoft (Acorn, it is rumoured, wanted a fee of no more than £2 per package but Microsoft refused to budge below £10, despite the BBC Micro user base figures). Acorn asked Locomotive Systems to write a Microsoft-style Basic — the result: Mallard Basic.

So what will it do for BBC users? Well, they can design and write a variety of applications for which they would otherwise require a database system (remember that users will have a free database package in Fileplan). They can even write applications programs for sale to other BBC users. The only size limitation is that the total field size of any record should not exceed 250 characters. The limitation on the number of records in a file is the standard CP/M limit of 32,000 (of course, at anything like this level your system will run so slowly as to be worthless).

As is usual with program generators, the programs Nucleus produces don't need Nucleus to run, but they do need a copy of Compact's Start-of-Day program on the applications disk, and they need Mallard Basic. This is not a problem though, as the user gets the licence to both of these along with his purchase of the Z80 processor. This is a good deal, as dealers have to get a licence from Microsoft and from Compact (for the MBasic and the Start-of-Day program respectively) for any Nucleus programs they sell.

Procedure

The procedure for running a program generated by Nucleus on the BBC is simple. Switch on the Z80 processor; load the disk containing the Start-of-Day program; key 'B' to boot up CP/M; type 'Compact2' to boot up the Start-of-Day program; type in the date in response to the prompt which then appears; and then load up the program disk and the data disk for your Nucleus-produced application. Note that you don't need Nucleus itself at this stage.

Creating a program with Nucleus is reasonably straightforward, providing you have a clear idea of the system you want to produce. There are a number of steps to be worked through and you are prompted through each stage by menus.

Nucleus is a menu-driven package. All Compact programs have the same menu structure, starting with a 'company level' menu. This can be personalised with the user's own name by using the CMPARMS command on the Start-of-Day program. The CMPARMS option is also used to set the printer parameters, to tell the program what codes your printer needs to move to bold face type or to print in condensed mode (that is, 132 characters on 80 character paper). These parameters are automatically copied across to any new program generated by Nucleus. The company level menu allows multi-company systems to be built up.

Next is the 'system' menu, which appears on screen when a level from the company menu has been selected.

The system level menu for BBC users is '1 Nucleus — Definition'. Now you get the main Nucleus menu up on the screen, which is ordered according to the sequence you have to follow to write a program. It looks like this:

Nucleus Definition Program Level

1. Create Nucleus Parameter File
2. Create System Definition
3. Create File Definition
4. Create File Linkage
5. Print File Definition
6. Create Update Program

The BBC version of Nucleus differs from the 16-bit version in that the report writing side of the package has been moved to a separate disk. The system level menu on the second disk has three options: 1. Nucleus — Reporting; 2. Nucleus — Document Writer; and 3. Nucleus — Letter Writer.

Each of these system options has its own program level menu. Selecting option 1 (Nucleus — Reporting, to get into the report writer) brings up three choices: 1. Create M/F Print program; 2. Create Selected Report Program; and 3. Create Label Print program. In the Sirius version of Nucleus, these last three choices constitute options 7 to 9 on the Nucleus — Definition menu given above.

The pyramid of menus and sub-menus sounds confusing, but moving up or down the pyramid is very easy. Keying 'Return' instead of an option number automatically takes you to the next highest level. Hit a couple of returns simultaneously and you are out of Nucleus and back to CP/M and the 'A>' prompt.

The first two stages (Create Nucleus Parameter File, and Create System Definition) don't involve the user particularly. Option 1 writes the housekeeping and menu routines to the program disk in Drive B. Option 2 gives you a chance to tell Nucleus what your program is to be called (up to 20 alphanumeric characters). This name will appear hereafter on the System Menu whenever you load this program disk. Nucleus automatically assigns an option number to all the programs loaded onto this particular disk (the



numbers are stored in the parameter file on the disk). The numbering starts from 20. Numbers 1 to 19 are reserved for Compact's business programs.

The actual program creation begins with option 3: File Definition. You need to work out the shape (that is, the number of fields in each record, relationships between files, calculations, and so on) in detail before you begin. Nucleus allows only limited room for you to change your mind. Each stage of the program creation has an 'OK Yes/No?' prompt: if you answer 'Y' (Yes) then that is what you are committed to.

Each file created has to be named (up to 20 alphanumerics). Nucleus recognises two different types of files, master files and transaction files. The difference between them is that master files have a unique key to access each record. A stock file, where each stock item has its own stock code number, would be a 'master file'. You would opt to create a transaction file whenever a unique key wasn't appropriate: for example, if you were designing a sales ledger file where a number of transactions were to be posted to the same customer account number.

A program can consist of more than one file since Nucleus has a facility for linking files. The next step, after selecting the file type and naming the file, is to work through the 'field definition' menu.

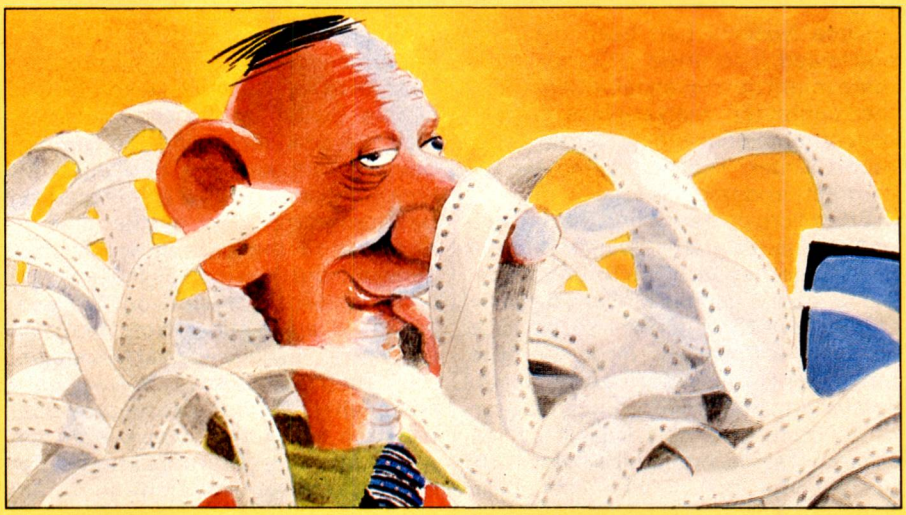
A file consists of a number of records, each of which has a number of fields. Anyone familiar with database packages such as dBasell will find the field definition screen familiar:

DESCRIPTION OF FIELD
TYPE OF FIELD (A, AN, D,)
NUMBER OF CHARACTERS
NUMBER OF LINES
NUMBER OF DIGITS BEFORE POINT
NUMBER OF DIGITS AFTER POINT
ALLOW NEGATIVE VALUES?
MINIMUM VALUE
MAXIMUM VALUE
DELETE PROTECT?

Key fields

The Nucleus manual provides a good, clear account of what each of these prompts means and non-programmers should have little difficulty in using this to construct their file. Once each field has been specified, the program needs to be told which fields will be the key fields for searching and indexing. A point to note here is that while you can specify all the fields in a file as key fields, the more key fields you have, the slower the system runs when you are adding new records to the finished program.

A useful touch is that you can specify how many of the characters of a key field should be used in the key. The longer the key field, the more memory space it takes up, so if you were building a customer address file, for example, you might decide to sort on just the first five characters of customer names.



The next stage is to specify the relationships between any linked files. The point of linking files is to cut down on memory overheads (the more compact a program, the faster it will run). For example, a club with various categories of membership would find it convenient to record the membership as a two character code on the members' master file, and to link the code to a full description of the membership category, held on a second file. This means that the category description is only held once, and not many times over, against each member's name on the master file disk. Again, the manual provides a reasonable guide to the concept and its application.

There are two more major stages before the creation of a program is complete. These are: the setting up of 'update' routines for adding data to a file; and the creation of reports, to reveal the contents of your files.

Each update program is given a name (for example, 'Update monthly sales') and it then becomes a numbered option on the main menu that Nucleus creates for your program. Designing the update program is guided, as in the file creation stage, by a set of screen prompts. The only difficulty is deciding what maintaining your files is going to mean in practice.

Nucleus' report writing is fairly flexible. If you opt to create a detailed report, Nucleus displays all the fields in the file, file by file. You work through these files indicating which fields are to be printed in the report, what order they're to be printed in, the fields to be totalled and what the spacing between fields should be. There is also the facility to create a program which will dump your master file to a printer.

Document Writer is included in Nucleus so that more complex reports can be created. An example of this type of report is where invoices or statements are to be printed. Here you need a 'header' part to the report, giving the customer name. But you also need a 'transaction' part listing all the items bought by a particular customer.

Letter Writer is a very limited form of word processing which simply gives users the ability to pull information from data files into text, making the production of standard letters and other mailmerge functions possible.

One major criticism of Nucleus in the past (in its 16-bit format) has been that the Report Writer side of the package only operated with a printer. It was not possible to design reports which could be sent to the screen, allowing on-screen enquiries into files.

BBC Micro users will benefit from recent improvements to Nucleus which provide the user with limited screen enquiries. At the moment, it's not possible to do selected searches on screen (these have to be dumped to a printer), but you can page through records sequentially starting at whatever record number you choose. Since the whole point about Nucleus programs is that they can be amended, users might well want to try writing their own routines to plug this gap.

Commitment

Compact's David Parson reckons that the company is committed to including full screen reporting routines in future updates of Nucleus. To date, it has given greater priority to producing a colour version of Nucleus (as demanded by Hitachi) and to sorting out the Mallard Basic.

Next month: Accountant

END

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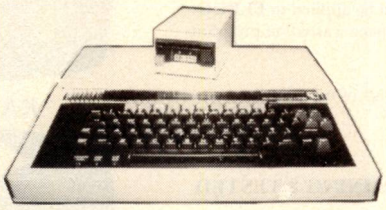

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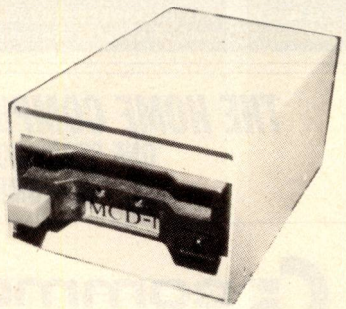

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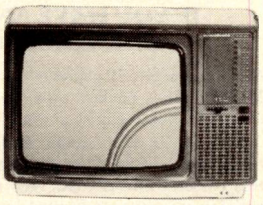

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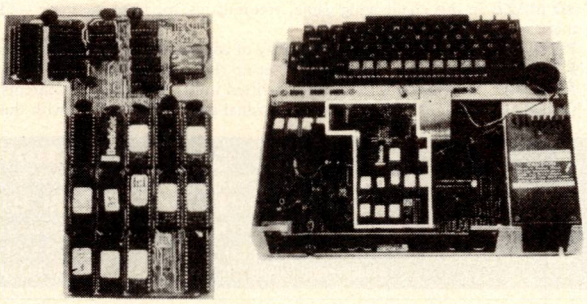

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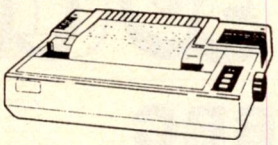

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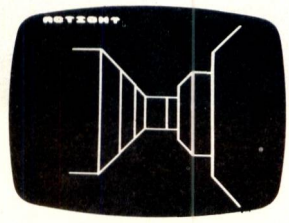

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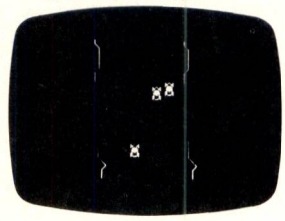

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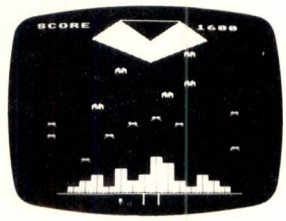

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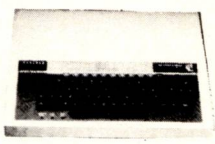
BBC MICRO  **MODEL B £399.00**

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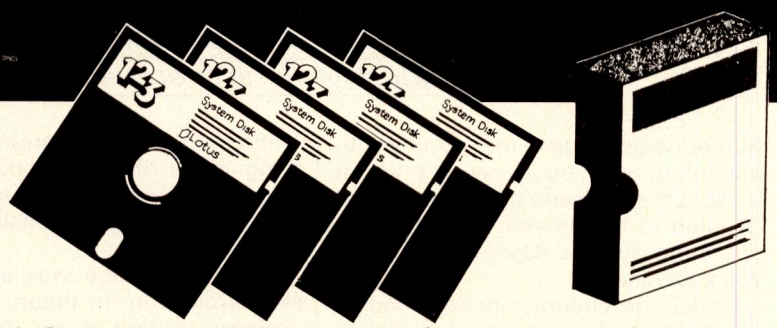



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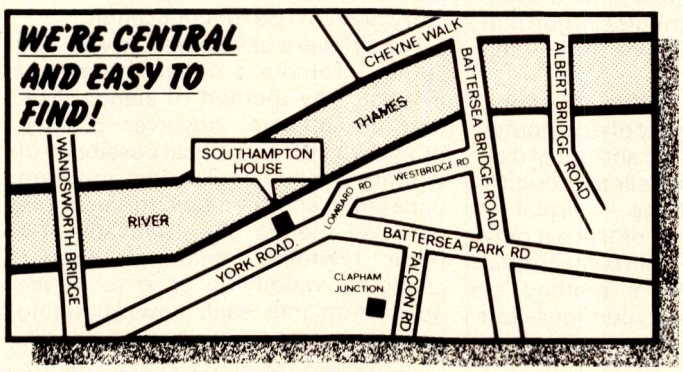

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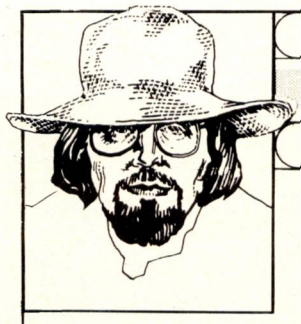


BANKS' Rapport!

The emergence of a universal standardisation in the computer hardware/software industry is long overdue. Martin Banks prays for a miracle.

Someone sidled up to me recently with one of those, you know, significant looks in their eye and whispered: '1984 is going to be the year of interesting operating system developments, did you know that?'.

Under the circumstances, I had to answer that I didn't know what he was talking about, partly because he was speaking in Esperanto. This tended to make the oral/audio communications interface protocol translation problem loom just a little large in my life. This man then wandered off, muttering something that sounded vaguely disrespectful, though I couldn't be sure.

The incident set me to wondering, however. Although, through the benefit of artistic licence, I did manage to interpret what the man said, there are a million occasions every day when two or more people of different cultural and language backgrounds fail entirely to communicate with each other in any meaningful way.

This is not totally dissimilar in general principle to what has happened in the computer business. Each manufacturer, for sound business and technical reasons, has tended to go off and do its own thing. This has meant that each brand of computer is different, not just cosmetically, but fundamentally.

In the microcomputer business the situation has been, on the surface at least, different. Apart from the three early star companies — Commodore, Apple and Tandy, each of which followed the traditional route of producing machines that were compatible only with their own — the micro business threw up a degree of theoretical commonality that was surprising, and which bucked the trend.

The trend bucking was only theoretical, however, as anyone who has tried to stick bits of 'similar' equipment or software together will have found.

On the hardware side, for example, the S-100 bus structure rapidly grew up. Many computers were made to this hardware 'standard', yet the circuit boards from one would, more often than not, fail entirely to work with another, even though they were 'the same'. It was no different in software. There rapidly grew to prominence this thing called CP/M, the operating system to which all self-respecting program developers paid considerable deference.

With CP/M there was a degree of standardisation, in theory at least. A program written to run under CP/M would run on any machine that would run CP/M. Unfortunately, it was never quite that easy in practice. It depended which version of CP/M was in use and what machine it had been prepared for. In practice, each CP/M was different, which meant that it could not be assumed that a program would run on one computer just because it ran on another.

The old tradition of separatist development had, to all practical purposes, managed to rear its ugly head once again. The head is still very much in view, though software technology would seem at last to be shaping up to offer a means of knocking it back down again.

The mention of Esperanto at the beginning offers some pointer. Although that language has singularly failed so far to become the universal verbal communications medium it was designed to be, the need for something like it shows the validity of the attempt. By the same token, the computer industry needs its own Esperanto so that the vagaries of hardware and software separatism no longer become important.

Knowing the computer industry as well as we do by now, it goes without saying that it has come up with a new buzzword to cover this particular problem. This actually falls into a well-defined sub-set of computer jargon that has been around for some time — the Virtuals.

This started with Virtual Memory, which refers to the ability of a computer to swap data rapidly into and out of disk in such a manner to appear as though it is equipped with a large — virtual — main memory, when in practice it only has a small(ish) one. Then came Virtual Machine, which was a method of making one computer configuration appear to a piece of software as though it were a different computer.

This latter was a forerunner of the latest addition to the virtuals — Virtual Environment. This type of virtual environment is one where it matters not a jot what language an application program is written in, or what operating system it should run under. With oven ready virtual environment™ installed in your computer, it will run. Sadly, the availability of such a product is some way off, but the early signs that it will be a working, practical reality are emerging.

If it works, and if it actually does mark the start of the 'something' I feel it ought to be, then this virtual environment stuff is likely to prove very interesting to the millions of users, both existing and potential, who sit in corners sucking thumbs when it comes to solving multifarious and usually stupid operating problems caused by computers.

The reason it will prove interesting, if it all works, is that it will no longer matter about the details of software. The user will be able to load it into a machine and its operating system will sort out what should be done to make the thing run properly.

No longer will it be necessary for the user to ensure that a newly purchased applications program is written to a specific version number of a specific operating system, or whether the operating system, under which the selected application program label says it has been written, is the one specifically available on a particular computer. The user, who normally has better things to do than kick the cat because the software won't run, will only have to load the disk into the machine — end of story, start of use for application.

For software developers as well this should promote a certain degree of interest. Any method of standardisation in software, however ghastly, brings with it the practical possibility of writing a new application program once only, and then having the entire potential market place available. No more rewriting, tailoring, editing, changing, modifying *et al* to fit the application into each new operating system/machine environment (there's

STATEMENT

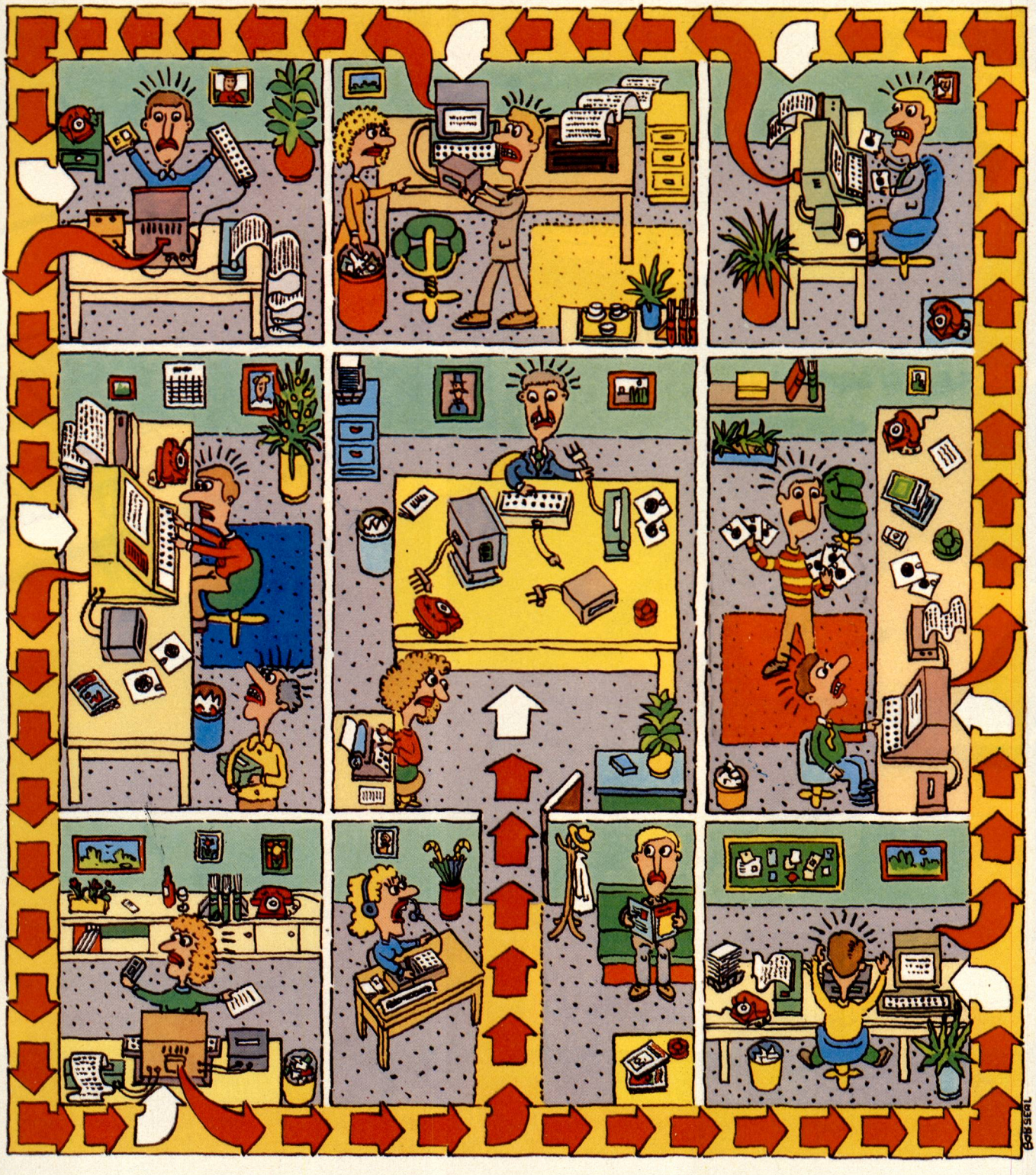


Illustration by Bob Seal

that word again).

How will this miracle be achieved? Well, just take a look at one particular product.

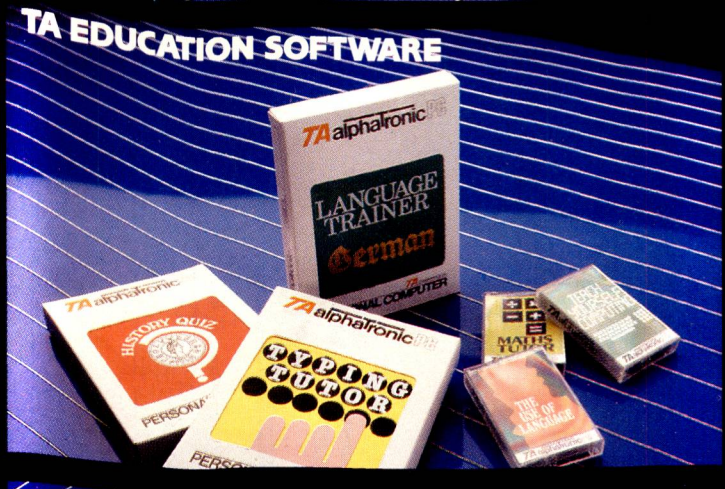
Buy an IBM PC if you will, and then run PC-oriented applications under the latest version of Concurrent CP/M from Digital Research. This will mean that other, non-PC-DOS programs can be run as well.

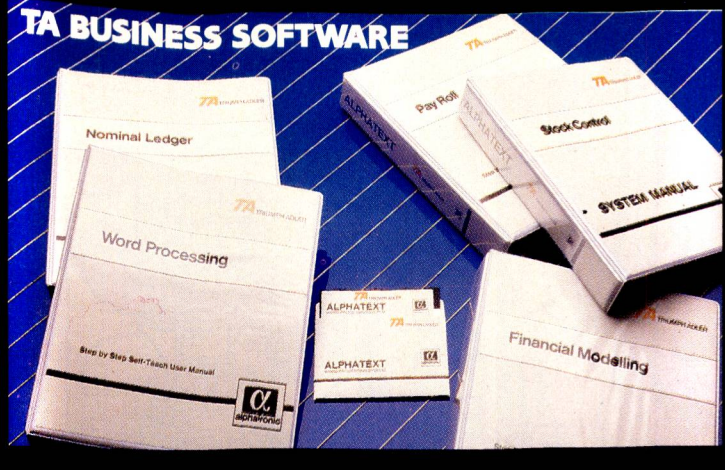
The alternative looks even more intriguing. You will be able to purchase, in theory at least, any computer capable of running Concurrent CP/M. This is essentially any of the 8086/8088-based machines with a goodly chunk (256k or more) of memory on board. If it is the latest Concurrent, then that machine will also be able to run PC-DOS Version 1.1 applications software. At a stroke, an IBM-look-alike computer will be turned into an IBM clone, or pretty damned near. It's a long way from the full meaning of 'virtual environment' but it is a step, I feel, in the right direction. When even experienced software developers get caught out in the maze of 'which-version-for-what-machine' permutations (as I have seen happen before) then it's time something was done.

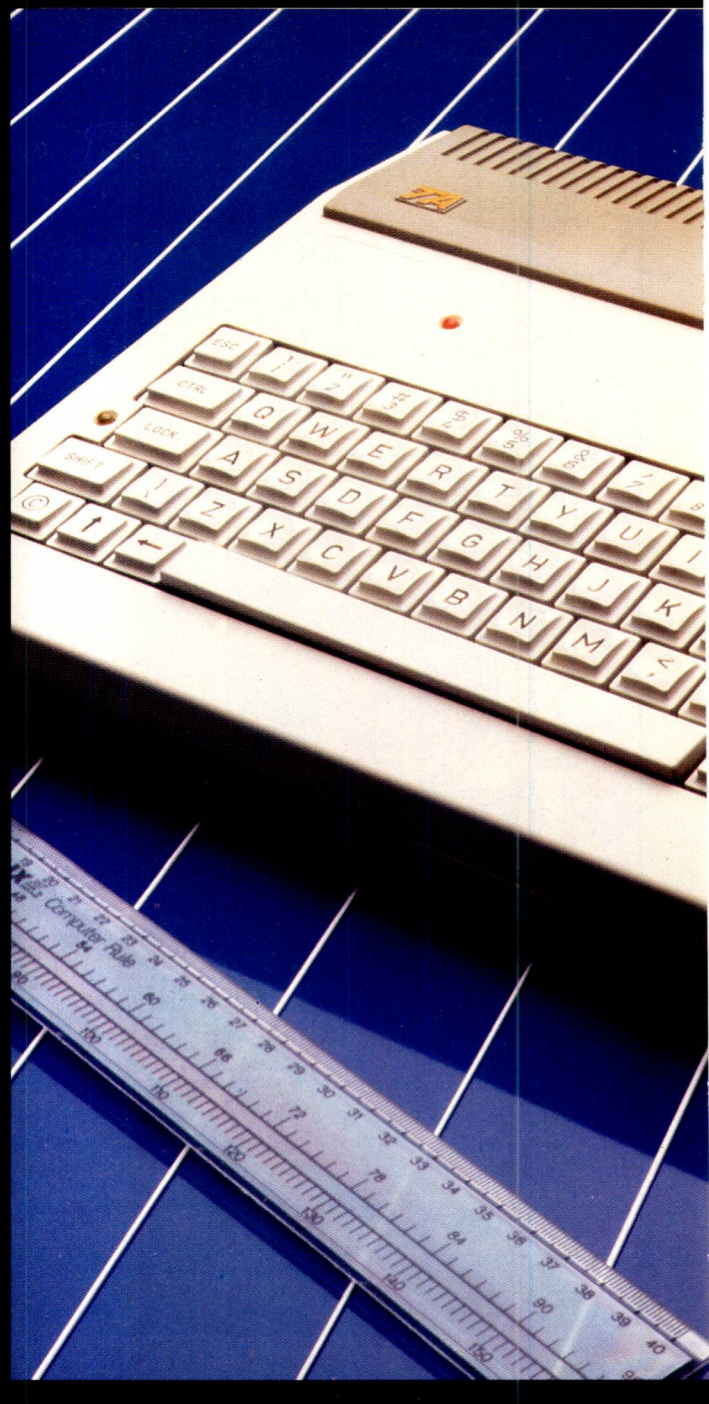
END

The Alphatronic









The Alphatronic Personal Computer makes playing, learning and working more fun, more fullfilling, more rewarding. But when you put it to work, then it really means business. In fact it's probably the cheapest way to access business programmes through CP/M software.

The games first though — enough for the most ardent player. Some just plug into a socket at the back, with their own 16K Rom module. Others can be played from virtually any cassette recorder. There are arcade games to sharpen reflexes and test imagination. Educational programmes to increase knowledge, plus chess and other traditional games.

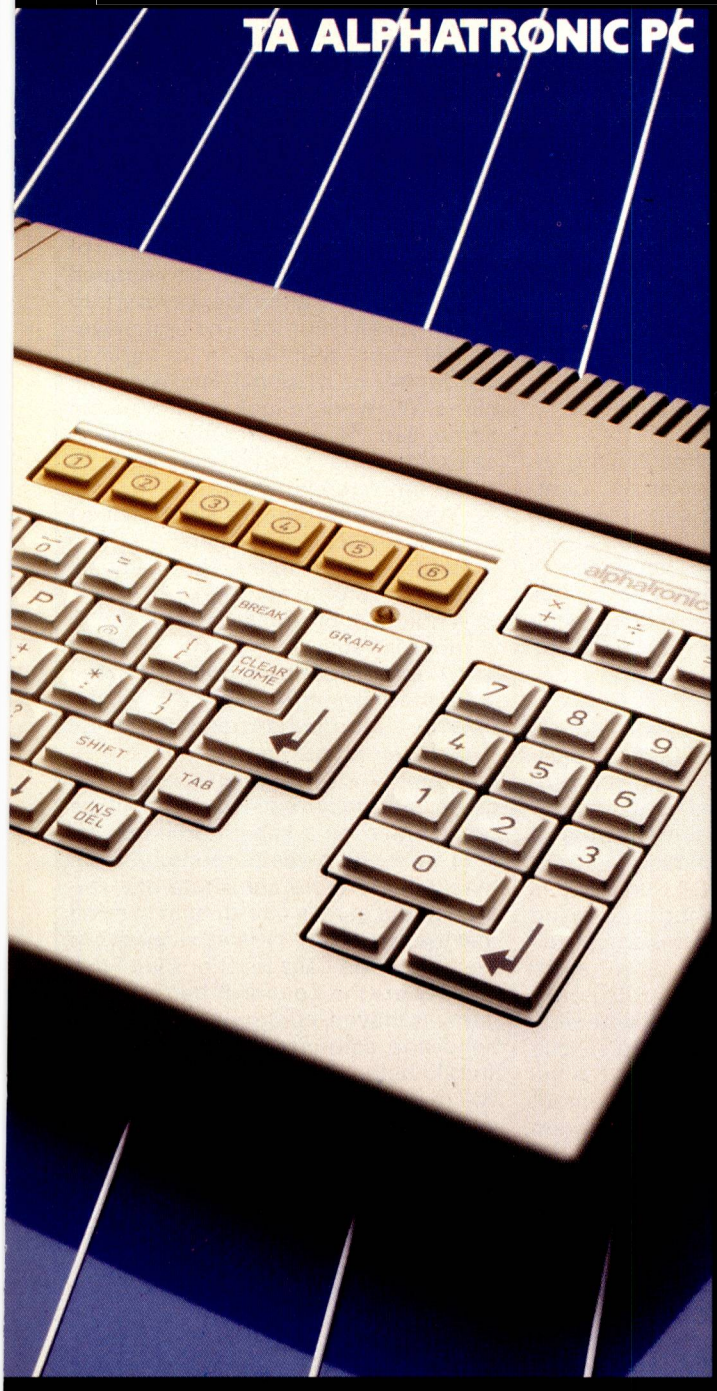
You'll benefit from the learning programs. There are cassette instruction courses on writing programs in BASIC. Other cassettes get you and your family off to a flying start into skills like typing, household budgeting, tax returns and investment management. And of course there's our own instruction and BASIC interpreter manual.

Now to business. The Alphatronic PC is unusual in giving you low-cost access to a complete version of CP/M, the world's most popular operating system for business software. You just connect up one or two floppy disc drives and a printer, then you can run a whole host of new management programs: office word processing, business accounting packages and financial planning — the choice i tremendous.

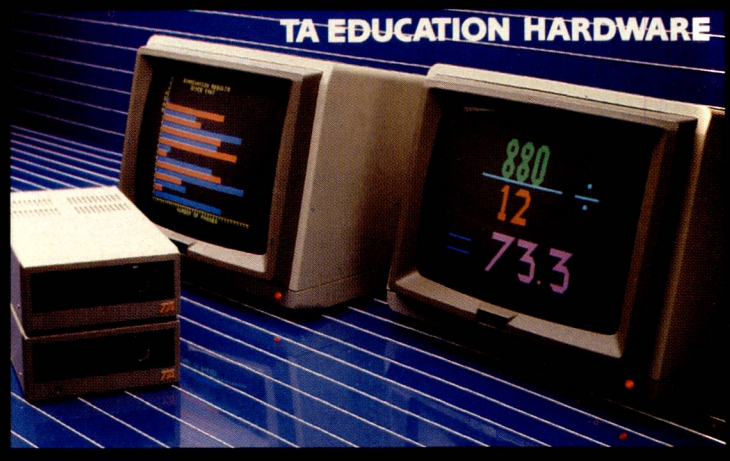
The keyboard is a real delight compared with competitive models. There are very few confusing multi-function keys, and a really professional numeric keypad is included. Six separate keys can be programmed and indexed for special routines. And the full alphanumeric keyboard is just like a modern electronic typewriter.

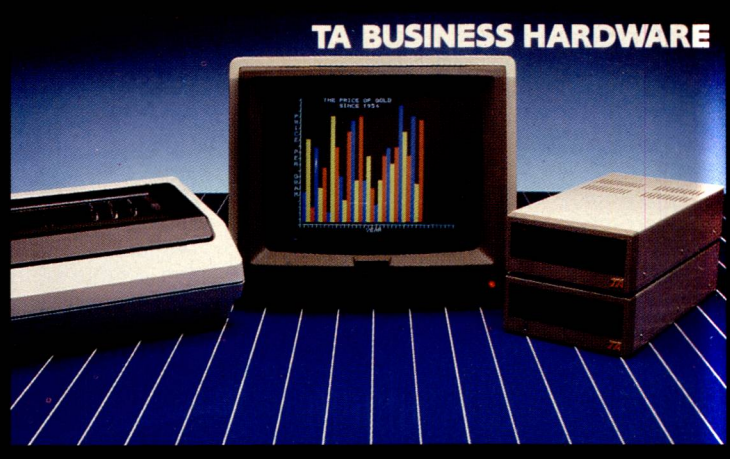
You may recognise the keyboard, because the

C means business









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E4

TEACH YOURSELF ASSEMBLER

Addressing refers to how we specify the location of the operand, or, the byte or bytes upon which the instruction will operate. This month we look briefly at some of the addressing modes you need to be familiar with.

Each of the processors we are using has instructions to enable specified internal registers to be incremented or decremented. As an example, the 6502 uses INX to increase the value of the X register by one. The instruction when assembled results in a single object code byte. The 'address' of the operand (which in this case is the X register) is specified within the 'op code'. This form of addressing is termed 'implied' or 'implicit'. It is used in instructions such as register-to-register transfers and register increment/decrement.

If an instruction uses **immediate addressing**, it gets its operand byte/s from the location or locations immediately following the op code in memory. One example is in the loading of constant values into registers or register pairs.

These instructions, when assembled, result in two bytes of object code being produced—the op code followed by the data value. As we have seen previously, the 8080 and Z80 also have instructions that load register pairs with 16 bits of data, resulting in three bytes of object code being produced when the instructions are assembled—the op code byte plus the two data bytes.

Absolute addressing specifies a memory byte using a full 16-bit address. Such instructions, three bytes long, consist of the op code followed by the two byte address giving the location of the operand. POKE address, value . . . is a typical 'absolute addressing' Basic statement.

In the case of **relative addressing**, instead of an address we give a displacement to be added to the value already in the program counter. Such displacements are restricted on 8-bit micros because they have to be specified with one byte.

Up to now, the addressing modes we have looked at may be regarded as 'static', or to put it another way, once the program has been written the memory locations upon which the various instructions will operate are fixed, completely defined by the instructions you have selected. **Computed addressing** enables the address of an operand to be computed at run time and falls into two categories — indexed and indirect addressing. This month we look at indexed addressing and give you an idea of its usefulness.

Indexed addressing

Indexed addressing uses an address that is obtained by modifying a specified 'base address' given in the program. The 6502 load accumulator instruction LDA has several forms of addressing options including indexed. The mnemonic form LDA address,X is an example of absolute indexing using the X register. The effect is to get the value present in the X register and add it to the specified base address. The base address is specified by you at assembly time in the same way that you specify an ordinary 'absolute' address, but the X register can be used by the program to compute the offset during program execution.

As an example, suppose that you have a table of 20 data items held in memory and have labelled the lowest byte location BASE (think of them as being 'numbered' from zero to 19). The instruction LDA BASE,X will access the base value if X is zero, the byte above this if X is one, and so on. In general, it will access the X'th data item of the table:

	MEMORY LOCATIONS
etc.	
4th	
3rd	
2nd	
1st	
BASE:	

It is this location that is addressed if the X register has the value 4.

You've probably used similar ideas in your Basic programs, for example, FOR I% = 1 TO 9: PRINT X (I%):NEXT I%. When I% = 4 you are referencing X(4). Indexed addressing is particularly useful for accessing successive data elements from tables or blocks of data. On the 6502 both the X and the Y registers are available as 8-bit index registers. The limitation on the 6502 is that X and Y are 8-bit registers, so the indexing offset is restricted. The 8080 processor has no indexing facilities at all. The Z80 has two 16-bit index registers but these are used to hold the base addresses, not the offset values.

Connect Four game

Let's illustrate indexing by examining one way to represent the game Connect Four. The essential details of the game are that two players have sets of coloured counters which are dropped (one at a time by alternate players) into one of seven columns. The first player to get four counters in a vertical, horizontal, or diagonal line wins the game. We want to look at how such a game can be represented within a computer and restrict ourselves to some simple beginnings:

1) Write a subroutine to set up (clear) the board representations.
2) Write a subroutine for players' moves (column number).
3) Write a subroutine to check that move is valid.
4) Write a subroutine to make the move on the computer's boards.
5) Write a subroutine to identify change of player for next move.

To define how we are to represent the game internally, each player will be represented on a separate board created by seven bytes of memory. Each byte will therefore constitute one column of the games board: bear in mind that the boards are 'twisted sideways in memory'. The base locations we have labelled are the 'column 0' bytes. As the game is played, column 0 is on the left hand side, column 6 on the right (Fig 1 should help you get the general idea). We've numbered the seven columns from 0 to 6 because of the way we'll use indexing to access them. The six rows, however, have been numbered from 1 to 6 because the row number then represents the 'bit position' within the byte.

The presence of a counter in a certain position will be indicated by setting the equivalent bit to 1. Our bytes are eight bits wide and we'll use the inner six bits of the bytes. We'll also select one byte of memory to act as a player switch, and change its value with each move to identify which player is making a move. Seven bytes will be used to count how many 'pieces' have been placed in a given column, and a further seven bytes used to identify the position of the last piece placed in a given column.

We'll discuss the overall ideas in terms of 6502 coding, but the layout of the boards and the general principles will be similar on the Z80; differences will be discussed, together with any changes needed after each individual subroutine discussion.

No indexing facilities are available on the 8080, so we must look at ways to

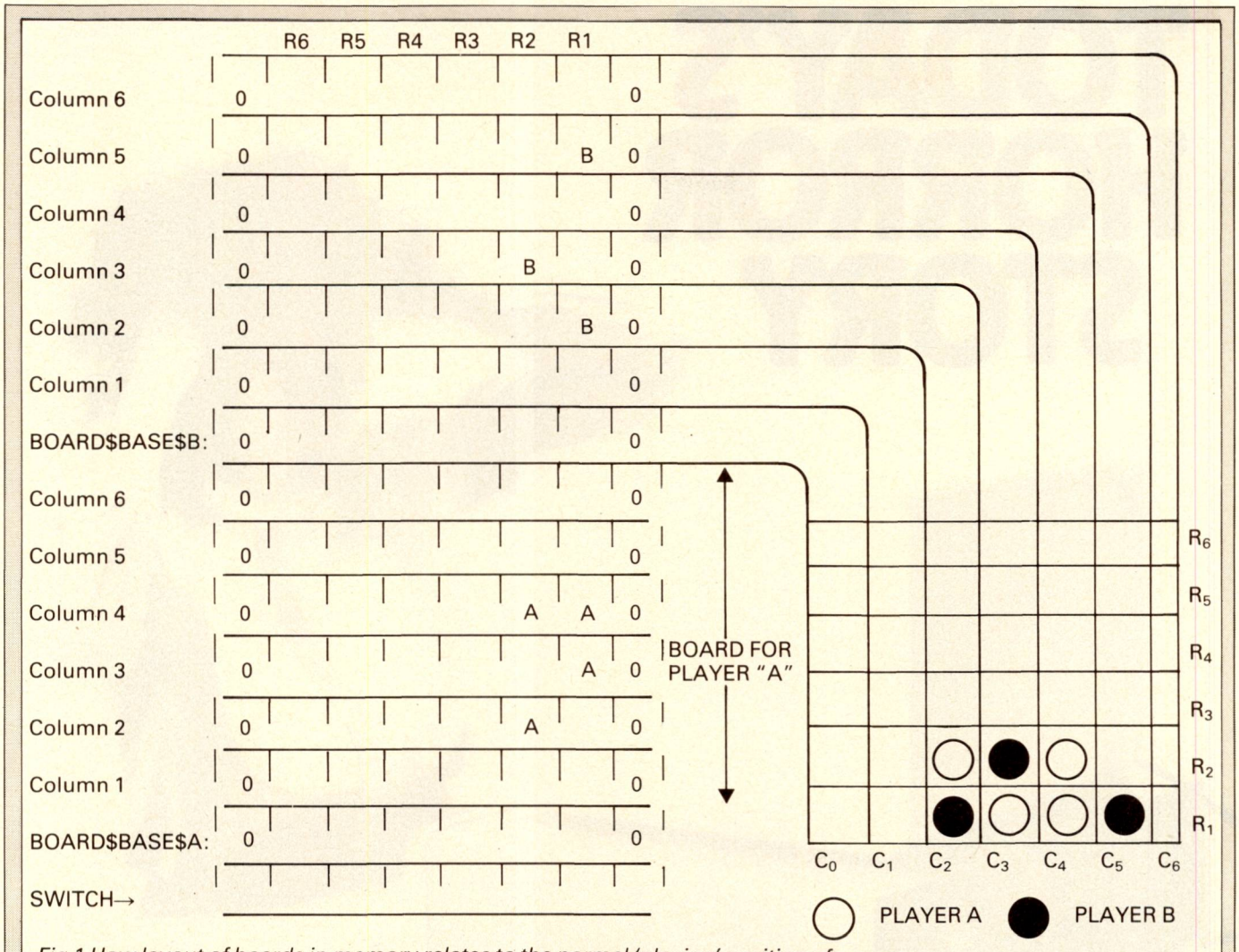


Fig 1 How layout of boards in memory relates to the normal 'playing' position of boards in practice.

create equivalent effects without indexed addressing.

Clear memory subroutine — 6502

We will, at the end of a finished program, use an assembler pseudo operation to reserve certain memory locations for use by our program: the operation is usually called 'reserve data storage space'. Our assemblers use the letters DS N to reserve N memory locations, and in our case, this space will 'sit' immediately above the actual program code.

We must write a subroutine to clear the area of memory assigned for the boards, and make the initialisations needed to the switch byte (we'll arbitrarily set to zero to indicate player 'A' and to FF hex to indicate player 'B'). We initialise the seven bytes starting at the location labelled ROW$POINTER$BASE so that they contain the binary value 00000001, and will be using an operation called a left shift to push those single bits from right to left as the game progresses.

We initialise an area of memory by loading the accumulator with the number we wish to store, loading an index register with the number of bytes to initialise and then using a loop that implements indexed addressing to store the contents of the accumulator. We decrease the index register by one each time we pass through the loop, repeating until the index value becomes zero. Bear in mind that because we don't branch back once the index register has become zero, we must initialise the base location separately.

```
        LDA  #value      ;Value we wish to store
        LDX  #n          ;n is the offset value
START:  STA  BASE,X      ;This is the indexed addressing bit
        DEX              ;Decrease the value in X by 1
        BNE  START       ;Back for next byte if X<>0
        STA  BASE        ;This does the base location
```

Fig 2 Typical 6502 form

The arrangement in Fig 2 is fairly straightforward, but you may consider it more convenient if we handle the base location within the loop itself. In actual fact we can, by using a typical 'trick' — we reference the byte *below* the base. In practice, we make use of another facility of modern day assemblers: we can perform simple arithmetic operations on labels, addresses, and so on. In Fig 3, we use the instruction STA BASE-1,X so that the base address refers to the byte below that, labelled BASE. In this case, we must set the X register to the number of bytes we wish to reference. The equivalent form of the first 6502 example is shown in Fig 3.

In our finished routines we use two loops, one to initialise the memory between the byte labelled COUNTERSINBASE and the top of board 'B' with zeros, the other to initialise the seven row-pointer bytes.

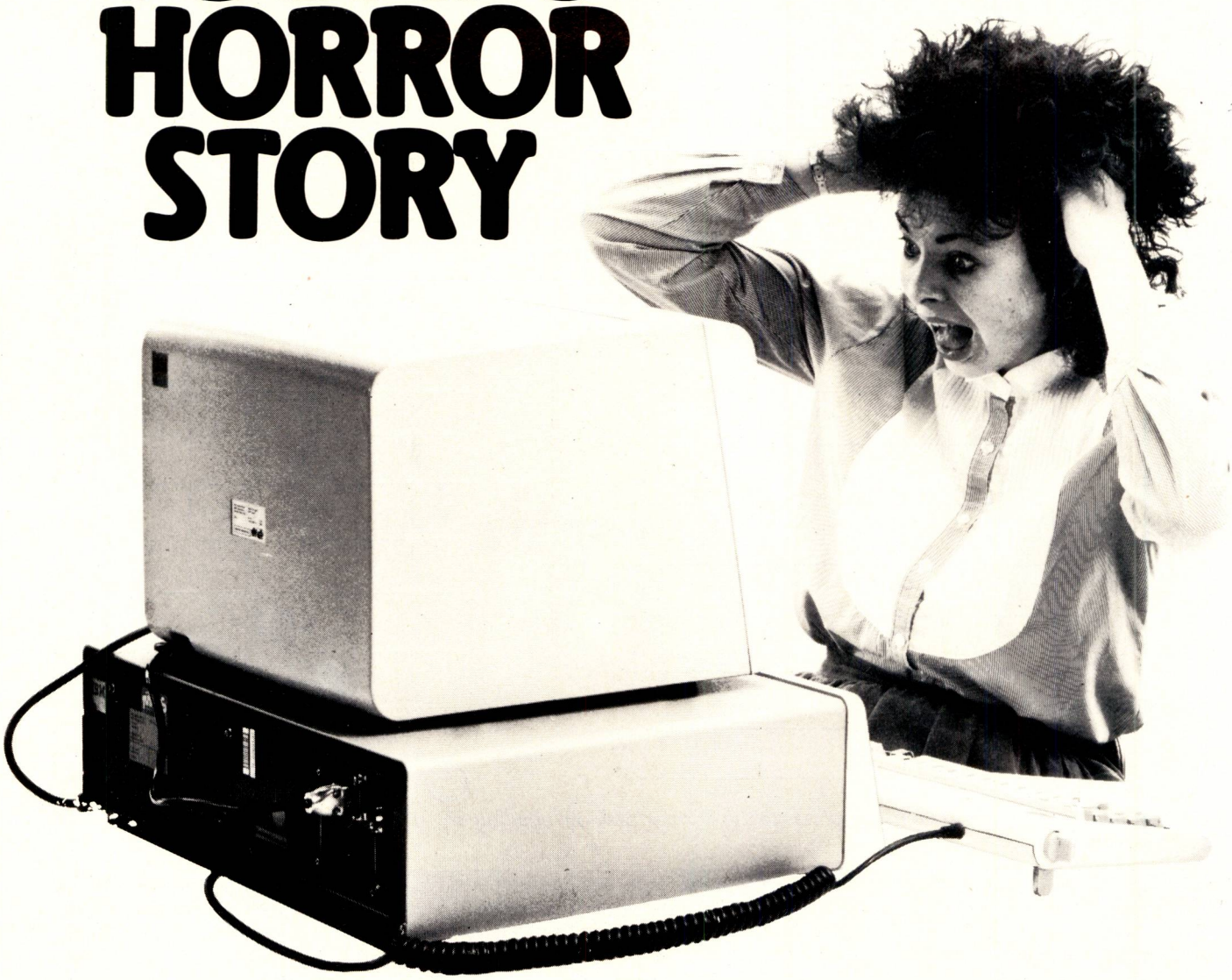
```
        LDA  #value      ;Value we wish to store
        LDX  #N          ;Number of bytes
START:  STA  BASE-1,X    ;This is the indexed addressing bit
        DEX              ;Decrease the value of X by 1
        BNE  START       ;Back for next byte if X<>0
```

Fig 3 Alternative 6502 form

Clear memory subroutine — Z80/8080

Indexing on the Z80 is implemented somewhat differently to the 6502. The

TODAY'S HORROR STORY



You have a micro and a winchester. Maybe even a local area network. By now you have probably realised two things. Backing it up is... well, let's say **inconvenient.** And discovering that it wasn't backed up when it went wrong was... well, **stressing.** If only you could have a removable winchester – but they're not generally available and anyway they're too small for most purposes.

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index registers IX and IY are used to hold base addresses and not offset values. The indexed instructions on the Z80 offer the inclusion of a displacement value within the mnemonic form of the instruction. As an example, the instruction LD (IX+number),value loads the memory location whose address is 'IX+number' with the specified value. When assembled in memory, the layout of the instruction is as shown in Fig 4.

BYTE 1	BYTE 2	BYTE 3	BYTE 4
1st OP CODE	2nd OP CODE	DISPLACEMENT	LITERAL
DD hex	36 hex	number	value

(<---op code values--->)

Fig 4 Layout of indexed Z80 instructions

successive locations in memory. The mnemonic INX represents an 8080 register pair increment instruction.

```
        LD    IX,BASE       ;Set up index register IX
        LD    C,n           ;Number of bytes
START:  LD    (IX+0),value  ;Value stored at address in IX
        INC   IX            ;Increase register IX by 1
        DEC   C             ;Decrease counter C
        JR    NZ,START      ;Back for next byte if C<>0
```

Fig 5 Z80 version 1

Note that we have an instruction here with a two byte op code, resulting in a total instruction length of four bytes. Let's use this instruction to create a simple loop to store a constant value in a set of adjacent locations (see Fig 5).

DCR, however, is a single register decrement.

We have given versions of the 'clear memory' subroutine for all three processors: each uses two loops to perform the initialisations shown in Fig 1.

```
        LD    IX,BASE-1     ;Byte below base address
        LD    IH,TARGET+2   ;HL points to displacement
        LD    (HL),N        ;N is the number of bytes
TARGET: LD    (IX+0),value  ;Run time modified displacement
        DEC   (HL)          ;Decrease displacement
        JR    NZ,TARGET     ;Back for next byte if displ.<>0
```

Fig 6 6502 variable displacement implementation

You'll notice that within this loop we are essentially using the index register as a 'pointer' to the location in which we wish to store the data item. We are not using 'indexing' in the true sense of our original definition, but are effectively using the IX register to specify an address which is then used to store the data.

If we wish to implement the variable displacement found on the 6502, we use the HL register pair to 'point' to the byte holding the displacement, and modify it during execution by using a DEC (HL) instruction as shown in Fig 6.

The first Z80 example offers some insight into an equivalent 8080 version. On the 8080, the HL register pair are frequently called the 'primary data pointer', with instructions existing to retrieve/store data in memory at the location specified by the current contents of HL. The standard notation for 8080 assemblers is to use the letter 'M' to signify a byte whose address is specified by the current contents of the HL pair. Thus, MVI M,6 will store the value 6 at a location specified by an address in HL. The example in Fig 7 is a direct translation of the Z80 version and also uses the HL register pair to point to

```
        LXI   H,BASE        ;Initialise base value
        MVI   C,number      ;Number of bytes
START:  MVI   M,0           ;Store "immediate value" at location HL
        INX   H             ;Increase HL
        DCR   C             ;Decrease counter C
        JNZ   START         ;Back for next byte if C<>0
```

Fig 7 8080 version

At the end of the Z80/8080 routines we also set B and D registers to zero.

Get move subroutine 6502/Z80/8080

We use a system input routine to collect a column number in the accumulator. One immediate problem is that the ASCII character codes for the numbers 0 to 9 on the keyboard are not the numeric values of the numbers themselves. The values are as follows:

DECIMAL	BINARY	ASCII VALUE
0	00000000	00110000
1	00000001	00110001
2	00000010	00110010
3	00000011	00110011
4	00000100	00110100
5	00000101	00110101
6	00000110	00110110
7	00000111	00110111
8	00001000	00111000
9	00001001	00111001

To convert the ASCII form to a real binary equivalent of the input number, we need to set the upper four bits of the ASCII form to zero. This can be accomplished by using an 'AND' operation. Essentially, two bytes, one of which is the accumulator, are compared bit by bit. If both bits are set to 1 then the corresponding accumulator bit is set to 1, otherwise the accumulator bit is set to 0. Fig 8 shows the effect on the ASCII code of the number 9.

The value we compare against is often called a 'mask'. On the 6502, several addressing modes are available with the AND operation. We'll use an immediate addressing mode to compare the accumulator with 0F hex (00001111 binary). The mnemonic will thus take the form AND #0FH,with the '#' sign signifying the immediate addressing form. Having obtained a proper numeric representation of the input character, we store it in the X register by using a transfer to X register (TAX !) instruction. We then have the column number for the user selected column in the X register.

On the Z80 and 8080 we use similar AND operations to mask the upper four bits of the accumulator, but we'll use the C registers to store our results. The code for all three processors is shown in Fig 9.

Computing offset into board area 6502

The offset into the boards is dependent on whether player A or player B is being dealt with. We use the value held in the switch byte in conjunction with a 6502 instruction called BIT. This is similar to the AND operation, but the result of the ANDing is not stored in the accumulator. It does, however, affect the following flags: bit7 is placed into the 'N' flag, the 'V' flag is set equal to bit six of the byte being tested and the 'Z' flag is set or reset depending on the result of the ANDing. It's a strange instruction but it turns out to be very useful. We'll use it to test bit7 of our switch byte, to place bit7 into the N flag. We can then use a 'branch on plus' conditional branch instruction to either add seven to the value present in the accumulator (so that offset refers to board B), or to avoid doing so. *Note: it is the contents of the byte labelled* SWITCH *that is being tested (illustrating an absolute addressing instruction).*

Accept for now that it's necessary on the 6502 to use a 'clear carry flag' CLC instruction before adding a number to

ACCUMULATOR	00111001	<------ ASCII "9"
OTHER BYTE	00001111	<------ "MASK"
RESULT	00001001	<------ REAL "9"

Fig 8 Effect on the ASCII code for the number 9

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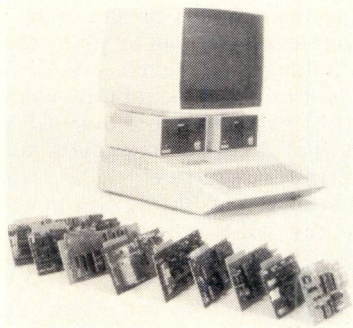

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```
6502                    Z80                     8080

JSR INPUT$ROUTINE       CALL INPUT$ROUTINE      CALL INPUT$ROUTINE
AND #0FH                AND 0FH                 ANI 0FH
TAX                     LD  C,A                 MOV C,A
```

Fig 9 Processor codes for results

the accumulator. The reasons will be explained later in the series when we look at arithmetic operations in detail. CLC combined with an 'add with carry' ADC instruction will result in a 'normal' addition. CLC followed by ADC #7 will therefore add seven to the value of the accumulator. The final value in the accumulator is either the offset required (column number) for the A board or the equivalent offset for board B (relative to the base BOARD$BASE$A). We copy this value into the Y register by the method shown in Fig 10.

```
            BIT  SWITCH     ;N flag set if B's move
            BPL  G$M$1      ;Branch if A's move
            CLC
            ADC  #7         ;Board B needs additional offset
G$M$1:      TAY             ;Board offset in Y now
```

Fig 10 Final accumulator value in Y register

Computing the offset into the board area Z80/8080

As one of several alternatives, we load the accumulator with the contents of the switch byte and then add the contents to itself. This sets or clears the sign flag which is then used to add, or not add, the offset for board B. We have chosen to store the result in the E register.

Check move is valid subroutine — 6502/Z80/8080

On most microprocessors it's possible to shift bytes and registers to the left or right. The 6502 has instructions to perform various shifts and we'll make use of the instruction ASL, which is an arithmetic shift left. Our row pointer bytes are initialised to the value 00000001 binary by the 'clear memory' coding. If we consider the effect on the accumulator we can describe the shift effect diagramatically:

```
00000001  <------  initial value of
                   accumulator
00000010  <------  accumulator
                   after one ASL
                   instruction
00000100  <------  accumulator
                   after two ASL
                   instructions
```

The bit at the right hand side is always set to zero, the bit on the left hand side is shifted into the carry. If we use the instruction ASL A then we perform the above shift on the contents of the accumulator.

We want to load the accumulator with any one of seven bytes, depending on the value of the X register. We can do that easily on the 6502 using indexed addressing. We use the instruction LDA ROW$POINTER$BASE,X followed by ASL,A to shift the contents of the accumulator to the left (think about this carefully if you find it difficult to 'picture'). The single bit, after this instruction has been performed, will be in the bit position corresponding to the bit position on the board to be updated for this move. This representation has been arranged for reasons that will now become clear. If it has been shifted to the bit7 position, the move is illegal because the column already has six pieces. How can we tell? The ASL instruction on the 6502 affects the carry, the zero and the N flags. The N flag is used to determine the status of bit, because on the 6502 all data movement and arithmetic instructions will set the N flag to the value of bit7. The type of coding we use is shown in the following example:

```
LDA  ROW$
     POINTER$
     BASE,X      ;Get column image
ASL  A           ;Shift to left
```

The Z80 also has shift instructions available, and the instruction SLA A will shift the contents of the accumulator to the left. With the 8080, shifting as we have described is not available. We could use one of the 'rotate' instructions but these do not affect the sign flag (the bit7 flag). To overcome this problem, we choose instead to add the contents of the accumulator to itself. This produces the equivalent effect of a left shift which does affect the sign flag.

Making the move subroutine — 6502

After the 'check move' subroutine has been performed we'll have an image of the new move held in the accumulator. The first step is to store the contents of the accumulator back in the location used in the 'check move' subroutine. We can do this easily by using a 'store accumulator' STA ROW$POINTER$BASE,X instruction. Following this, it's necessary to add the new move into the appropriate board column. Let's take a typical example to illustrate the effect we wish to obtain to 'create the new move' (see Fig 11).

Another logical function exists called OR, that tests the accumulator with another specified byte. It will set any accumulator bit to 1 if either or both respective bits in the accumulator *or* the other byte specified is set to 1.

The 6502 has an instruction called ORA which 'ORs' the accumulator with another specified byte. We're going to use the instruction in an indexed addressing form in order to OR the image of the current state of the column in question with the new move present in the accumulator. The updated column will then be replaced into its correct memory position by using the equivalent 'store accumulator' (STA) instruction. Having done this, we increase the value of the corresponding numerical count of the number of pieces in the column. This is achieved with a single indexed addressing instruction INC COUNTERINBASE,X which increments the value currently in memory. The combined code to store the new row position byte, create the new move in memory and update the numeric count is achieved as follows:

```
STA  ROW$POINTER$BASE,X
ORA  BOARD$BASE$A,Y
STA  BOARD$BASE$A,Y
INC  COUNTERS$IN$BASE,X
```

Making the move — Z80/8080

In the clear memory routines we set B and D registers to zero. Since the column number and board offset for a move are held in the C and E registers, it should be apparent that the value of the BC pair is C and the value of the DE pair is E. This has been arranged in order to use an instruction that will add BC or DE to the HL register contents. If we load HL with BOARD$BASE$A, then use the Z80 instruction ADD HL,DE (DAD D for 8080), we set HL to the value HL+DE. In our case (DE=E), we are adding the offset E to the base address in HL which creates the equivalent of an indexed addressing instruction.

Changing the 'Player' subroutine — 6502/Z80/8080

We change players by changing the value of the byte we have labelled SWITCH. We set it to zero when we perform the clearing of memory. After each move we want to change the value, so that it alternates. We have seen examples of AND and OR as logical functions: another logical function is called 'exclusive OR'. This is similar to the OR described earlier, except that if both bits being tested are high, that is, are 1, then the accumulator bit will be set to 0 and not 1.

It's indirect addressing next month plus full listings of all the Connect Four subroutines discussed here, and the main block coding needed to run the programs. END

```
BYTE . . . ROW$POINTER$BASE,X ..... 00000100←image of the new move
                                              in the accumulator
BYTE . . . BOARD$BASE$A,Y ..... 00000010←current column state
RESULT NEEDED IN ACCUMULATOR ... 00000110← required new state
```

Fig 11 Creating a new move



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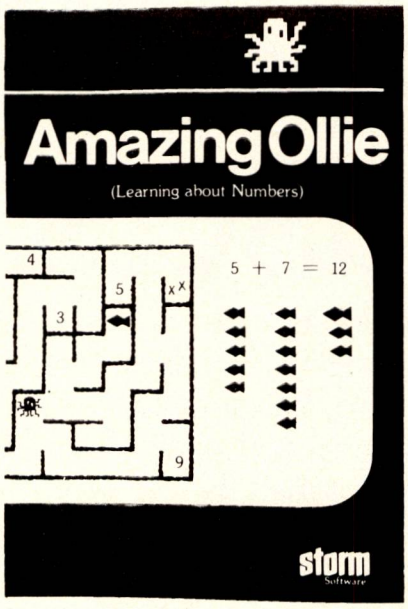

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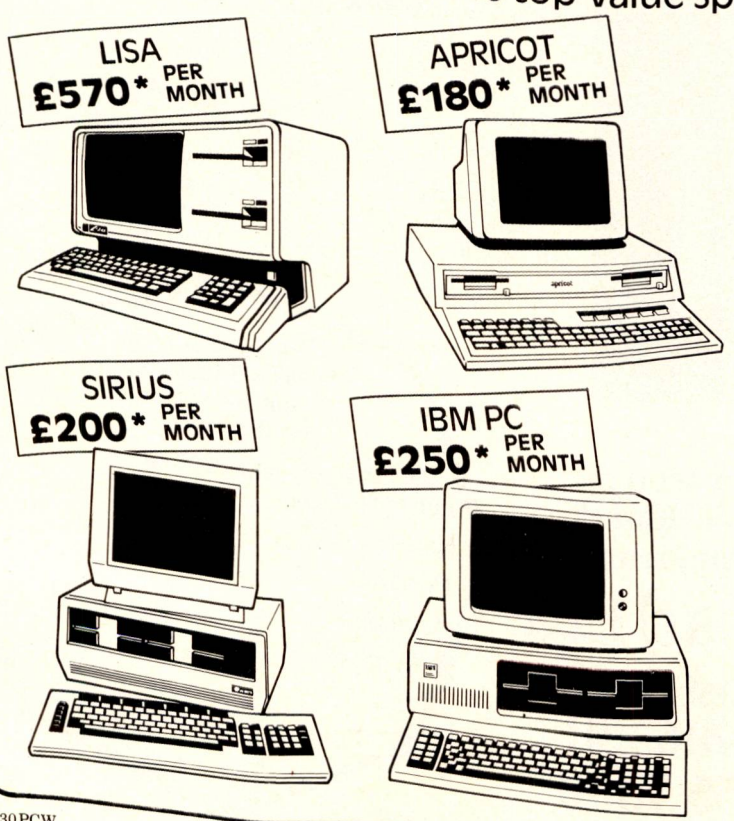

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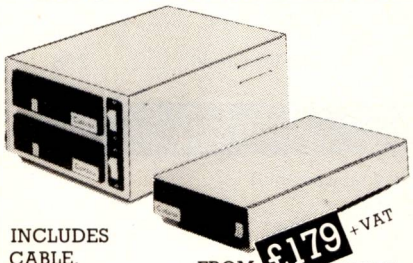

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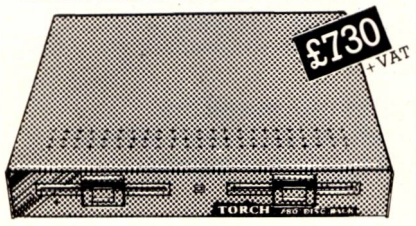

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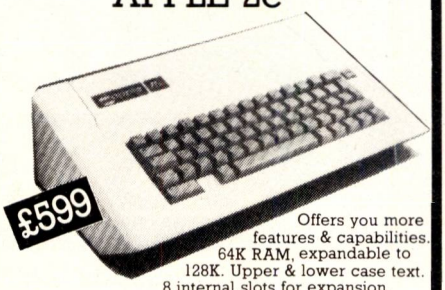

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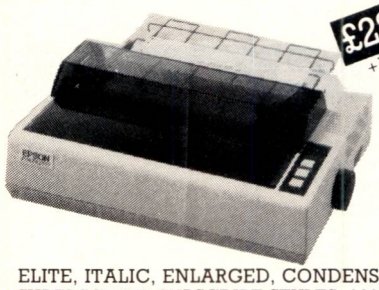

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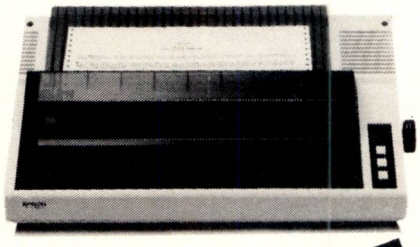

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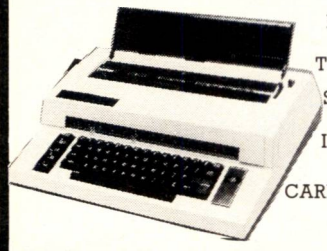

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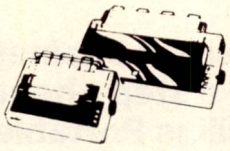

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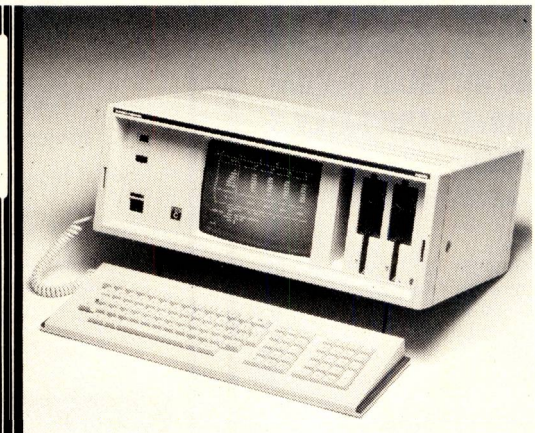

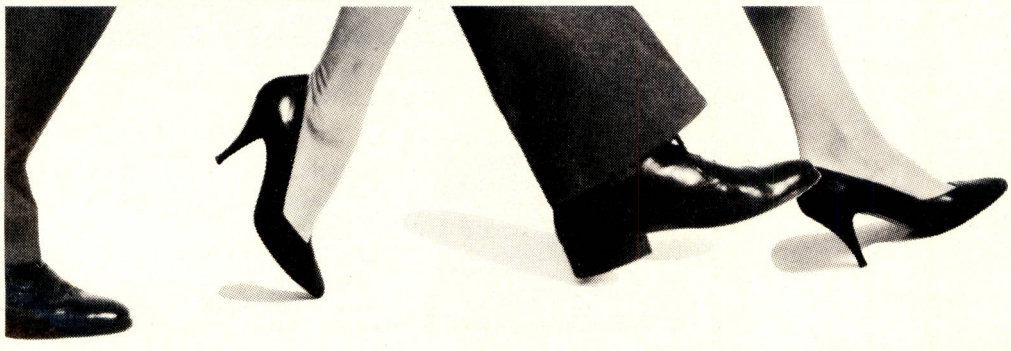

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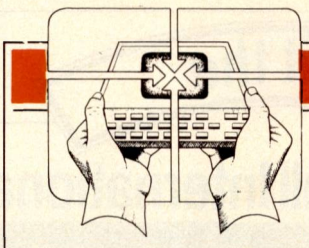

COMPUTER TOWN UK! NEWS

Margaret Spooner brings you the latest news on Computer Towns.

Computer Town UK! receives an interesting variety of correspondence — see Chip Chat for one amusing example. A more serious request comes from Chelsea College, which is interested in locating any currently available software in the Health Education field suitable for a variety of user groups, such as school groups, home users, antenatal clinic visitors, and so on. The work is being carried out for the Health Education Council.

Since it's possible that some CTUK! members have worked in these areas, I am passing on this request to you in the hope that anyone who has written relevant software will contact Wendy Riddle, Development Officer, Chelsea College, University of London, Bridges Place, London SW6 4HR.

Wendy mentions that human biology, medical matters, life choices and personal relationships are among the broad scope of areas that are of interest.

And now news of the inaugural meeting of a new Computer Town at Hayes Library. About 100 people turned up to the delight of organiser Martin Haugh. He confessed to being 'somewhat overwhelmed', but expects numbers to settle as the merely curious people drop out. Those attending were of all ages and both sexes.

A steering committee was formed and will draw up a programme of forthcoming monthly meetings, alternating between formal talks, informal demonstrations and hands-on sessions. A demonstration of Micronet is planned for the second meeting. A final request from Martin: 'Any old television sets would be appreciated.'

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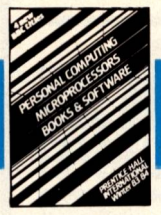

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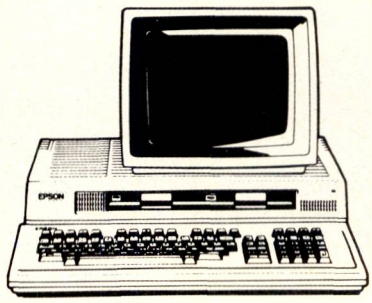

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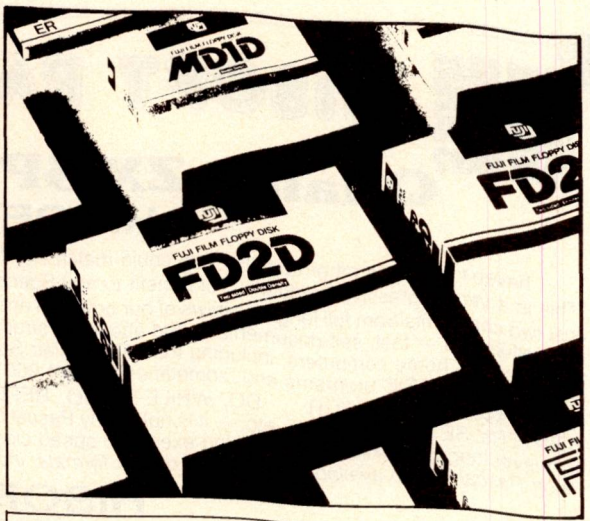

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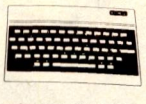

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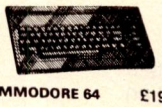

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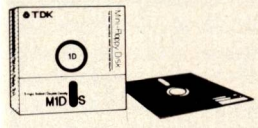

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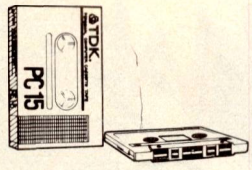

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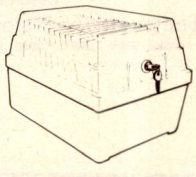

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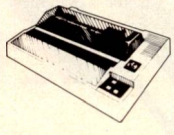

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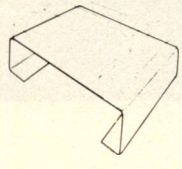

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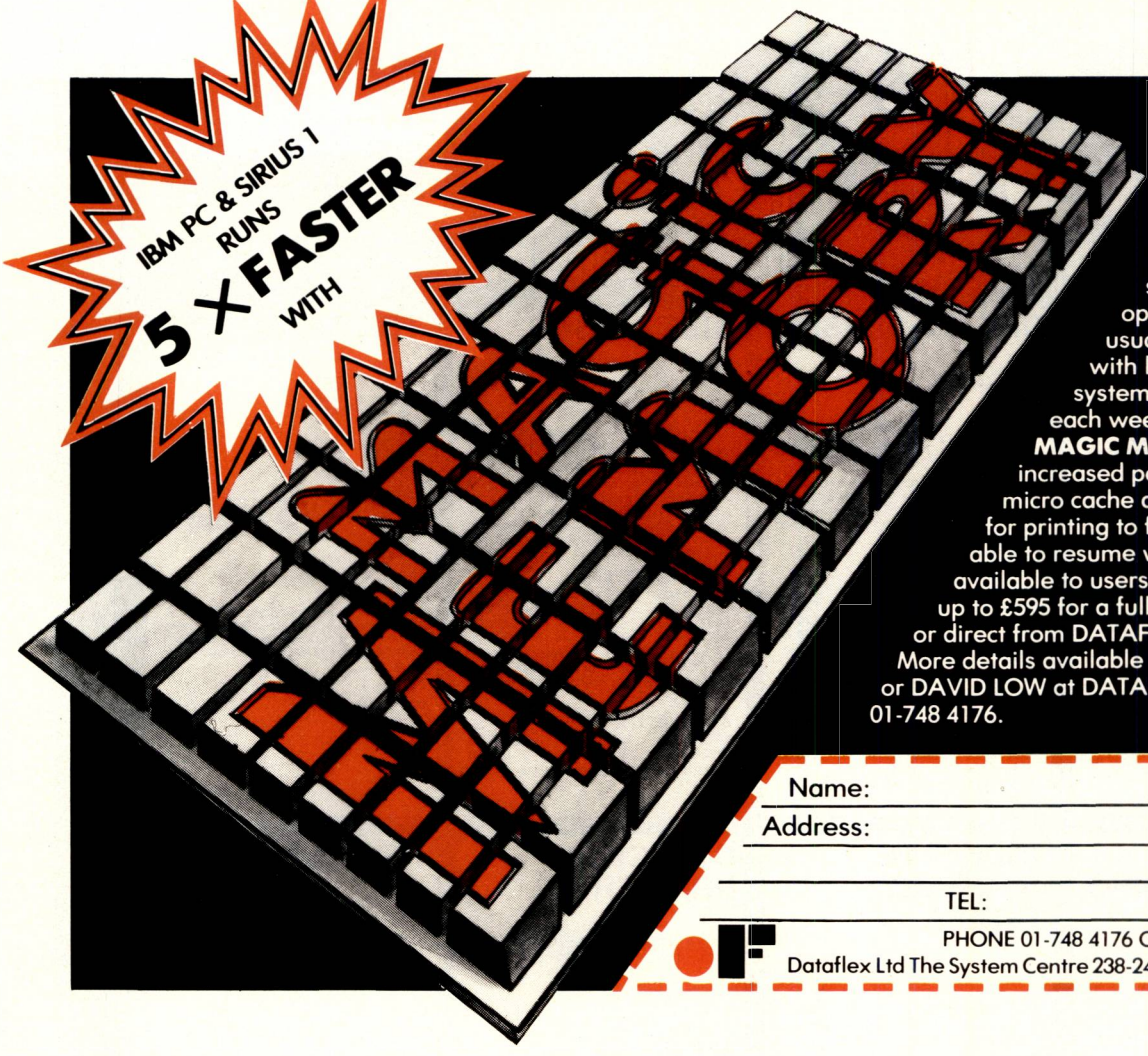

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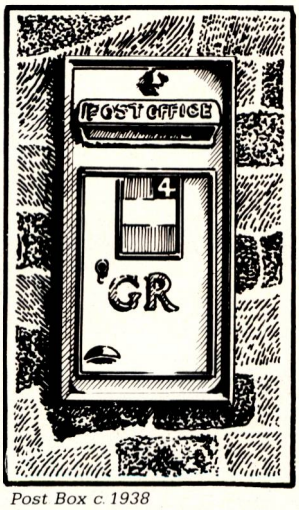

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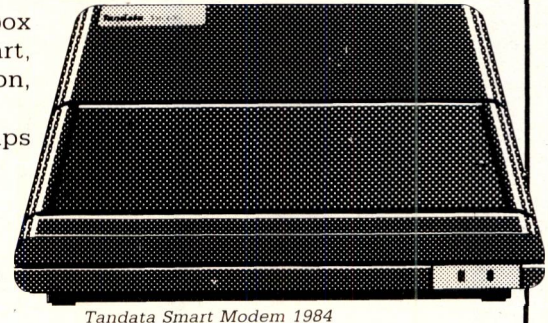

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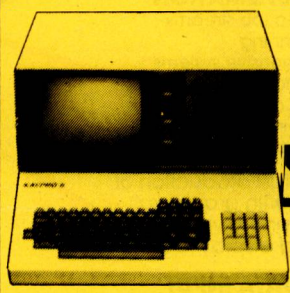

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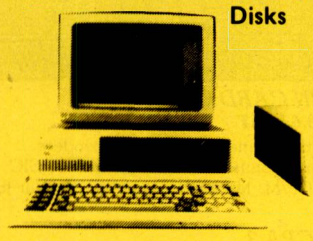

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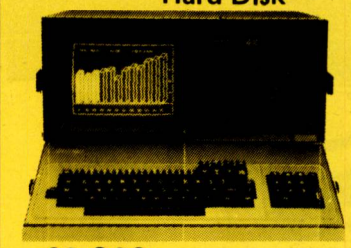

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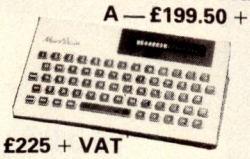

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In the early days of micros, the first spreadsheets appeared, using complicated cell co-ordinate references to define plans.

This made the most of limited computing power but plans were tricky to write, and difficult to read later.

Today's micros are much more sophisticated but all the spreadsheets are more or less the same as they always were. All that is, except PlannerCalc and MasterPlanner. Described in a recent university report as "... the best spreadsheet package currently on the Market," PlannerCalc and MasterPlanner are true business aids.

Dyed in the wool calc freaks won't like them but businessmen will.

NEW USERS START HERE

PlannerCalc at £85.00* is now accepted as the first choice for people new to financial planning.

Designed for 8-bit micros, it boasts the kind of features that you'd expect to pay twice as much for. (Buy PlannerCalc's nearest rival and you'll have to.)

Unlike all other 'calc' products it allows you to enter calculations in a language you understand. Plain English.

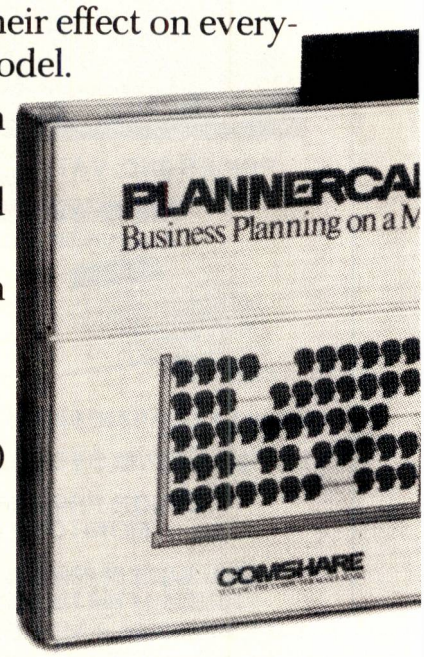
For example:

```
LINE 1  SALES=100, 150, 175, 210
LINE 2  EXPENSES=GROW 70 BY 15% FOR 4
LINE 3  NET=SALES-EXPENSES
LINE 4  CSALES=CUM SALES
COLUMN 5 YEAR=SUM OF COL 1 THRU COL 4
```

So it's much easier to use.

It uses the popular "spreadsheet" approach with a window that can be rolled in all directions.

Which means you can enter new figures and rules and immediately see their effect on everything else in the model.



It comes with the best manual on the market and it's suitable for most micros with a ™CP/M 2.2 operating system, 64K of memory, giving at least 900 cells, minimum screen width of 80 characters and 2 floppy disc drives.

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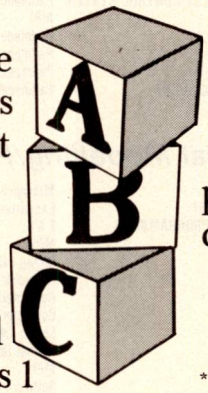

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DESPOOL	Digital Research	●			
DIAGNOSTICS II	Supersoft	●	●		
DISK DOCTOR	Supersoft	●	●		
DISKED-2	Slogger Software	●			
DISK-EDIT	Supersoft	●	●	●	●
DISKMAN	Slogger Software	●			
DISKORG	Slogger Software	●			
DISKTOOLS-1 (DISKMAN & DISKORG)	Slogger Software	●			
DISKTOOLS-2 (DISKTOOLS-1 & DISKED-2)	Slogger Software	●			
dUTIL (FOR DBASE-II)	Fox & Geller	●			
FILESHARE	Micro Focus	●	●		●
DEC RAINBOW SERVICE S/W:	Silicon Valley Corp.				
(1) Format/Verify Service			●		
(2) Autorun Service			●		
(3) Function Key Service			●		
SERVICE S/W VOL. 1 (1, 2 & 3)			●		
SYSTEM CHECKER	Supersoft	●			
THE OPERATING GUIDE	Decision Systems	●			
UTILITIES I	Supersoft	●			
UTILITIES II	Supersoft	●			

Sorting

		CP/M	CP/M-86	MS-DOS	PCDOS
MSORT	Microsoft	●		●	●
SUPERSORT	Micropro	●	●	●	●

Code Generators

		CP/M	CP/M-86	MS-DOS	PCDOS
AUTOCODE	Stemmos	●		●	●
FORMS-2	Micro Focus	●	●	●	●
QUICKCODE	Fox & Geller	●		●	●
SOURCEWRITER	Softwright	●	●	●	●
THE LAST ONE	D.J. 'A1' Systems	●	●	●	●
THE LAST ONE—COMPACT	D.J. 'A1' Systems	●	●	●	●

Telecommunications/Conversions

		CP/M	CP/M-86	MS-DOS	PCDOS
BACDEBIT	Comley	●			
BACSCOPY	Comley	●			
BSTAM	Byrom Software	●	●	●	●
BSTMS	Byrom Software	●			

Telecommunications Cont.

		CP/M	CP/M-86	MS-DOS	PCDOS
ICL CO3 EMULATION (Bulk)	Synchro Systems	●			
ICL CO3 EMULATION (Interactive)	Synchro Systems	●			
ICL CO3 EMULATION (Interactive & Bulk)	Synchro Systems	●			
REFORMATTER CP/M ↔ DEC	Microtech Exports	●			
REFORMATTER CP/M ↔ IBM	Microtech Exports	●	●		

Word Processing/Text Editing/Editors

		CP/M	CP/M-86	MS-DOS	PCDOS
CORRECTOR	Supersoft	●			
EDIT-80 V2.02	Microsoft	●			
MAILMERGE	Micropro	●	●	●	●
MEMOPLAN	Chang Labs	●	●		●
WORD	Microsoft				●
WORD WITH MOUSE	Microsoft				●
PARAGRAB	Focus	●			
PEDIT	Phoenix	●			
PMATE	Phoenix	●	●		
SPELLSTAR	Micropro	●	●	●	●
STARBURST	Micropro	●	●	●	●
STARINDEX	Micropro	●	●	●	●
WORDMASTER	Micropro	●			
WORDSTAR	Micropro	●	●	●	●
WORDSTAR PROFESSIONAL (WS+MM+SS+STAR INDEX)	Micropro	●	●	●	●

Databases/Data Management Systems

		CP/M	CP/M-86	MS-DOS	PCDOS
DATASTAR	Micropro	●	●	●	●
FRIDAY	Ashton Tate	●	●	●	●
dBASE-II	Ashton Tate	●	●	●	●
INFOSTAR	Micropro	●	●	●	●
REPORTSTAR	Micropro	●	●	●	●

Financial Accounting

		CP/M	CP/M-86	MS-DOS	PCDOS
INCOMPLETE RECORDS SYSTEM	MPI	●	●	●	●
NOMINAL LEDGER	Padmede	●		●	●
OPEN ITEM PURCHASE LEDGER	Padmede	●		●	●
OPEN ITEM SALES LEDGER	Padmede	●		●	●
PADMEDE BUSINESS CONTROL SYSTEM	Padmede	●		●	●
PAYROLL	MPI	●			
PURCHASE LEDGER	Padmede	●		●	●
SALES INVOICING	Padmede	●		●	●
SALES LEDGER	Padmede	●		●	●
TIME & COST RECORDING	Padmede	●		●	●

Financial Modelling/Problem Solving

		CP/M	CP/M-86	MS-DOS	PCDOS
CALCSTAR	Micropro	●	●	●	●
DECISION ANALYST	Executive Software	●	●	●	●
LINEAR & GOAL PROGRAMMING	E A S	●			
MATHSPACK	MPI	●		●	●
MICROPLAN	Chang Labs	●	●	●	●
MULTIPLAN	Microsoft	●		●	●
PLANTRAC 1	Computerline	●		●	●
PLANTRAC 1+	Computerline	●		●	●
PROFIT PLAN	Chang Labs	●		●	●
QSTAT	Pivotal Software	●			
STATSPACK	MPI	●		●	●
TK! SOLVER	Software Arts				●
TK! SOLVER PACKS					
FINANCIAL MANAGEMENT					●
MECH ENGINEERING					●

Business Applications

		CP/M	CP/M-86	MS-DOS	PCDOS
JOB COSTING	Heseltine	●	●	●	●
POLICY MASTER	CSA Micro Systems	●	●	●	●
PRINT ESTIMATION	Software Mgmt Systems	●		●	●
STOCK CONTROL	Padmede	●		●	●

Training Aids

		CP/M	CP/M-86	MS-DOS	PCDOS
CP/M TUTOR	Syntax Software	●			
KEYBOARD MASTER	Anthony Ashpitel	●	●		●
TYPING MASTER	Anthony Ashpitel	●	●		●

Graphics

		CP/M	CP/M-86	MS-DOS	PCDOS
dGRAPH	Fox & Geller	●		●	●
STATSGRAPH	Supersoft	●			

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  PASCAL
  BASIC
  COBOL
  ASSEMBLER

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* *Input to Plink-86 can be free-format and multi-line.*

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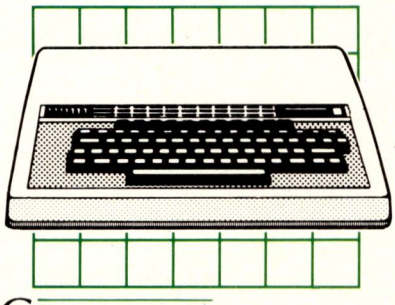

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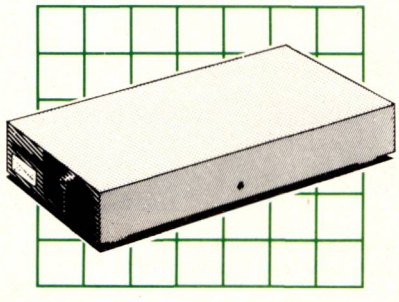

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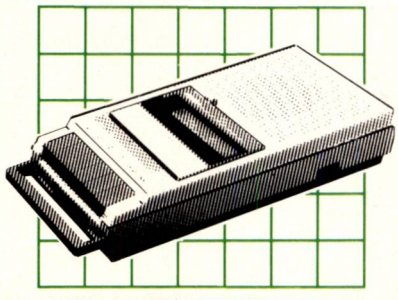

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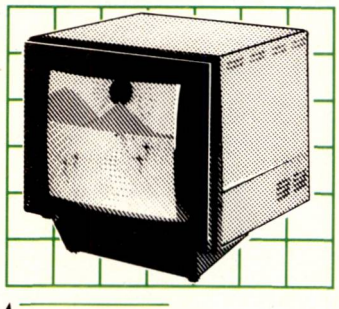
BBC DATA RECORDERS – complete with lead for connection to BBC computer
BUSH CASSETTE RECORDERS



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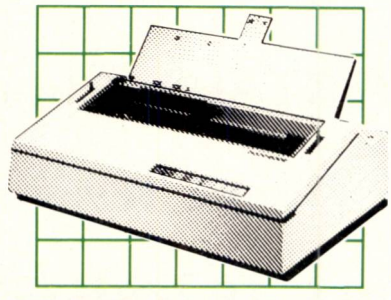

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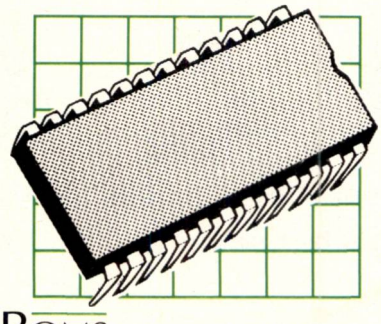

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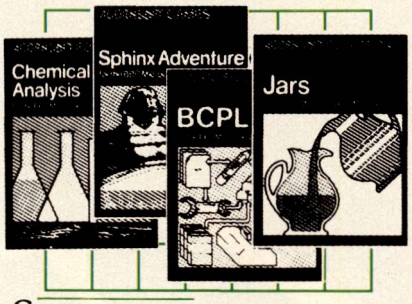

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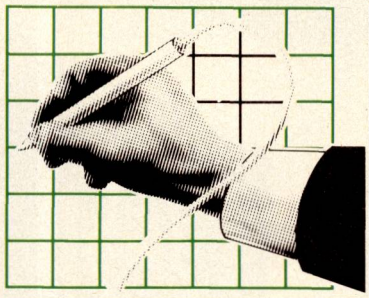

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TELETEXT ADAPTOR – for BBC computer
MODEM 1000 – for Prestel, Viewdata, etc.
MODEM 2000 – Duplex version
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VTX 500 SPECTRUM COUPLER
RH ELECTRONICS LIGHT PEN
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ATPL EProm Eraser
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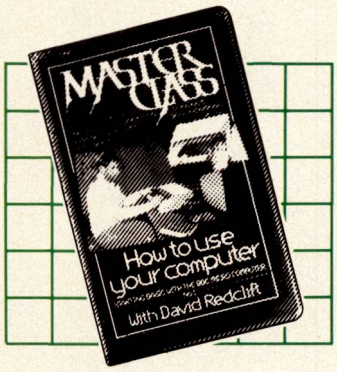

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VISION 80

Simply the most versatile 80 column card available for the Apple II+/IIe. Its 9x11 character set matrix is the largest and sharpest available, giving a crisp clean display. On-board communications software allows the Apple to act as a terminal with a wide range of databases and a number of different machines, including Apple to Apple communications.

- Character dot matrix is 9 x 11 which provides three lines of dots for full descenders on lower case letters. The full ASCII set of 128 characters is provided.
- Shift key does what you would expect it to do, and also has a shift lock facility and a visual LED shift lock indicator.
- Character set also includes twelve additional keys not normally available on the Apple keyboard.
- This card includes a built in softswitch ie no cable changes necessary when switching between 40/80 columns and graphics.
- The built in communications software driver gives your Apple the ability to be used as a true interactive intelligent terminal to mainframe computers or communications facilities. Fully compatible with CCS serial cards and Apple communication cards etc.
- The Vision 80 typeface is of an attractive appearance and is highly legible due to its large 9 x 11 character font.
- It supports all Applesoft commands including the text Window ie Home, Text, GR, HGR, HGR 2, Tab etc. It has inverse and normal display ie Highlight and Lowlight in CP/M and Pascal.
- It is possible to change the cursor character to either a block cursor or an underscore cursor. The speed of cursor blink can be altered and it is also possible to re-define the character set with your own personalised font.
- The card comes complete with demonstration utilities disc and is simple to install. It also includes a comprehensive users manual.
- For use with Apple II+, IIe. Supports DOS, Pascal and CP/M Software.

£185 + VAT

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The Vision 128/256 Ramcard is an inexpensive means of providing up to 256 Kilobytes of additional RAM main storage for the Apple II, II+, IIe. The card can be used as a fast scratchpad, supplementing the local storage of data arrays for application programs that can utilise this facility directly (eg. Visicalc etc), alternatively with appropriate utility software support, the card can be 'masked' to appear as a fast disc storage unit.
The Vision memory expansion is available as a basic 128K card which can be upgraded to 256K RAM as required. The card, which is fully compatible with the Vision 80, is fully buffered allowing lower power consumption and giving greater reliability. The card also features 6 L.E.D. indicators to indicate the current bank selected and read/write enabled.

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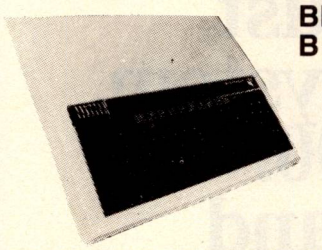

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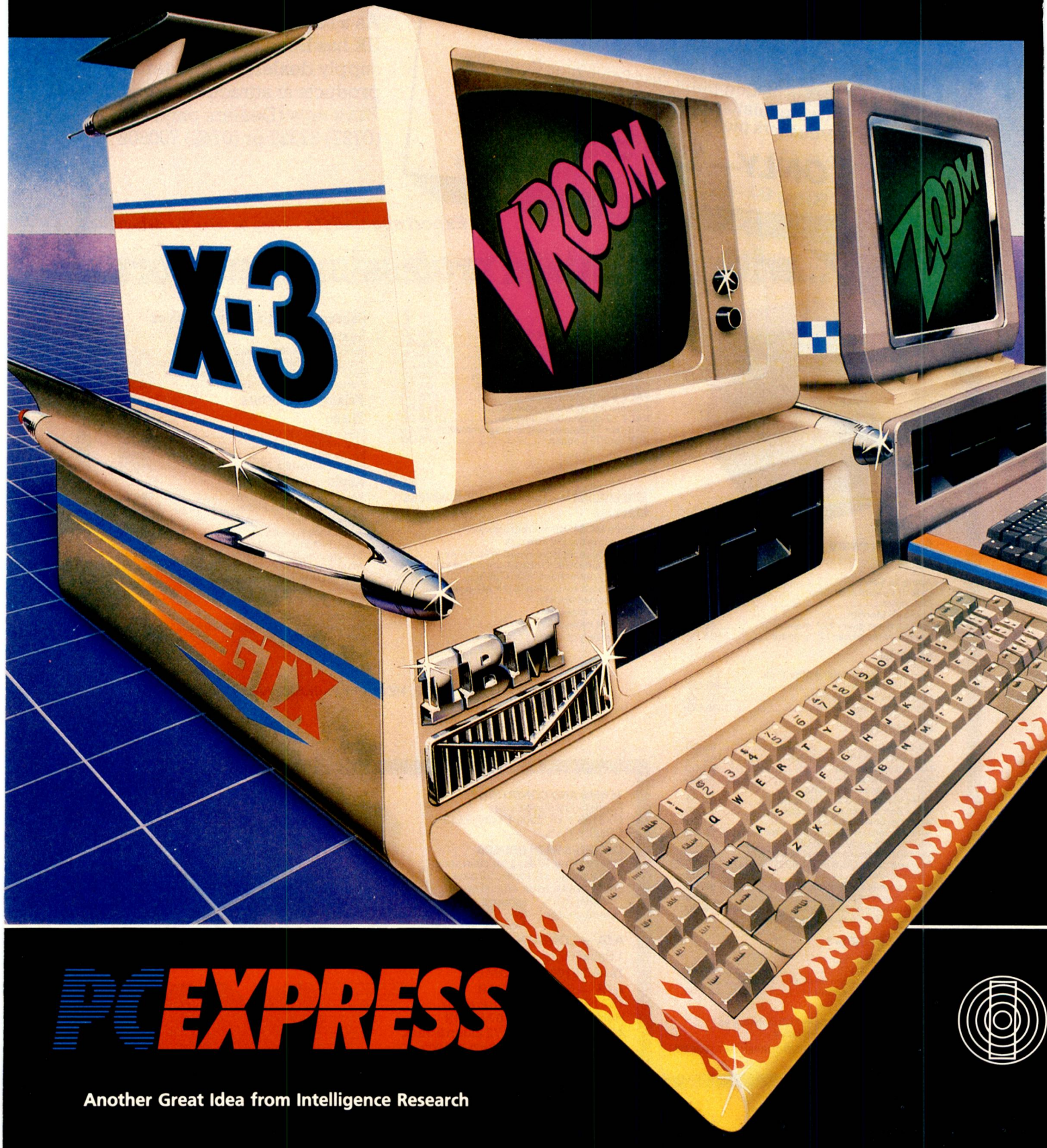

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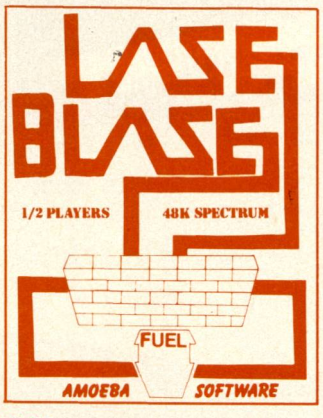

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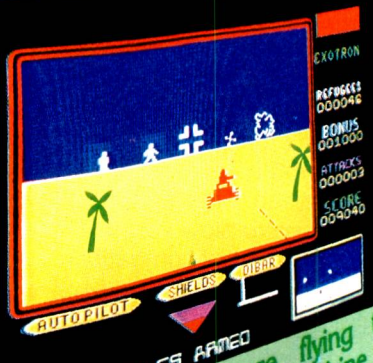

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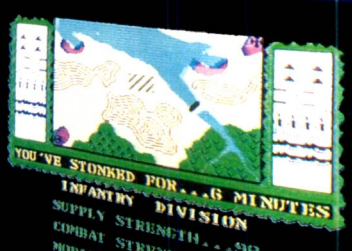

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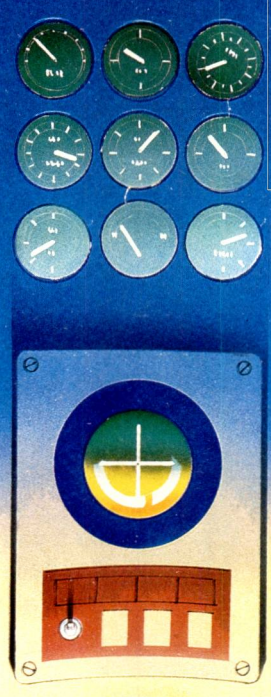



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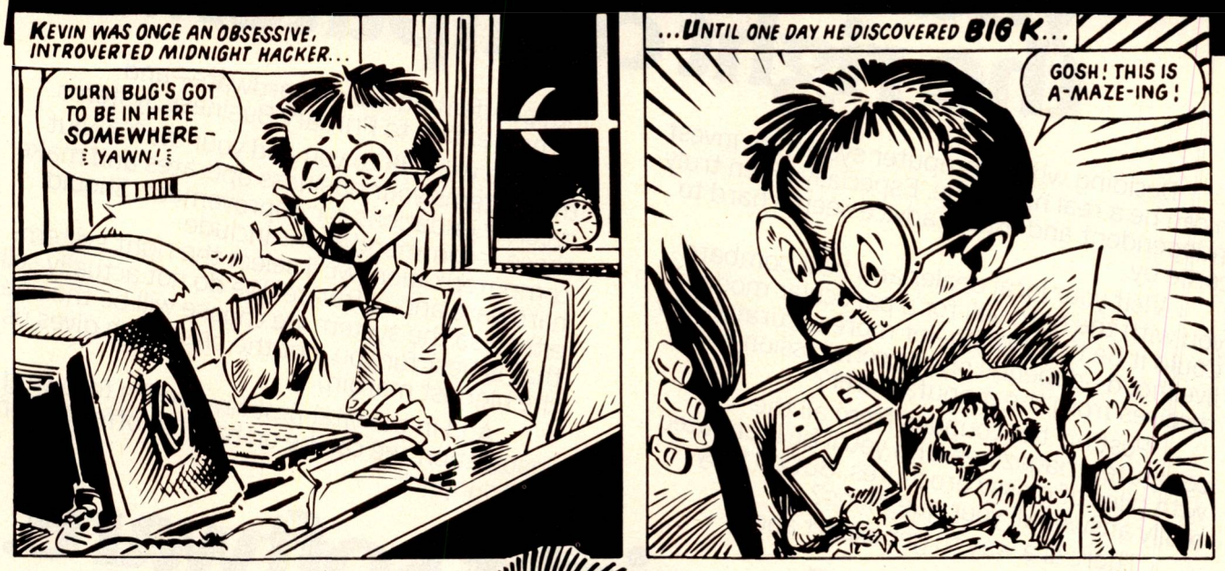





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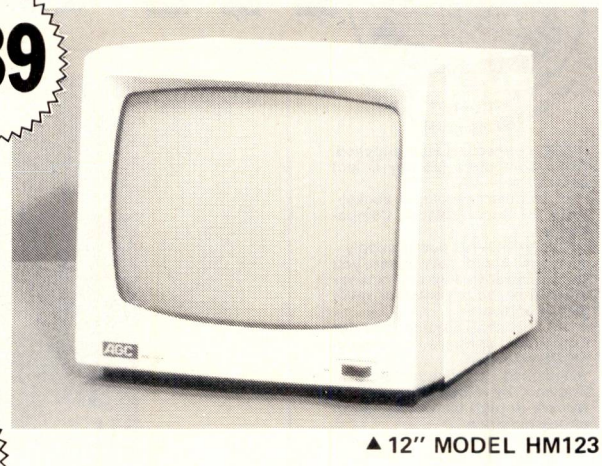

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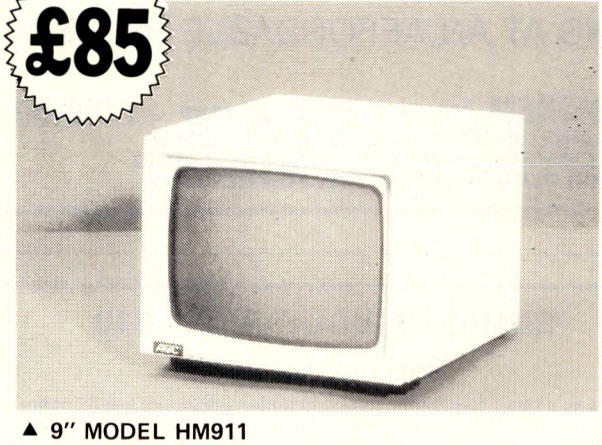

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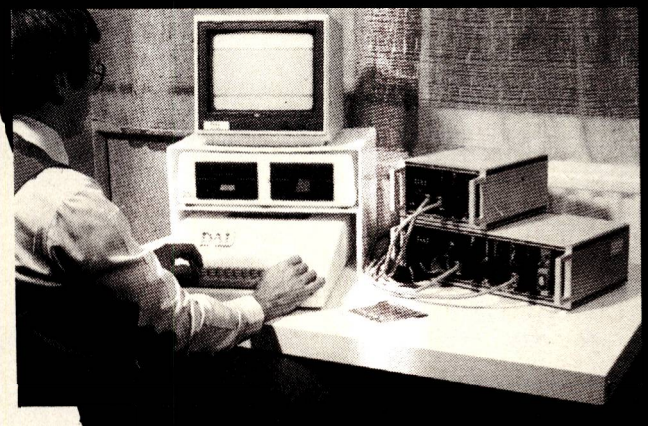

DAI lives on

Thanks for mentioning the DAI personal computer on page 238 of your December issue. However, you say it's no longer available. It is! Anyone interested should contact Data Applications, 16b Dyer St, Cirencester, or myself.

D Atherton, 16 Douglas St, Atherton, Manchester

PCW FEB.84

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Brother EP44

The Brother EP44 is an electronic typewriter, text editor, computer printer, calculator and serial terminal all in one. At under £300, Surya wondered whether it was all too good to be true.



Photographs by Crispin Thomas

When I saw the Brother EP22, I thought it looked rather impressive. It was an electronic typewriter with a 15-character 'type-ahead' buffer, and it had an RS232 interface to enable it to be used as a computer printer. It could also store up to 4k of text in RAM for printing later, enabling it to be used as a simple portable text editor. Being cheap (£220), compact and battery-operated it seemed like a useful idea, and I made a mental note to take a closer look at one.

As things turned out, this didn't happen until the 1984 Which Computer? Show, by which time Brother had produced a new model: the EP44. The EP44 does everything the EP22 does, except that the 44 is capable of transmitting data through the RS232 port as well as receiving it. In addition to being a typewriter, printer, text editor and calculator, it can also be used as a serial terminal. And the price? It retails at £253.

Hardware

The 44 has a non-impact, dot-matrix print mechanism capable of use with a ribbon onto normal paper, or without a ribbon onto thermal paper. If a 'non-impact', dot-matrix printer sounds like a contradiction in terms, it's not. The ribbon is 'burnt' onto the paper rather than hammered through a ribbon, as is usual with dot-matrix printers. The display is a 15-character LCD window, adjustable for viewing from different angles.

The lid covering the keyboard and display simply lifts off, revealing a full-sized, standard, qwerty/type keyboard with two shift keys, a shift lock (not a caps lock) and a full-sized space bar. There is also a key marked '2nd shift': this gives access to an alternative character set comprising a varied assortment of accents, foreign letters, currency and mathematical symbols.

The EP44 is attempting to perform three different tasks. Firstly, it's a straightforward portable typewriter. Secondly, it operates as a computer printer and thirdly, it can be used as a dumb terminal.

Typewriter

The EP44 comes complete with an instruction manual, a connections guide book, two packs of paper, a sheet illustrating the correct way to insert the ribbon cartridge and — a welcome surprise — a set of batteries. Since the 44 can use a ribbon or print without one, Brother supplies both thermal and ordinary glossy paper.

The first time you use the machine, you will have to insert the batteries and ribbon cartridge. Thereafter, all you have to do is remove the lid, switch on and feed in a sheet of paper.

Typewriters fall into three classes: manual, electric and electronic. The difference between the last two is that an electric typewriter is a mechanical machine using an electromagnet to strike the paper. An electronic typewriter, in contrast, is capable of simple formatting, storing small amounts of often-typed text (perhaps your address) and will normally have a 'type-ahead' buffer. The Brother EP44 is electronic, and offers some features normally reserved for large desk-top typewriters.

To use the machine as a standard typewriter, the three-position switch labelled 'NP CP DP' is set to DP (Direct Print). Everything you type is then immediately printed, the characters being simultaneously displayed on the 15-character LCD screen (the LCD screen is needed since the print head obscures the last few characters typed).

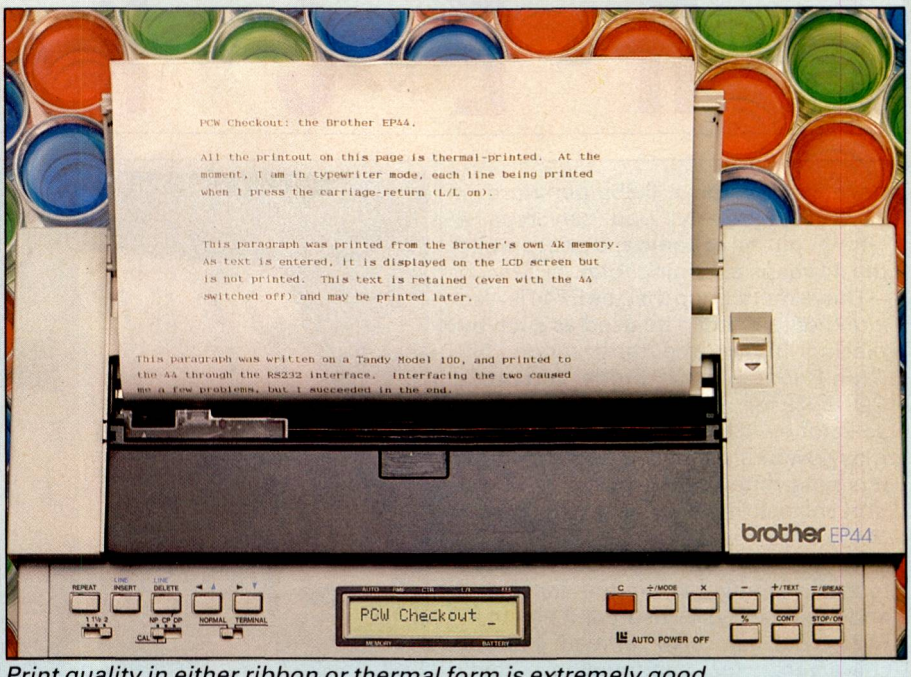
In this mode, the only clever thing the 44 does is to perform carriage-returns automatically by detecting the right hand margin and waiting for the next space. When you type the space, it does a carriage-return instead. This is useful for people like me who get so engrossed in what they're writing that they forget to hit the carriage-return, in spite of warning bells or bleeps. The feature is toggled on and off by holding down the blue 'CODE' key and pressing '4'.

The margin setting on the 44 allows you to exceed the right hand margin by six characters. If you need to go any further, you have to press the margin-release key. The six-character limit made me aware of just how many seven letter words there are in the English language!

In direct print mode, there is no method of correcting characters other than the old Tipp-Ex and backspace routine. The Brother therefore supports a correct-before-printing (CP) mode.

In CP mode, the characters appear on the LCD display as they are typed but are not printed on the paper until 15 characters later.

When you type 'The quick brown fox', the letter 'T' is printed as you type the space after 'brown', enabling you to correct any immediately obvious errors (spelling mistakes) before they are printed. This is called a 'type-ahead' system, since you are typing 15 characters ahead of the typewriter.



Print quality in either ribbon or thermal form is extremely good

The editing facilities offered in CP mode are impressive. As well as the obvious destructive backspace, you can go back and delete forwards, overtype and insert. Let's suppose that you were writing a letter to Mr Smith and had just typed 'Further to our conversation this morning'. You would then decide that Mr Smith might not remember the conversation without prompting, and might want to rewrite the opening to read 'Further to our conversation about the EP44 this morning'. To do this, the cursor-left key is used to move the cursor to the 't' of 'this' and the 'INSERT' key is pressed. The cursor changes shape as a visual reminder that you are in insert mode and you can type in the additional text. When this is done, you press 'INSERT' once more to switch it off and use cursor-right to return to your previous position. The delete function works in a similar way.

Although the 15-character type-ahead buffer is useful, the text to be correct will often be more than 15 characters back. For this reason, there is a 'line-by-line' (L/L) print option in CP mode, which is toggled on and off by CODE-7. With the L/L facility on, the 44 does not begin printing until you reach the end of the line and you (or the 44, if the automatic carriage-return option is on) press the carriage-return. Until then, you can edit anything on the current line, giving you a type-ahead buffer of anything up to 80 characters (the maximum column width).

Other facilities available in CP mode are 'right-margin flush' (RMF) toggled by CODE-5, and centred (CTR) toggled by CODE-6. With RMF on, the text is printed flush with the right-hand margin instead of the left. With CTR on, the current line is centred midway between the two margins. RMF is useful for printing your address at the top of a letter, and centred text good for headings.

One of the continual problems of business correspondence is the need to keep copies of almost everything. With the 44, this is a problem no more. The machine has 4k of RAM built in and can store a three page letter in memory as it's typed. To do this, you simply press CODE-N for New text. Everything typed after this (or rather up to 4k's worth) will be stored in RAM as well as printed. When you have finished the letter, remove the printed letter, insert a fresh piece of paper and press CODE-P to Print the contents of RAM — an instant copy. You can repeat this process when required if several copies are needed.

The 44 has a built-in calculator. Its typewriter keyboard has all the standard mathematical functions but there is a special keypad at the top right hand corner with +,−,/,×,% and = signs. If you use the keypad when typing a line such as '25+25+50+100', the Brother will calculate and print the result when you press the equal key. If you want to print these functions without performing a calculation, you use the standard typewriter keys instead of the calculator keypad.

The calculator is more intelligent than I first realised. As well as inserting carriage-returns in between figures without affecting the calculation, it will also insert text. Any non-numeric characters typed in the middle of a calculation are printed by the typewriter but ignored by the calculator. This means you can enter 3500 words × 0.85p per word = 2975 (the total was printed by the Brother when I pressed the equal key). After using cursor-left to insert a pound sign and decimal point, you then

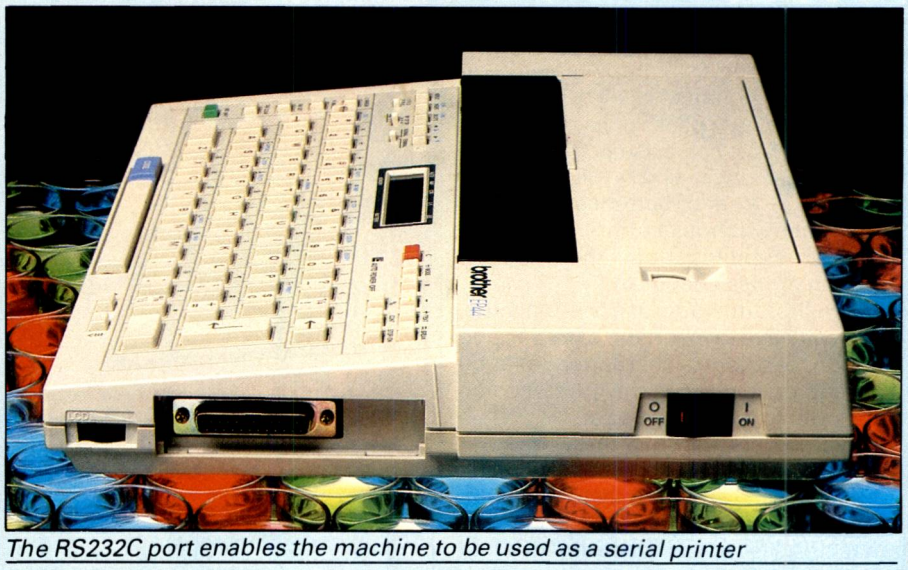
have 3500 words × 0.85p per word = £279.50. Similarly, you can type a whole column of items and prices while the 44 keeps a running total.

I have mentioned that the EP44 is also a text editor. It can be used as such by placing it into the third mode, NP (Non-Printing). In NP mode, you press CODE-IN for new text and move the selector switch to NP. Up to 4k of text may now be entered and stored in RAM. It is not printed as it is entered, so you don't need to have paper in the machine at the time.

You can use the cursor-control keys to move to any point in the document and then overtype, insert and delete at will. You can also embed control characters for underlining, text-formatting, subscript and superscript, and print-pause.

If you embed a CODE-S (Stop print) in the text, the printer will pause at that point, allow you to insert text if required, and then carry on when the CONTinue key is pressed. This allows personalised form letters to be produced — simply leave the name and perhaps an individual greeting line blank, insert a CODE-S and enter the desired text when the printer pauses.

Of course, you cannot compare the limited editing facilities of the 44 with a microcomputer-based word processor. The Brother has three major limits. Firstly, 4k is only 800 words: while this is perfectly adequate for most business correspondence, it is obviously of no use for anything longer than a letter. Secondly, the 15-character 'window' is less than ideal when it comes to locating a specific piece of text. Thirdly, the nicad backup battery can only retain text for an hour when the machine is switched off.



The RS232C port enables the machine to be used as a serial printer

Printer

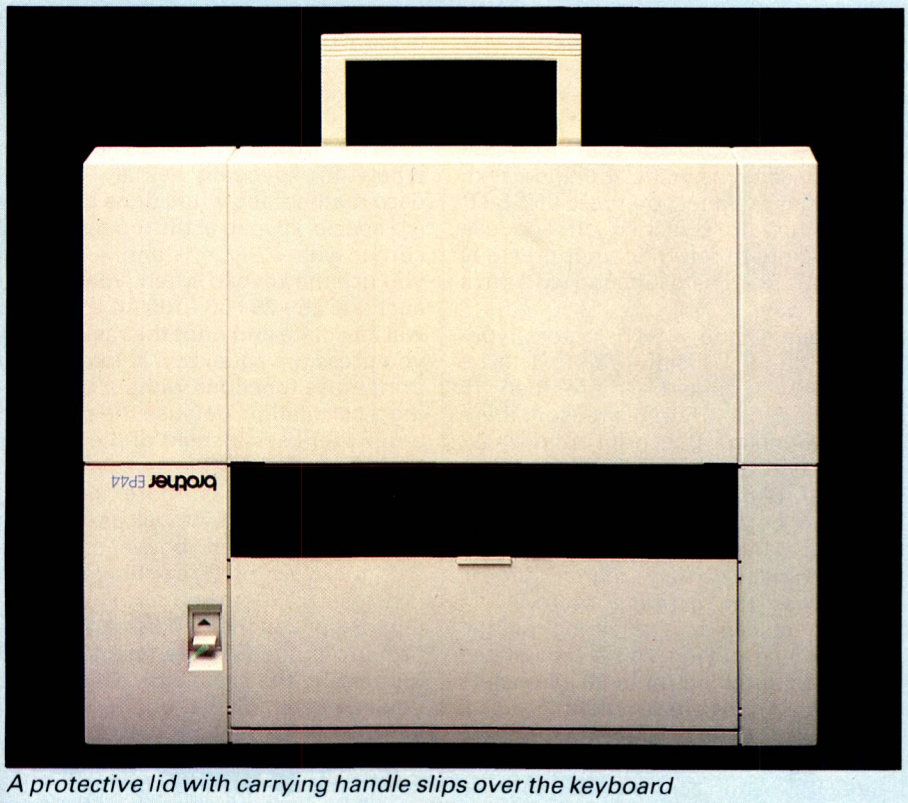
The 44 has an RS232C port to enable it to be used as a serial printer. You also need a custom-wired RS232 cable costing £20-30 from a good computer dealer. Brother supplies a connecting applications guide which details the necessary wiring details and communications protocols for the Apple II, Atari, Commodore 64/VIC 20, TI-99/4A, TRS-80 Model 100, Epson HX-20, NEC PC-8201 and 8801, Sharp PC1500 and the Sord M223 Mk III. It can be used with other computers provided they support serial access, but I suggest you talk to Brother's technical support department if your machine is not listed. I tested it as a printer using a Model 100.

The EP44 is attractive to users of 'lap-held' computers since the printer is as portable as the computer. Easily carried and running on batteries, it frees portable users from the need to return to their home/office in order to print a file or get a hardcopy listing of a program. Perhaps the people who would benefit most from this are travelling sales representatives. It's impressive to be able to dial your office from the customer's home or office and obtain latest prices, place orders and so on — but it's much more impressive to be able to produce a neat printout on the spot for the customer to keep. Lugging your average office printer around the country is no joke, so the 44 will fill this need nicely.

The print quality in either ribbon or thermal form is extremely good: there is very little difference between the two. In thermal form, of course, you need to use thermal paper. This is relatively expensive (£4.88 per 100 sheets) and the pack supplied with the machine is single-sheet rather than continuous form-feed stationery. This is of little consequence when the 44 is used as a typewriter, but single sheets are inconvenient when using the machine as a computer printer. Roll paper is also available, and is suitable for listings.

The way in which the 'paper-end' detector works makes it easier to use single sheets than it is on some printers.

Once you have the necessary cable, the 'NORMAL/TERMINAL' switch should be set to terminal. The message



A protective lid with carrying handle slips over the keyboard

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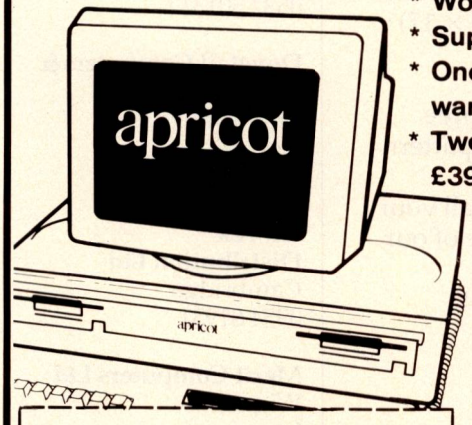

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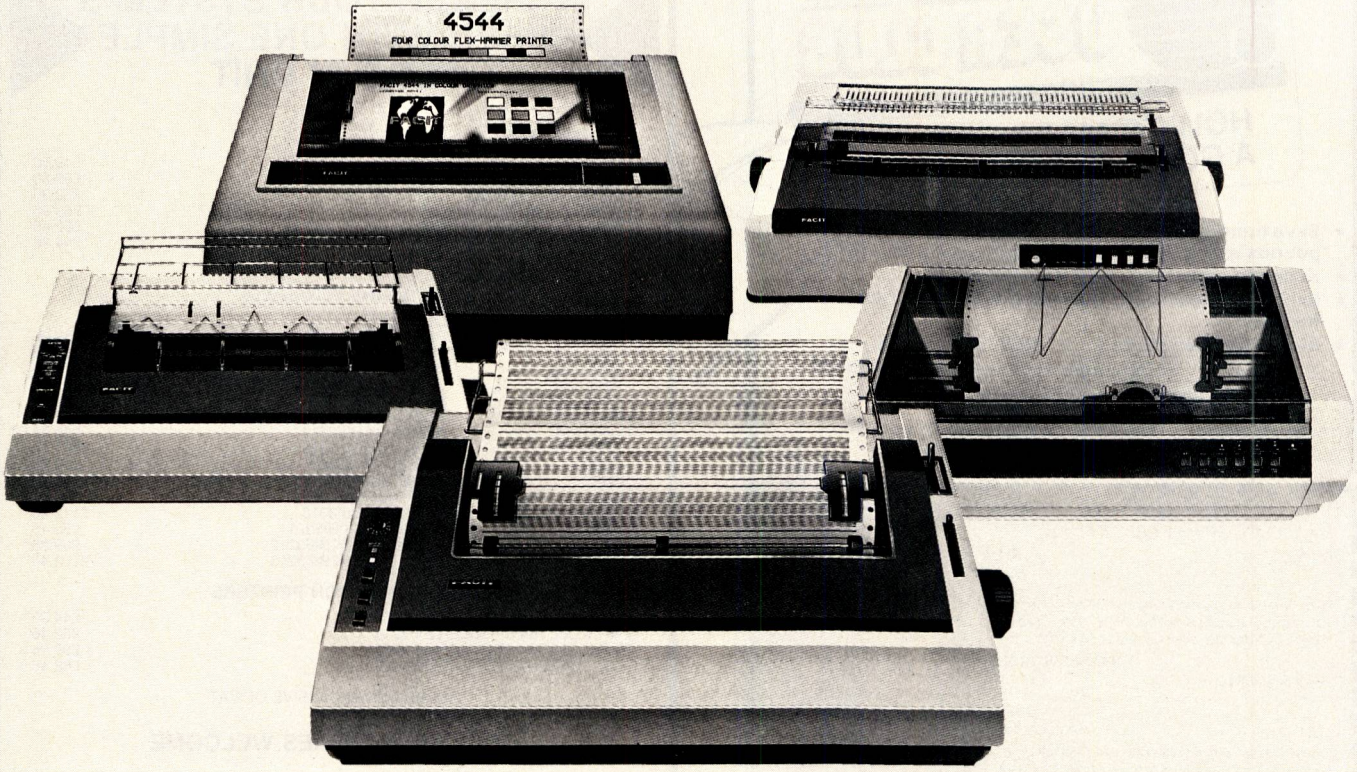

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'OFF LINE' appears on the display. Pressing the 'MODE' key allows you to configure the Brother to whatever communications protocols your machine prefers. The default protocols are 300-baud, 8-data bits, no parity, carriage-return and line-feed on receipt of CHR$(13), XON. These are easily-changed, however.

The applications guide recommends 300-baud for use with a Model 100; when I tried this, the 44 could not quite keep up — it missed characters occasionally. But occasional or not, missed characters are unacceptable even for rough text printouts, and can cause real headaches when generating hardcopy program listings. I switched to 110-baud which worked perfectly. When I informed Brother of the problem, it suggested that low batteries might be the problem — the 44 needs more power as a printer than as a typewriter, and the 'battery-low' indicator on the review model was set for typewriter mode (this problem has now been corrected). I tried again at 300-baud with new batteries, but found the 300-baud transfer only worked with new batteries. A mains adaptor would be a good idea when using the 44 inside, but doesn't help when printing files away from a mains power supply. 110-baud, though, is acceptable on these occasions.

Resetting the Brother's communications protocols is straightforward. The MODE key is used to advance to the next parameter, while the CR key steps through the available settings.

The 44 allows single, one-and-a-half or double line spacing to be hardware set, but the left and right margins must be software set when in terminal mode. Since the Model 100 TEXT program does not allow margins to be set, it is necessary to direct text output through some form of formatting program when using this or the NEC.

When the 44's 'paper-end' switch is triggered, printing is suspended and the message '# PAPER EMPTY' appears on the LCD display. If you press the CONT key at this point the next line will be printed, and printing will halt again with the same message. This allows you to finish printing the current paragraph before inserting a new sheet. Once the new sheet has been inserted, simply press CONT to continue printing.

Any single sheet printer is inconvenient for anything longer than two or three pages, so it's possible to use roll rather than sheet paper. This is particularly suitable for program listings which do not normally need to be 'paged'. A roll holder is available for £6, and roll paper — thermal or ribbon — is slightly cheaper than sheet.

Wherever special paper is required, the price of the paper is an important factor to be taken into consideration: there's little point in buying a cheap printer if you can't afford to buy paper for it! So far as the Brother is concerned, the paper is not cheap but neither will it break the bank. Plain paper costs £2.25 per 100 sheets, or £2.87 for a roll (equivalent to 107 sheets). 40,000-character ribbons cost £1.75. Thermal paper is more expensive at £4.88 per 100 sheets, £4.02 per roll — rather pricey for rough listings. I found that ribbon printing gives readable copy on ordinary Bond paper, though the quality is not suitable for letters. This is another reason why the 44 will not be at home in an office — it doesn't give correspondence quality on standard letter-headed paper.

Terminal

With a 15-character display and/or printout, nobody is going to buy the EP44 as a terminal, but if you've bought the machine as a typewriter/printer, the ability of the machine to double as a dumb terminal is a great bonus.

I logged onto a couple of bulletin boards using the EP44 as a terminal. Waiting for the printer to catch up with the incoming data was slightly irritating, but it worked perfectly. I took great pleasure in leaving a message informing the Sysop of one board that I was logged onto his board with a typewriter . . .

I wrote part of this review on the EP44 in non-print mode and uploaded it later to a Model 100: this gave me a chance to test both text-editing and uploading. I quickly discovered that 4k of text is something less than 20 minutes writing, and it's difficult to edit a document with only a 15-character window. But by printing out sections and editing from the hardcopy, it was workable.

The piece of text in question was well-travelled by the time it reached the printed page. It started life at home on the EP44, was uploaded to a Model 100 in Hyde Park (well, the sun was out!), and was then further uploaded at the *PCW* office (after editing) to a Torch Diskpack where it took its rightful place in this review.

One of the main uses I found for the machine's terminal capabilities was in recovering hardcopy of messages left for me on bulletin boards. This is easier than the process of downloading the message to RAM or disk, and then printing the file to a printer later. The Brother functioned perfectly on TBBS and CBBS boards, as well as Prestel and Telecom Gold.

Prices

	£
Brother EP44	253.00
Optional soft carrying-case	30.00
Optional roll-paper holder	5.95
40,000-character ribbon	1.75
100 sheets of thermal paper	4.88
100 sheets of standard paper	2.25
Roll of thermal paper (107 sheets)	4.00
Roll of standard paper (107 sheets)	2.87

All prices include VAT. Available from WH Smith, Boots and other large department stores. Brother can be contacted on (061) 330 6531.

Conclusions

The Brother EP44 shows great promise. As a typewriter alone, it is expensive but offers very sophisticated features. Its size and weight enables it to be transported easily. Although the editing facilities cannot be compared to a microcomputer-based word processor, the 44 is a quantum leap from an ordinary electronic typewriter.

As a printer, it's aimed pretty squarely at the home rather than the business market: the lack of form-fed stationery alone makes it unsuitable for most business applications. As a home printer, it is cheap, produces high quality output and is compact. As a companion to a portable computer, its size and battery-power make it ideal. The communications protocols may be a little daunting to an inexperienced user but these will be quickly learnt, and most users will keep them on one setting. The fact that the printer is very quiet in operation may also be important to all-night hackers — an ordinary dot-matrix printer can sound positively deafening at 3am!

I wouldn't expect anyone to buy the machine primarily as a terminal, but it's a worthwhile bonus to anyone needing a typewriter and/or printer.

Brother has packed a lot of features into a very compact machine at an equally compact price.

END

Technical data

Electronic thermal/ribbon printer/typewriter
Built-in text editor
4k RAM text buffer
2-way RS232 interface
Selectable communications protocols with dumb terminal capability

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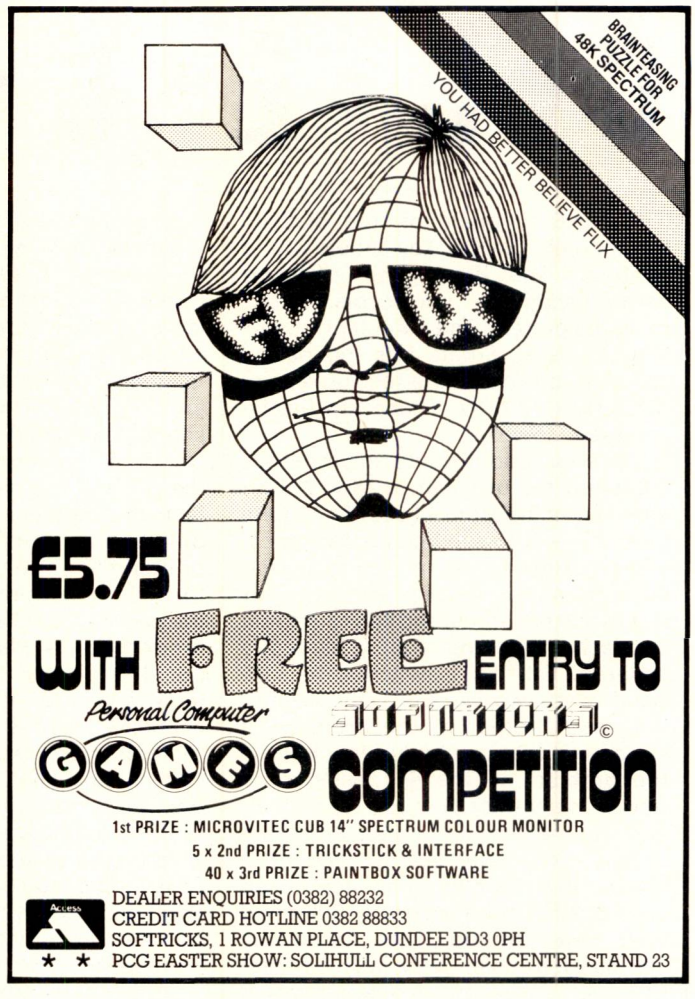

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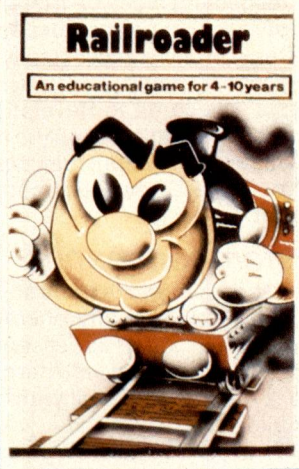

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Revelation

Peter Bright assesses Revelation, a sophisticated database and applications generator utilising a Pick-like operating system. This easy to use but expensive system may well find its niche in the medium-sized business market.

The advent of 16- and 32-bit micros has opened the door to minicomputer software on small machines. The most obvious example is the use of Unix on the new breed of 'supermicros'. Another is Pick which is an operating system/database manager. It is usually found on multi-user systems but I've been testing an implementation on the IBM PC.

Called Revelation, a complete Pick-like operating environment with database, it was designed by Cosmos Inc in the USA. It is imported into this country by Doncaster-based Interactive Data Machines ('IDM').

Pick was conceived back in the 1960s by Dick Pick, and its major selling points are that it provides some very powerful database management tools and is easy to use.

In use

To run Revelation you need an IBM PC XT with a 10Mbyte hard disk, at least 500k of RAM and an Intel 8087 maths co-processor chip — that little lot adds up to quite a hefty system. The pairing of the IBM's 8088 main processor with the additional 8087 maths co-processor greatly enhances the computing power of the IBM PC, especially in the case of floating point arithmetic. This combination is known as the iAPX88/20.

IDM will supply the 8087 as part of its Revelation package — you just plug it into the socket next to the main 8088 processor. The only points to watch are that you don't bend any pins and that you remember to plug the chip in the right way round.

The software is equally straightforward to install. It is supplied on two floppy disks which are copied onto the hard disk. If your IBM is running version 2 of PC-DOS you will also need to create a new directory.

Revelation can be called from PC-DOS simply by typing "REV". This produces the main copyright screen which gives dire warnings about software theft, promising a reward of $500 for the successful prosecution of 'violators'. This is strange when you consider that the system isn't copy protected. The only protection is that each copy has a serial number matching a little stick-on label which is fixed to the machine. If the numbers don't match then the software must have been stolen.

In order to perform any useful tasks you must tell the system which user account you wish to work on (an account is a way of grouping files together). For example, each user can have his own account or there may be a different account for each application. Accounts can also be password protected, in which case you'll need to enter the account name followed by the password: you have three attempts at getting the password right. Absolute beginners use an account called SYSPROG, containing tutorial files for use with the user manual.

New accounts can be created by using the 'CREATE-ACCOUNT' command followed by the new account name.

The first time I tried to enter 'SYSPROG' the machine wouldn't accept the input, because I typed it in lower case and the machine was looking for upper case. This is a dead giveaway that the system hails from unfriendly minis. No self-respecting piece of 'friendly' micro software would be case-dependent.

After you have successfully entered the account name, the machine displays a 'Welcome to Revelation' message and then attaches all the files used by your account. It will then display a ':' — the standard Revelation control level prompt.

System commands

Revelation has all the tools and utilities normally found on any operating system. Some, such as essential disk utilities, are not dealt with here because of lack of space. I'll deal with the Basic compiler later.

COPY. This does all the normal file copying. It also copies files between Revelation and PC-DOS formats (very useful when you're trying to bring over old PC files).

CREATE-FILE. Unlike most other micro operating systems, Revelation applications won't open their own new files. Before you start you must create the file by typing CREATE FILE followed by the filename, followed by an estimate of the number and average size of the records it will contain.

PC and EXIT. These utilities allow you to call PC-DOS commands. Typing 'PC' will take you back to the PC-DOS command line complete with the 'A' prompt. You can then execute PC-DOS commands, and to re-enter REVELATION you simply type 'EXIT' to get back in the REVELATION command mode.

EXECUTE and RETURN. The EXECUTE command allows you to suspend what you're currently doing, do something else, and then come back and carry on where you left off by using the RETURN command. This is useful if you forget a vital piece of information when half way through editing a Basic file.

File and database structure

One of the major advantages claimed for Revelation is that it supports variable length records. In general, micros can only support fixed length records where a fixed amount of file space is allocated for each record. The problem with this approach is that when you are allocating the space you must budget for the longest possible record even if the majority will only be half as long. The result is a great deal of wasted disk space. The advantage is that fixed length records are very easy and quick to manipulate.

Variable length records only take up the amount of space needed by each data element. Different data elements are separated by special characters so that the machine can tell where one ends and the next begins. It makes much more efficient use of disk space but is difficult (and slow) to manipulate. One of the reasons for the addition of the 8087 is to speed up calculations for disk access.

Disk access efficiency is further enhanced by the use of cache memory: up to the last nine frames that have been read off the disk can be stored in RAM. It reduces the number of disk reads because it's likely that the information required will be in RAM. As RAM access speed is much faster even than a hard disk, the response time of the machine is faster. The amount of RAM available



Illustration by Geoff Kelly

for cache memory varies according to the other current demands.

Revelation also uses a hashing algorithm which allows direct record accessing to increase disk access speed. The combination of the two makes for a fast system.

Revelation has three key parts geared to database management/applications design: R/Design, a database builder; R/List, which interrogates the database; and R/Basic, which is a version of Basic geared to database management.

R/Design

R/Design is made up of ten different functions covering all aspects of database creation. All the options are presented in menu format.

DEF: the first stage in creating a new database. All it does is create the datafile. Input takes the form of a filename followed by a 'Q pointer' which allows synonyms to be set up for the datafile. You also input the name of the file owner and the approximate number of records and fields which are to be retained by the file. The system will be quite happy with a rough approximation for the last two items.

BUD. Revelation relies heavily on the idea of the data dictionary. For every datafile there is a dictionary, holding information on the size, length and type of each field plus system data for the retrieval of each record. Bud sets up the dictionary.

When Bud is selected the screen displays a list of headings. The first is the name of the datafile to which the dictionary relates — this is always the same as the name defined in DEF.

The remaining entries relate to the type of data contained in each field. All the information has to be entered separately for each field.

One of the most interesting features here is that the value of a field can be the result of any piece of R/Basic code. It's conceivable that you could enter a small basic program as the formula, which will allow very complex formulae to be built up.

PGMR. After the data dictionary has been designed, you start to build the program to enter data onto the database.

PGMR asks for the program name and the file to be accessed. The actual program can be in one of three forms: R/List for simple database queries; Interpreted for simple database accessing; and R/Basic code for more complex applications. If R/Basic is chosen then the program generator will need to be used.

SEL, SCR.GEN and SCR. These define how the data entry screen will look. SEL selects the fields to be displayed on the screen. SCR.GEN will generate a standard entry screen based on the output of SEL. SCR allows you to take the standard screen, move items around and generally customise it.

ENTER. Now you're ready to start entering data onto the database. For an interpreted program this is done with the ENTER function. If you are using a R/Basic compiled program, then you only need to call the program.

R/Basic program generator:–

Included with Revelation is the best code generator I've seen — it produces excellent R/Basic code. The generator is called by entering GEN from the R/Design main menu. It takes its information from the definition set up in the previous R/Design stages.

Basic code generators have been around for many years. Perhaps the most famous is 'The Last One' which was launched in a blaze of publicity in 1981. The problem with most code generators, however, is that the code produced is almost impossible to read. The machine may have known what it was doing, but if you try to alter the code manually you're in for a long job. Revelation produces clear, easy to read listings. It uses meaningful variable names rather than the meaningless 'A$=' approach. It even puts REM statements into the listings so that it's easy to tell what's going on. It's

Sample output from GEN

```
0001    ****************************************************************
0002    *
0003    *
0004    *   CONFIDENTIAL  --  THIS PROGRAM IS PROPRIETARY AND IS NOT TO
        - - >  BE USED
0005    *                     OR DISCLOSED TO OTHERS, NOR IS IT TO BE
        - - >  COPIED
0006    *                     WITHOUT THE EXPRESS WRITTEN PERMISSION OF
0007    *                          PERSONAL COMPUTER WORLD
0008    *
0009    *              ALL RIGHTS RESERVED UNDER COPYRIGHT LAWS.
0010    *
0011    * PROGRAM     : PROG
0012    *
0013    * NAME        : PETERS PROGRAM
0014    *
0015    * TYPE        : ENTRY
0016    *
0017    * DATE        : 09 FEB 84
0018    *
0019    * AUTHOR      : PETER BRIGHT
0020    *
0021    * DESCRIPTION : TEST PROG
0022    *
0023    ****************************************************************
0024    *
0025    *
0026    * COMMON VARIABLES USED BY R/DESIGN AND GENERATED PROGRAMS
0027    *
0028    COMMON FILE.RDES
0029    COMMON PROMPT.FOR
0030    COMMON LAST.PROMPT
0031    COMMON ITEM.RDES
0032    COMMON DATA.IO
0033    COMMON VALUE.NO
0034    COMMON PROGRAM
0035    COMMON DIS.VAL
0036    COMMON WORK
0037    COMMON STD.PATRN.FLAG
0038    COMMON DEPTH.FLAG
0039    COMMON DUP
0040    COMMON REST.OF.SCR
0041    COMMON PROMPT.NMS
0042    COMMON PROMPT.BODIES
0043    COMMON COLM.INCR
0044    COMMON ROW.INCR
0045    COMMON DONT.DISPLAY
0046    COMMON IN.SCREEN
0047    COMMON ERROR.SPC
0048    COMMON CLR.SPC
0049    COMMON WINDOW.ACT
0050    COMMON WINDOW.CNT
0051    COMMON WINDOW.OP
0052    COMMON SAVE.VALUE
0053    COMMON SCREEN
0054    COMMON FORMULA.ANSWER
0055    *
0056    PROMPT.FOR=''
0057    LAST.PROMPT=''
0058    ITEM.RDES=''
0059    DATA.IO=''
0060    VALUE.NO=''
0061    PROGRAM=''
0062    DIS.VAL=''
0063    WORK=''
0064    STD.PATRN.FLAG=''
0065    DEPTH.FLAG=''
0066    DUP=''
0067    REST.OF.SCR=''
0068    PROMPT.NMS=''
0069    PROMPT.BODIES=''
0070    COLM.INCR=''
0071    ROW.INCR=''
0072    DONT.DISPLAY=''
0073    IN.SCREEN=''
0074    ERROR.SPC=''
0075    CLR.SPC=''
0076    WINDOW.ACT=''
0077    WINDOW.CNT=''
0078    WINDOW.OP=''
0079    SAVE.VALUE=''
0080    SCREEN=''
0081    FORMULA.ANSWER=''
0082    *
0083    *  STANDARD VARIABLE DEFINITIONS
0084    *
0085    EQU AM              TO CHAR(254) ;* ATTRIBUTE MARK
0086    EQU VM              TO CHAR(253) ;* VALUE MARK
0087    EQU SVM             TO CHAR(252) ;* SUBVALUE MARK
0088    EQU DELIM           TO CHAR(247)
0089    EQU BEEP            TO CHAR(7)   ;* MAKES TERMINAL BEEP
0090    CLR=@(-1)
0091    EQU CANT            TO "CAN'T OPEN FILE "
0092    *
0093    ****************************************************************
0094    *
0095    * OPEN ALL FILES
0096    *
0097    OPEN '','TEST' TO FILE.TEST ELSE PRINT CANT : 'TEST' ; STOP
0098    OPEN '','RDES' TO FILE.RDES ELSE PRINT CANT : 'RDES' ; STOP ; *
        - - >  SCREEN FILE
0099    OPEN 'DICT','TEST' TO @DICT ELSE PRINT CANT : 'DICT TEST' ; STOP
0100    *
0101    ****************************************************************
0102    *
0103    *
0104    * DATABASE FILE LAYOUTS
0105    *
0106    *
0107    *
0108    * (TEST)
0109    *
0110    EQU TEST$TEST1          TO 0
0111    EQU TEST$TEST2          TO 1
```

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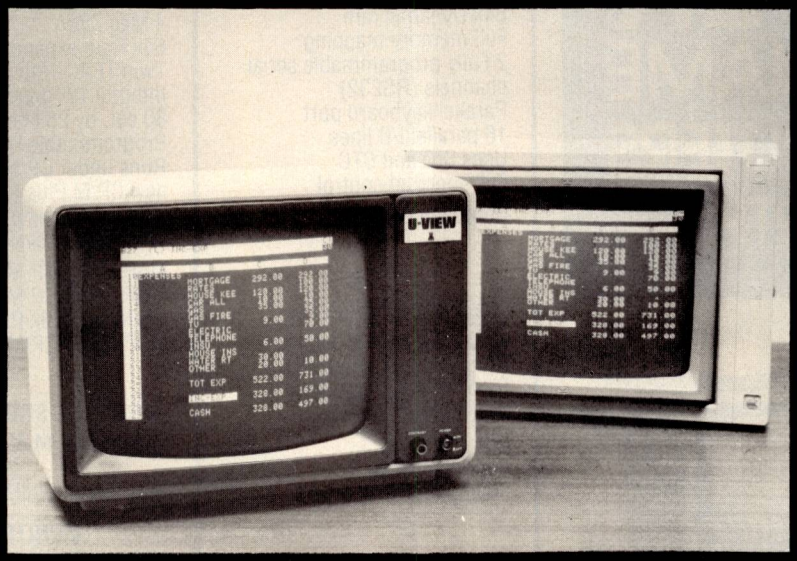

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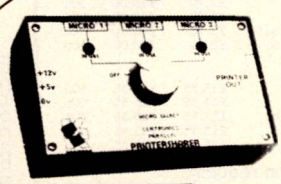

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comparatively straightforward to customise the code after it has been generated.

When the generator is called it asks for a filename in which the program is to be stored and then proceeds to create the program. The amount of time it takes depends upon the complexity of the database you are trying to create. I tried it on a fairly simple database and it took 11 minutes to generate 360 lines of R/Basic code.

I only encountered one problem when using the generator. This occurred when I tried to generate a very large program. The machine thought about it for twenty minutes and then exited with an 'Out of String Space' error. IDM explained that the minimum amount of RAM a system should have is 500k. My IBM only had 320k so the generator simply ran out of memory.

R/Basic

R/Basic is a highly stylised version of the language. It's also compiled rather than interpreted which makes it even more unusual in the micro world.

I showed an R/Basic listing to the Programs Editor and he thought it had more tham a hint of Cobol about it. This is especially true of the listings produced by GEN. One of the most obvious differences is that line numbers are used purely for reference. All GOTOs, GOSUBs and so on are addressed to labels rather than line numbers, so instead of saying GOTO 10, you would say GOTO TOP or GOTO HEAVEN.

This looks like a very powerful implementation of Basic. As you would expect, most of the extended features relate to handling complex file structures, but because of the 8087 maths chip it should be possible to handle complicated arithmetic very quickly.

Since it's a compiled language, getting an R/Basic program to run can be quite time-consuming. The line editor has to be called to create the program file, then you have to save the program, compile it and run it. The editor is a fairly standard line editor and it really isn't up to standard in comparison with modern editors.

The way programs are stored is interesting. Usually you have a separate disk file for each program, so you might have two files called PROG1 and PROG2. In Revelation, you only have one file which you might call BP, containing all your Basic programs as records. PROG1 and PROG2 would be two records within the file BP: this may seem strange but it works well enough.

Before a program can be run for the first time it must be compiled, which is done by using the Basic command followed by the filename and program name. To compile PROG1 you say BASIC BP PROG1. The compiler will then print a series of asterisks on the screen to show that it's doing something useful. Assuming the compilation was successful, the program can be run by typing RUN BP PROG1.

R/List

Now that you've introduced the information into your database, it might be a good idea to find a way to retrieve it. There are two ways of doing this. The first is to write an R/Basic program — R/Basic is normally used to produce all your standard monthly reports. The second method is to use R/List, a query language useful for producing one-off *ad hoc* reports.

The most commonly used verb in R/List is the LIST command. This displays the contents of any file in any order. At the most fundamental level, you might say LIST CUSTOMERS COMPANY PHONE. This will look in the CUSTOMERS file and display all the company names and phone numbers contained in the file.

One major advantage of R/List is that it understands English-like phrases. For example, you could type LIST CUSTOMERS WITH CITY BETWEEN 'A' AND 'M' OR WITH ZIP UNDER 30000 and the machine will print all the customers who conform to those criteria. The system can also understand words like YESTERDAY, TODAY and TOMORROW, and can be made to ignore words such as THE to allow queries to read better. If you don't like the words the machine responds to, they can be altered by editing one of the system files called VOC. This makes R/List very flexible.

R/List also has a powerful sort option. On typing in LIST CUSTOMERS BY STATE BY CITY, for example, it will sort on the state and city fields. Any number of fields can be sorted but it does take rather a long time.

Fields are totalled in one of two ways. You can either use the TOTAL on its own to give a total at the bottom of the column, or it can be used in conjunction with the BREAK-ON command. If the BREAK-ON feature is used, a total will be produced every time the value of a specified field changes, which is useful where you need to show sub totals by department.

Documentation

Revelation is supplied with two instruction manuals. One contains an introduction to the system plus tutorials for R/List and R/Design. The second manual covers R/Basic. Both look like large paperback books and consist of photocopied pages.

I was impressed with the R/List tutorial — the left hand page contains instructions and the right hand page shows what should be happening on the screen. It was very easy to work through the examples checking that what appeared on the screen matched the examples. However, as I worked my way through the tutorials I became more frustrated that the required information wasn't in the book or was hiding away at the bottom of the page. My opinion of the manuals now is not very high. They were fine when I was starting out, but as I progressed they were of little help.

Conclusions

Revelation is a sophisticated package: any product requiring a minimum of 500k of RAM, a hard disk and a maths co-processor must be fairly complex.

IDM asked me not to categorise the product because it feels that it goes beyond the boundaries of normal database classification, and I have to agree on that point. Revelation is an operating system, database and applications generator all rolled into one. I suspect that most people will use it as an applications generator. It's very easy to design a file and then generate the R/Basic programs to input data and produce reports.

R/Basic will look very strange to anyone who is used to the more traditional Microsoft style of Basic, but it's extremely powerful. When combined with the in-built code generator it allows sophisticated programs to be produced quickly.

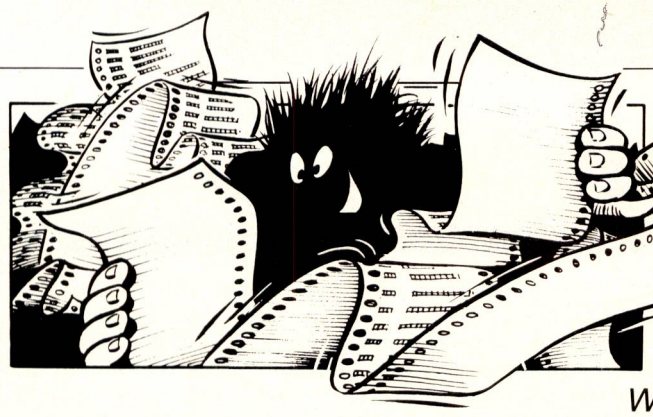
R/List contains features for producing *ad hoc* reports. Its major advantage is its ability to understand English-like phrases.

All in all I was very impressed with Revelation. The Pick approach of combining powerful database handling facilities with a friendly and (comparatively) easy to use operating system will become very popular.

Although Revelation is not a full implementation of Pick, it packs a great deal of power into what is a fairly mundane machine.

It's more difficult to predict who will use Revelation. The price of £1330 makes it one of the most expensive single user database products on the market and its power means that it will only be used to the full in complex applications. The main demand will come from medium to large companies who use a mini or mainframe for most of their major database work but who also have a need for powerful departmental databases.

END



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Spectrum Helpscreen

'Helpscreen' simulates a help key on the 48k ZX Spectrum. The program allows a screen of information to be saved into memory. The information may then be recalled at any time by pressing the 'Symbol Shift' and 'Space' keys together. Once the information has been examined the computer will return to its previous task on pressing the keys again.

The program has been written in machine code using the Artic assembler. It consists of four routines, save and activation, interrupt service, deactivation and display. The program is loaded at location 50431 and extends to 64469. Included in this memory allocation are two areas for storing display and attribute files: 50646 to 57557 (SCREEN1) and 57558 to 64469 (SCREEN2).

The save and activation routine is used to save a Helpscreen picture. It consists of moving the current display and attribute files to the location SCREEN1, then it activates the interrupt service routine. Activation consists of loading a pointer into the interrupt vector and setting interrupt mode 2. An alternative entry point may be used to activate the routine without saving the screen. This allows a Helpscreen to be read into SCREEN1 from tape.

Once activated, the interrupt service routine is called whenever there is an interrupt (50 times per second). The routine commences by checking to see if the keys are pressed. If they are not pressed then a RST 0038 instruction is executed which allows the ROM to scan the keyboard, then a return is executed. If the keys are pressed, the current display and attribute files are moved into SCREEN2, then the Helpscreen is transferred to the screen. The program waits for the keys to be released and pressed again; at this point the original screen is restored then a further wait is made until the keys are released, at which point a return is executed. The deactivation routine must be used before overwriting any memory locations between 50431 and 64469 otherwise the machine may crash. This routine returns the processor to interrupt mode 1.

The display routine may be used by a program to display and modify the Helpscreen. It consists of copying the Helpscreen into the display and attribute file area.

The example program, written in Basic and including the machine code in DATA statements, may be used to illustrate the use of the routine. Running the program will load the Helpscreen routines and then draw a wheel. This screen is stored as a Helpscreen and the interrupt service routine is activated. The Helpscreen may now be recalled at any time by pressing Symbol Shift and Space. The program then draws another wheel. Once this is complete the two wheels may be displayed successively by pressing and then releasing the keys; this gives the effect of a rotating wheel. Pressing 'Capital Shift' and 'Break' while the Helpscreen is not displayed will halt the program. List the program and then press the Symbol Shift and Space keys. The Helpscreen will then be displayed. Press again and the listing will return. RANDOMISE USR 50533 will display the Helpscreen to allow modification. RANDOMISE USR 50518 will deactivate the routine.

The Helpscreen may be used to recall useful information such as instructions for games. This information may be recalled at any time halting the current program. When the program resumes, it restarts from exactly where it left off. One use that I have found for it is to make a list of the Basic keywords and the corresponding keys for easy reference when typing programs in.

Richard Parrott

```
        ORG C4FF
        ;*************************
        ;* HELPSCREEN PROGRAM
        ;*************************
        ;* SAVE A SCREEN OF DATA
        ;* IN MEMORY THEN (IF THE
        ;* PROGRAM HAS BEEN
        ;* ACTIVATED) PRESSING
        ;* SYMBOL SHIFT & SPACE
        ;* WILL HALT CURRENT
        ;* PROGRAM AND DISPLAY
        ;* THE SAVED SCREEN.
        ;* PRESSING THE KEYS
        ;* AGAIN WILL RESTORE THE
        ;* ORIGINAL SCREEN AND
        ;* RESUME PROGRAM
        ;* EXECUTION.
        ;*************************
        ;* RANDOMIZE USR:-
        ;* 50433 TO SAVE SCREEN
        ;*       AND ACTIVATE
        ;* 50444 TO ACTIVATE ONLY
        ;* 50518 TO DEACTIVATE
        ;* 50533 TO DISPLAY SAVED
        ;*       SCREEN UNDER
        ;*       PROGRAM CONTROL
        ;*************************
        ;* PROGRAM IS LOADED AT
        ;* LOCATION 50431 AND
        ;* EXTENDS TO LOCATION
        ;* 64469 INCLUSIVE
        ;*************************
SCREEN1=E0D5      ;HELPSCREEN
SCREEN2=FBD5      ;SCREEN STORE
MSCREEN=5AFF      ;ACTUAL SCREEN
      CHECK       ;INT ROUTINE
```




```
        ;*************************
        ;* SAVE SCREEN & ACTIVATE
        ;*************************
STORE   LD    BC,1B00    ;SAVE
        LD    DE,SCREEN1;SCREEN
        LD    HL,MSCREEN
        LDDR
        ;*************************
        ;* ACTIVATE ROUTINE
        ;*************************
ACTIV   LD    A,C4       ;ACTIVATE
        LD I,A           ;INTERRUPT
        IM2              ;ROUTINE
        RET
CHECK   DI               ;INTERRUPT
        PUSH BC          ;ROUTINE
        PUSH DE          ;SAVE
        PUSH HL          ;REGISTERS
        PUSH AF
        CALL KEYS        ;PRESSED?
        JR    NZ INPUT   ;NO CONT
        LD    BC,1B00    ;YES
        LD    DE,SCREEN2;SAVE
        LD    HL,MSCREEN;SCREEN
        LDDR
        LD    BC,1B00    ;DISPLAY
        LD    DE,MSCREEN;HELP
        LD    HL,SCREEN1;SCREEN
        LDDR
LOOP1   CALL KEYS        ;PRESSED?
        JR    Z LOOP1    ;YES WAIT
LOOP2   CALL KEYS        ;PRESSED?
        JR    NZ LOOP2   ;NO WAIT
        LD    BC,1B00    ;YES
        LD    DE,MSCREEN;RESTORE
        LD    HL,SCREEN2;SCREEN
        LDDR
LOOP3   CALL KEYS        ;PRESSED?
        JR    Z LOOP3    ;YES WAIT
        JR    RETN       ;NO LEAVE
INPUT   RST   38
RETN    POP   AF         ;GET
        POP   HL         ;READY
        POP   DE         ;TO
        POP   BC         ;LEAVE
        EI
        RET              ;RETURN
        ;*************************
        ;* DEACTIVATION ROUTINE
        ;*************************
DEACT   IM1
        RET
KEYS    LD    BC,7FFE    ;PORT NO
        IN    E,(C)      ;INPUT
        BIT   0,E        ;SPACE?
        JR    NZ RETK    ;NO RETURN
        BIT   1,E        ;SYM SHIFT
RETK    RET              ;RETURN
        ;*************************
        ;* DISPLAY ROUTINE
        ;*************************
DISP    LD    BC,1B00    ;DISPLAY
        LD    DE,MSCREEN;SAVED
        LD    HL,SCREEN1;SCREEN
        LDDR
        RET              ;RETURN
END
```

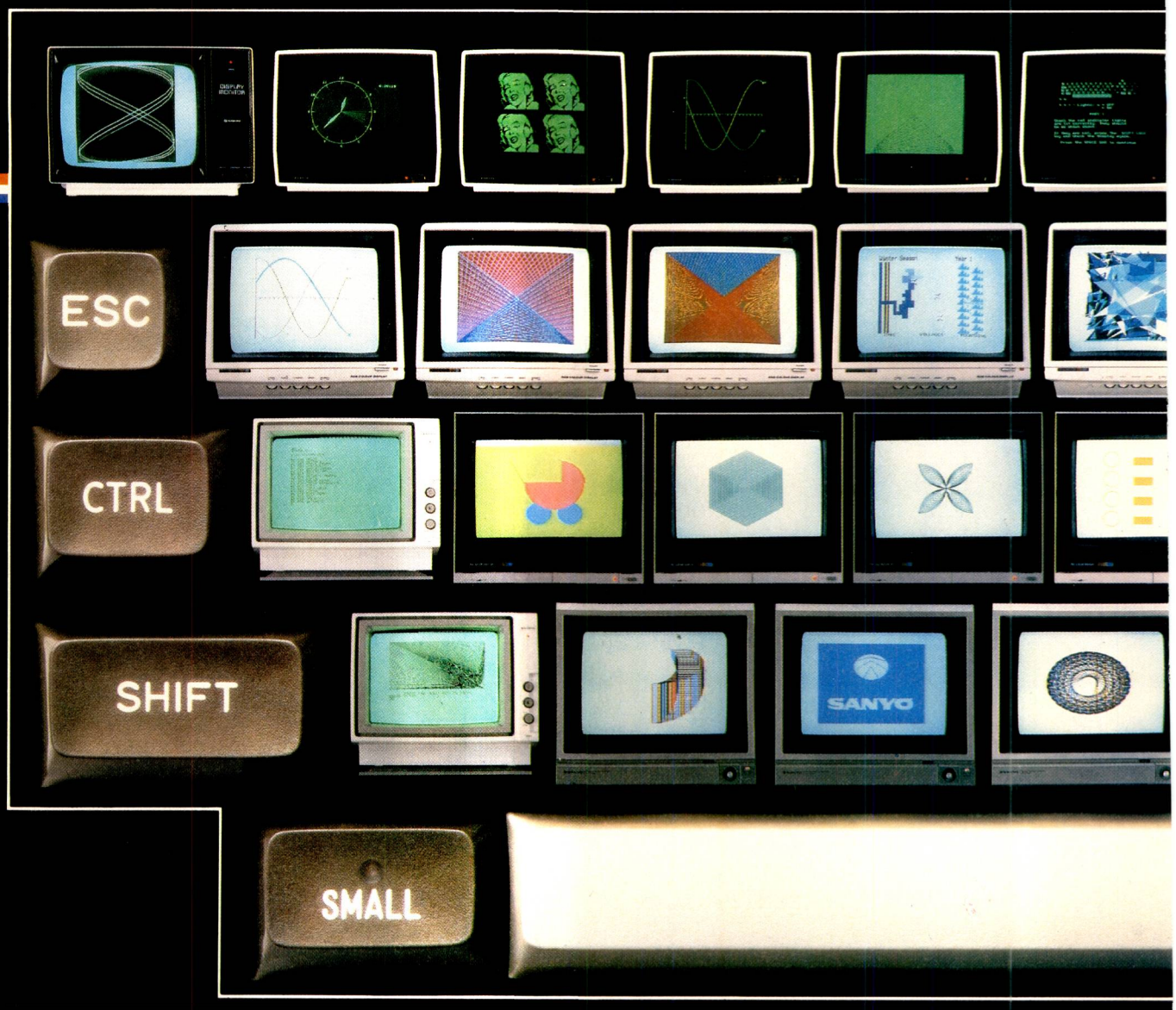
```
    5 REM *************************
        * HELPSCREEN EXAMPLE
        *************************
   10 CLEAR 50430: GOSUB 2000
   20 LET start=PI/24: GO SUB 100
0
   30 RANDOMIZE USR 50433: CLS
   40 LET start=0: GO SUB 1000
   50 GO TO 50
1000 LET x=128: LET y=83
1010 FOR i=4 TO 80 STEP 4
1020 CIRCLE x,y,i: NEXT i
1030 FOR i=start TO 2*PI STEP PI
/12
1040 PLOT x,y
1050 DRAW 80*SIN i,80*COS i
1060 NEXT i
1070 RETURN
1990 REM *************************
        * HELPSCREEN ROUTINE
        *************************
2000 DATA  19,197,  1,  0, 27
2010 DATA  17,213,224, 33,255
2020 DATA  90,237,184, 62,196
2030 DATA 237, 71,237, 94,201
2040 DATA 243,197,213,229,245
2050 DATA 205, 89,197, 32, 50
2060 DATA   1,  0, 27, 17,213
2070 DATA 251, 33,255, 90,237
2080 DATA 184,  1,  0, 27, 17
2090 DATA 255, 90, 33,213,224
2100 DATA 237,184,205, 89,197
2110 DATA  40,251,205, 89,197
2120 DATA  32,251,  1,  0, 27
2130 DATA  17,255, 90, 33,213
2140 DATA 251,237,184,205, 89
2150 DATA 197, 40,251, 24,  1
2160 DATA 255,241,225,209,193
2170 DATA 251,201,237, 86,201
2180 DATA   1,254,127,237, 88
2190 DATA 203, 67, 32,  2,203
2200 DATA  75,201,  1,  0, 27
2210 DATA  17,255, 90, 33,213
2220 DATA 224,237,184,201
2230 FOR i=50431 TO 50544
2240 READ j: POKE i,j: NEXT i
2250 RETURN
```

BBC operating system commands

The BBC Micro operating system commands are those which start with an asterisk.

For example, *MOTOR, *CAT or *FX.

The operating system commands are passed to the Command Line Interpreter ('CLI') when encountered. The CLI is vectored, and as a result it is possible to intercept the command line before it is passed onto the



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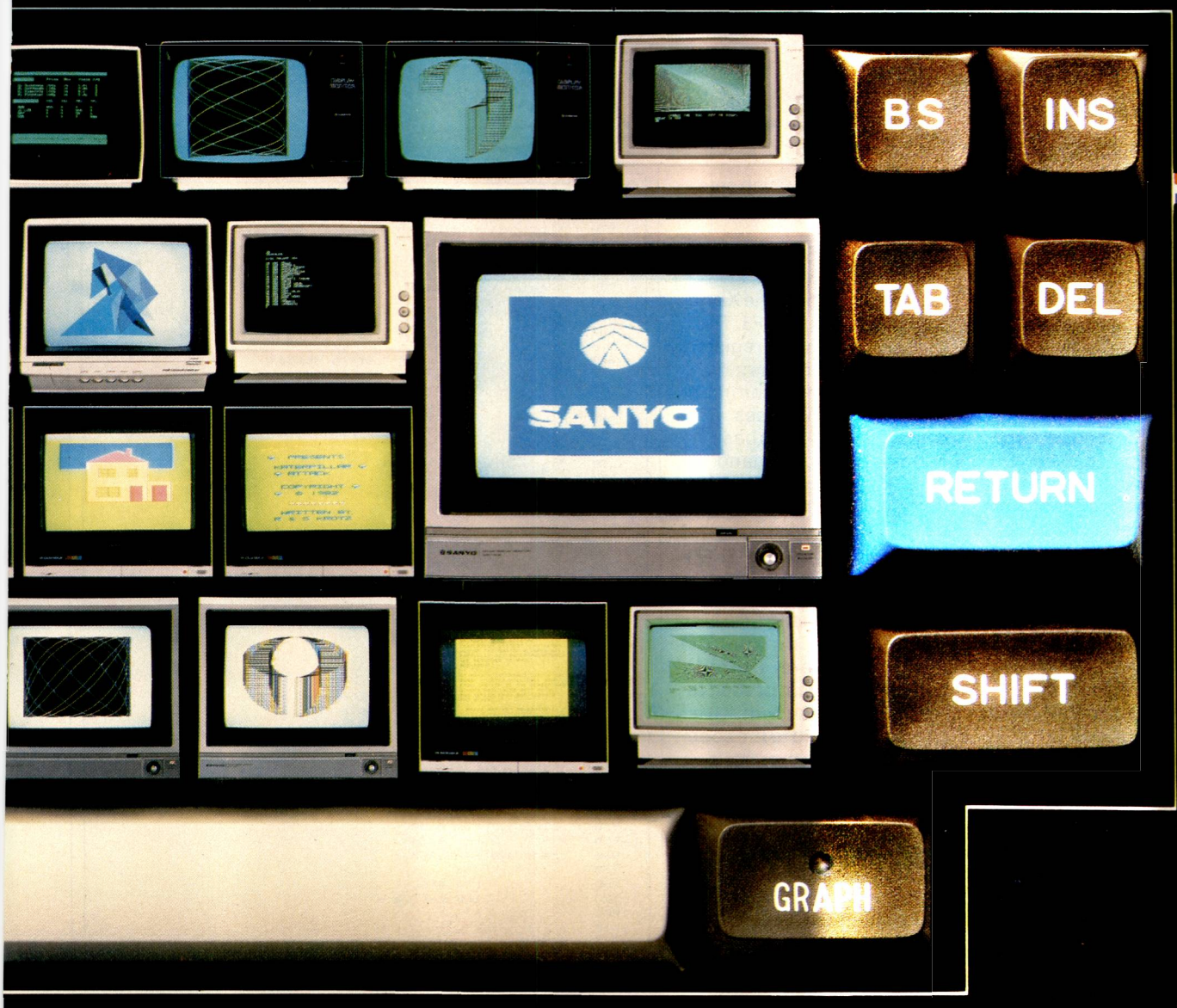

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CLI. This in turn allows the user to write his own commands which can be invoked either in the interactive mode or in Basic programs.

The technique employed is to place in the CLI Vector (CLIV) the address of a user written routine which examines the command line for new commands before passing unrecognised commands to the original CLI. The example listed here is a simple new command *CLEAR which sets all internal variables to zero. The new command is not particularly interesting in itself, but serves to illustrate the technique.

The program is fully commented but a few words of explanation are necessary.

Lines 90 to 100 set up the addresses of OSBYTE and CLIV.

Lines 270 to 350 set up the break action address. This means that once the routine is installed, it is resident until the machine is switched off. Pressing the break key causes the routine 'install' to be invoked.

Lines 400 to 500 are the routine 'install', which sets CLIV to point to the routine 'newcliv'.

Lines 590 to 830 are the routine 'newcliv'. This routine first stores the X and Y registers in &F2, &F3. The CLI uses the X and Y registers to point to the memory address where the command is located. The CLI uses &F2, &F3 to hold this base address of the command line. The subroutine &E039 (line 620) is a subroutine used by the CLI to strip leading spaces and asterisks from the command. The routine then checks to see if the command is the user's new command. If it is not, the X and Y values are restored and the command passed to the CLI to be dealt with. If it is, control is passed to the code which executes the user's command (lines 940 to 1000).

The remaining section of the program demonstrates that the technique works.

The ability to create new commands opens up all sorts of possibilities to the machine code programmer; any favourite utility can be invoked by direct command rather than by CALLing it.

John Hearn

```
LIST
   10 REM Demonstration of new commands
   20 REM for the BBC microcomputer.
   30 REM
   40 REM John Hearn    January 1984
   50 REM
   60 REM Set up Command LIne Vector
   70 REM and OSBYTE addresses.
   80 REM
   90 CLIV    = &208
  100 OSBYTE = &FFF4
  110 FOR I% = 0 TO 1
  120   REM
  130   REM Assemble code at &D01.
  140   REM Change this address if using
  150   REM discs (eg to &A00 which is
  160   REM normally the cassette work
  170   REM space.)
  180   REM
  190   P%=&D01
  200   [           OPT I%
  210   \
  220   \ start - load break action
  230   \ address to point to install.
  240   \ ie subroutine install is
  250   \ actioned after break is pressed
  260   \
  270   .start      LDX #&4C
  280               LDA #&F7
  290               JSR OSBYTE
  300               LDX #(install AND 255)
  310               LDA #&F8
  320               JSR OSBYTE
  330               LDX #(install DIV 256)
  340               LDA #&F9
  350               JSR OSBYTE
  360   \
  370   \ install - when break is pressed
  380   \ this routine installs new CLIV
  390   \
  400   .install    LDA CLIV
  410               CMP #(newcliv AND 255)
  420               BEQ return
  430               STA cliv
  440               LDA CLIV + 1
  450               STA cliv + 1
  460               LDA #(newcliv AND 255)
  470               STA CLIV
  480               LDA #(newcliv DIV 256)
  490               STA CLIV + 1
  500   .return     RTS
  510   \
  520   \ newcliv - this routine checks a
  530   \ operating system command to see
  540   \ if it is *CLEAR. If it is, the
  550   \ new command is actioned, else
  560   \ the command is passed to the CLI
  570   \ to be dealt with.
  580   \
  590   .newcliv    STX &F2     \ save X
  600               STY &F3     \ save Y
  610               LDY #&FF
  620   .loop       JSR &E039 \ strip spaces
  630               BEQ exit   \ cr found
  640               CMP #&2A   \ is it a *
  650               BEQ loop   \ yes strip it
  660               LDX #&00   \ zero X
  670               STY &70
  680   \
  690   \ now check if *CLEAR
  700   \
  710   .com1       CMP command,X
  720               BNE exit
  730               INX
  740               INY
  750               LDA (&F2),Y  \ get the next character
  760               CMP #&0D     \ all done?
  770               BNE com1
  780               JMP clear
  790   .exit       LDX &F2
  800               LDY &F3
  810               JMP (cliv)
  820   .cliv       BRK
  830               BRK
  840   \
  850   \ this is the code for the new
  860   \ command. In this example the
  870   \ internal variables (A% to Z%)
  880   \ are zeroed by the command *CLEAR
  890   \
  900   \ The internal variables are
  910   \ located at &404 to &46B
  920   \ inclusive.
  930   \
  940   .clear      LDA #&00
  950               LDX #&04
  960   .zerovars   STA &400,X
  970               INX
  980               CPX #&6C
  990               BNE zerovars
 1000               RTS
 1010   ]
 1020   REM
 1030   REM now put the new commnd name in
 1040   REM
 1050   command = P%
 1060   $command = "CLEAR"
 1070   NEXT
 1080 REM
 1090 REM now call the routine to
 1100 REM install it.
 1110 REM
 1120 CALL start
 1130 REM
 1140 REM now prove it works!
 1150 REM
 1160 A%=1:Z%=26
 1170 VDU12:PRINT"A% = ";A%'"Z% = ";Z%
 1180 *CLEAR
 1190 PRINT''"Now A% = ";A%'"and Z% = ";Z%
 1200 PRINT''''"To save the assembled code, enter....
      "''''"*SAVE ""NEWCOMMAND"" 0   D01 +0070"'''
 1210 PRINT"To load save code enter...."''''"*RUN ""NEWCOMMAND""
```

Lynx serial port

Little information is given by Camputers relating to the Lynx's serial port. The following data should be of use to Lynx owners wishing to hook up their machine to printers, modems and other computers or peripherals.

The serial facility is provided by a UART (Universal Asynchronous Receiver/Transmitter). On the Lynx, this UART is arranged to provide a serial output and accept a serial input at RS232 compatible levels comprising eight data bits, one start bit and one stop bit. There is no parity bit. Should this data format not be suitable for your application, it is possible to alter it by simple hardware modifications. The baud rate (speed at which transmission and reception is carried out) can be selected to be either 2400, 4800 or 9600 bits per second. Normally the Lynx will be set to the 2400bps rate.

To introduce a parity bit to the data stream on transmission, and to check for correct parity on reception, you should locate pin 35 of the UART chip (the UART is the forty pin package which is upside down relative to the other two forty pin packages. On my machine it is marked COM

8017, but could easily be marked IM 6402 or AY 3 1013 on yours). Pin 35 is normally connected to +5V. To enable parity it should be grounded instead. If odd parity is required, pin 39 also should be changed from its current +5V to 0V. If even parity is required, leave pin 39 as it is. The number of bits per character is set by pins 37 and 38 which are normally both tied to +5V, selecting eight bits. Fig 1 shows how to select other character lengths. The number of stop bits to be appended to each character on transmission is set by pin 36. A logic 1 (+5V) selects two stop bits and a logic 0 (0V) selects one. Normally this pin is tied to 0V. The baud rate is set by a small plug and socket assembly, called link 7. It can be found on the circuit board just below the row of din sockets. There are six pins on the male side and the socket joins one horizontal pair of pins at a time. When the plug is on the lowest two pins (as it is normally) the baud rate used by the UART is 2400 bits per second. Moving the plug to the middle set of pins gives 4800bps and the top set gives 9600bps. Although limited to three speeds, this gives the port extra flexibility.

On the software side, the UART appears as two distinct ports. One—&82—is the data port and the character to be read or written passes through this port. So OUT &82,50 will put 50 serially onto pin 1 of the din socket marked serial at the back of the Lynx. PRINT INP (&82) will display the last character which was received on pin 3 of the din socket. Note that while output is in 'real-time' —that is, the character is sent as soon as the instruction is executed by the processor—input is not. A serial data stream on pin 3 of the din socket will be taken by the UART whenever it appears and the character represented is stored within the UART to be read at the convenience of the processor. This facility means that the computer can send and receive data simultaneously—that is, it can have full duplex operation.

The other port connected with the UART is port &84. It informs the processor of the status of the UART. This information is bit coded and the port is read only. Of the eight bits in this port, only four are used. The others are permanently one (bits 5,4,3 and 0). Bit 7, the DAV flag, goes zero when data is available in the input register. To avoid over run (see below) data should generally be read (through port &82) as soon after DAV goes low. Once read DAV will return to a one until another character is received. Bit 6 is the TBE flag. It indicates that the transmitter buffer is ready to receive another character when zero. So if this bit is a one, do not try outputting data. Bit 2, the PE flag, indicates that a parity error exists in the last character received. Normally this bit is a one, but if, as detailed earlier, your computer is modified to check parity, the bit will go zero to indicate the failure of the parity check. Bit 1 is the OR flag and indicates, when zero, that more than one character has been received since the UART was last read by the processor. This state is called over run and can be avoided by regular checking of the DAV flag.

Finally, it should be noted that the Lynx serial port is not a full implementation of the standard RS232 link. In particular it does not allow handshaking between communicating devices. Therefore it should not be taken for granted that the computer can be linked to any piece of RS232 equipment, although a little software can often overcome difficulties. As proof of this I can say that I have been using a daisywheel printer with my computer for several months now with no problems and the minimum of software. If you wish to experiment with the port I suggest you first try the program given in Fig 2. If you have, or get hold of two computers, you might like to try connecting the two serial ports together—0V to 0V, In to Out, and Out to In, typing the program into both machines, and running it. It allows instant communication between the two computers.

Alternatively, if you haven't got two computers, you can simply join the Out and In pins on one machine with a piece of wire, and talk to yourself. Proof that the data is actually going through the port can be obtained by simply pulling out the wire and observing the result.

Jon Chalmers

PIN 37	PIN 38	BITS/CHARACTER
0	0	5
0	1	6
1	0	7
1	1	8

Fig 1

```
100  VDU 4,14
110  REM **CHECK TBE FLAG**
120  IF NOT(INP(&0084) BNAND BIN(1000000))
     =BIN(1000000) THEN GOTO 120
130  REM **SEND IF ZERO**
140  OUT &0082,ASC(GET$)
150  REM **CHECK DAV FLAG**
160  IF NOT(INP(&0084) BNAND BIN(10000000))
     =BIN(10000000) THEN GOTO 160
170  REM **DISPLAY IF ZERO**
180  PRINT CHR$(INP(&0082));
190  REM **NEXT CHARACTER**
200  GOTO 120
```

Fig 2

Spectrum on error

I have recently found a way of simulating the ON ERROR NEW and ON BREAK NEW command on the ZX Spectrum and I think that other Spectrum owners might be interested in the method.

What you do is PEEK the two byte system variable, ERR SP. This gives you the address on the machine stack holding the address in memory to which program execution jumps after an error has occurred. Usually the address held by ERR SP holds the address 4867, but if you POKE the address held in ERR SP to 0, when an error occurs in the Basic program, or BREAK is pressed, or the program ends, then program execution will start from address 00, which will have the same effect as typing PRINT USR 0. This will reset the computer to the same state it was in when first switched on.

Here's a short routine which should be put at the beginning of a program and will reset the computer if break is pressed, an error occurs, or the program ends.

```
1 >LET err sp = PEEK
  23613+256* PEEK 23614
2 LET err rtn = PEEK (err
  sp)+256* PEEK (err sp+1)
3 POKE err sp,0:POKE (err
  sp+1),0
```

Line 1 PEEKS the system variable ERR SP.
Line 2 stores the contents of the address held in err sp and err sp+1, in the variable err rtn.
Line 3 POKEs the address held in ERR SP, and the address after it to 0.

Once this routine has been run *any* attempt to stop or end the program will cause a machine reset. If you want to be able to turn this effect off from within a program then you should type in a routine such as the one below.

```
1000>LET err sp = PEEK
     23613+256 * PEEK
     23614
1010 POKE err sp,err rtn
     −256* INT (err rtn/256)
1020 POKE (err sp+1), INT
     (err rtn/256)
```

This will allow the program to be stopped in any of the usual ways.

Andrew Pagin

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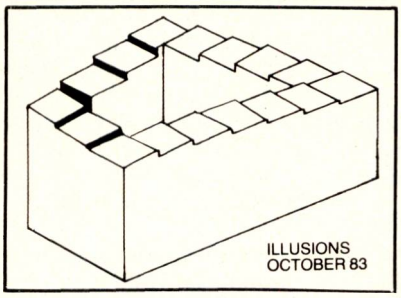

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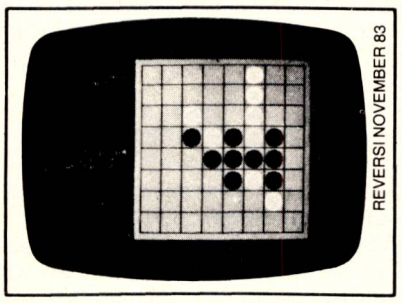

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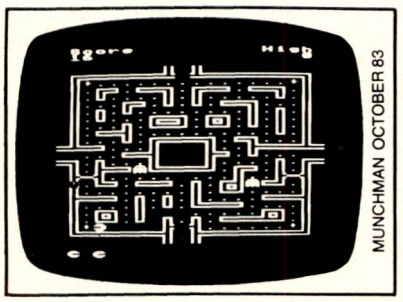

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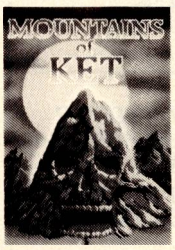

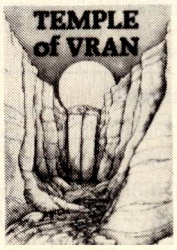

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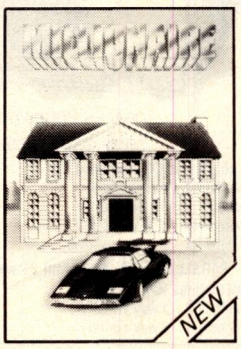

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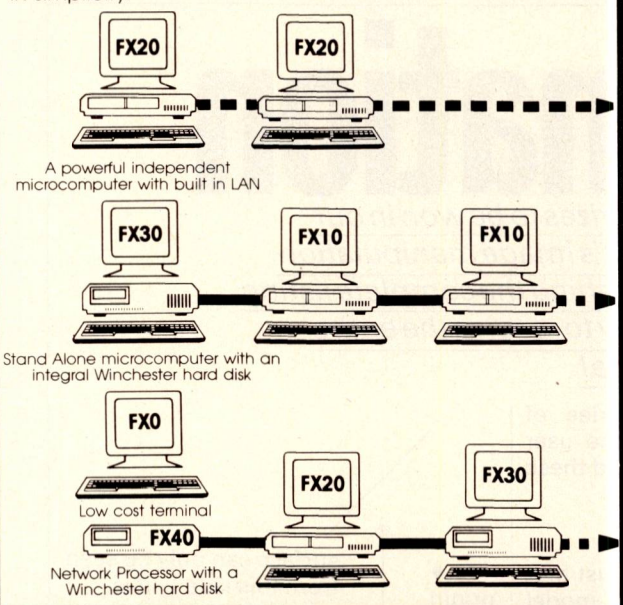

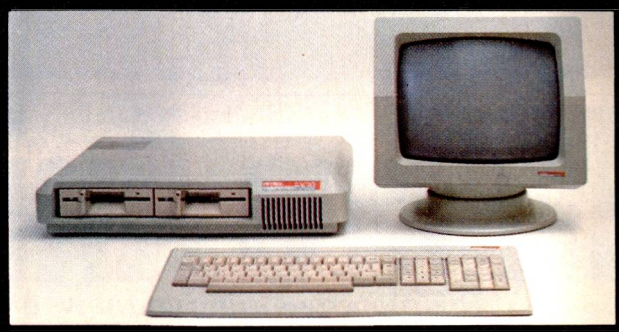

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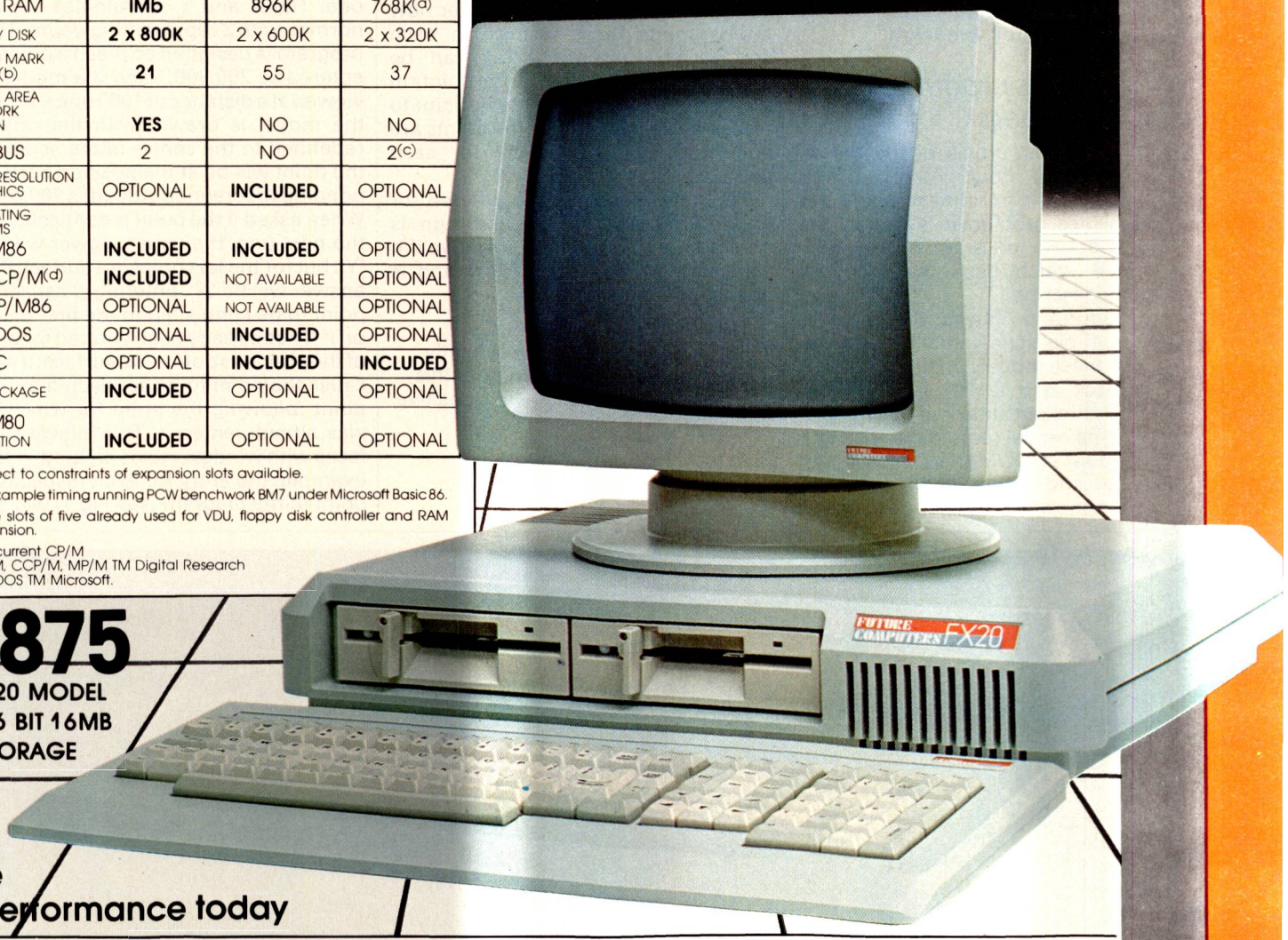

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Micro Animation

This month we bring you news of the prizes to be won in our competition and details of Martin Colbert's image manipulation program for the BBC Micro. Instead of publishing the complete listing we are offering readers the opportunity to receive the entire program, free, on tape!

The top prizes in *PCW*'s Micro Animation Competition are microcomputer systems from Fujitsu, Japan's leading computer manufacturer. Two FM16S 128k systems complete with software are waiting to be won together with an FM7 64k system, the uniquely-styled, 8-bit machine from the Fujitsu stable.

We're also pleased to announce the names of the judges who'll be deciding on the winning entries: Barry Norman, TV film critic and presenter of BBC Radio 4's *Chip Shop* will chair the panel; he'll be assisted by Roger Handley, Fujitsu's NW Europe Sales Manager, Hedley Griffin of Griffin Films and our own editor, Jane Bird.

3D graphics produced by Martin Colbert

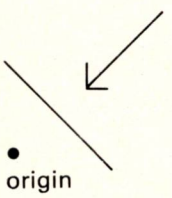
In the 'Patterns' article of the March 1982 issue of *PCW*, Alan Sutcliffe introduced an algorithm to solve the 'hidden lines' problem in 3D graphics. I have written a program on my BBC model B which uses the methods Sutcliffe described.

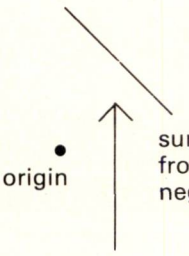
The program allows the user to create simple solid models; save the data for these models on tape and load them back at a later date; edit the model; print out data for the model; display the model rotated through any angle about the X, Y and Z axes at any distance; and create 'sequence' files so that the program will automatically display the model in a series of predetermined positions — the user also being able to save and load these sequence files.

Options

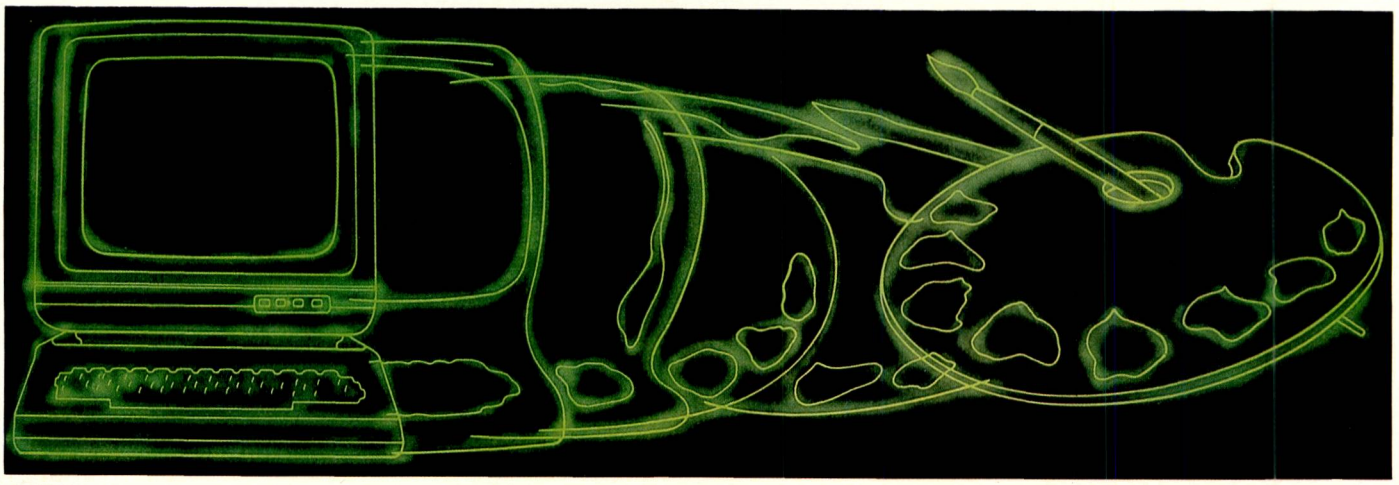
To create a new model you must first decide how many surfaces the model will have, for example, a cube will have six. Remember, however, that all surfaces are (as described here) single-sided. If you want your model to contain a surface which can be seen from both sides, this must be entered as two separate surfaces; the only difference being their signs. You then enter how many points there will be in each surface so that one array can be dimensioned to contain all the points in a model, and another array to point to this array to show where the points are and how many there are for each surface.

The data must then be entered for each surface in turn — the sign is entered first. A surface is negative if it can be seen from the origin, and is positive if it cannot:-





The coordinates for each point must then be entered, together with whether or not the point is connected to the next one. The X and Y coordinates are as normal, with Z representing depth. The program is designed so that if a point is entered as 200,300,1 and the model is viewed at a distance of 1000 units, when the model is drawn (with the origin redefined to the centre of the screen), the point will be at the position corresponding to screen coordinates 200,300. When asked if the point is connected to the next one, the usual answer wil be 'Y', but for the last point in a surface the answer will be 'N'. Entering N causes a point to be connected to the first point or, if N has already been entered for one of the previous points in a surface, it will cause the point to be connected to the point *following* the point for which N was already entered. This allows surfaces with windows to be created — for example, the entry for each respective point in the diagram (see Fig 1) will be



Y,Y,Y,N,Y,Y,Y,N, causing point 4 to be connected to point 1 instead of point 5, and point 8 to be connected to point 5 instead of point 1.

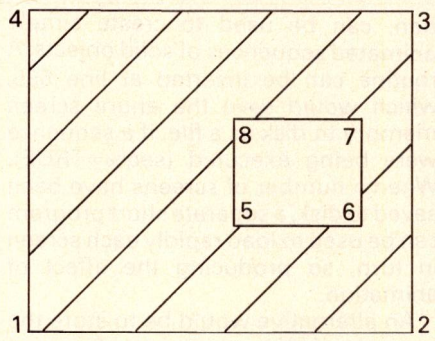


Fig 1

Finally, the drawing instructions for the surface must be entered. These are based on the triangle-drawing facility of the BBC Micro. They cause a surface to wipe out any lines from other surfaces which are behind it. The letters used are 'M', 'P' and 'R'. M causes a MOVE to the specified point, P causes a PLOT 85 instruction using the specified point and R tells the program that the drawing instructions are the same as those for the specified surface. The drawing instructions for a surface with four points would be M1M2P4P3, and if surface 5 of a model has the same drawing instructions as surface 2, then for surface 5 you would enter R2. If a surface has a window then the drawing instructions cause triangles to be plotted over the 'solid' part of the surface but leave the window untouched.

When the coordinates for a surface have been entered, the program calculates an equation surface plane. At this point, a division by zero error may occur due to the method used to calculate the equation. To rectify this, option 6 from the main menu should be used to alter the coordinates of the surface slightly. Luckily, this rarely happens, and the best way to avoid it is never to enter zero as one of the coordinates of a point — use one instead.

When all this has been done for each surface, which does not take as long as you might imagine, the program will calculate the plotting order of the surfaces using the method described here. The program will handle everything including 'frustrated loops': the only thing it cannot handle is the planes of two surfaces intersecting each other. It is left to the user to ensure that this does not happen.

Main menu option 2 may be used to save the data for the model as a named file and option 3 is used to load the data back again.

Option 4 is used to display the model. After choosing the foreground and background colours, you are asked if you want to create a sequence file. If N is typed you'll then be asked if you want to execute a sequence file. If N is again typed, you'll be asked if you wish to see the object being drawn. This allows you to choose between seeing each surface being drawn until the model is complete or simply seeing the complete model appear at once after a pause.

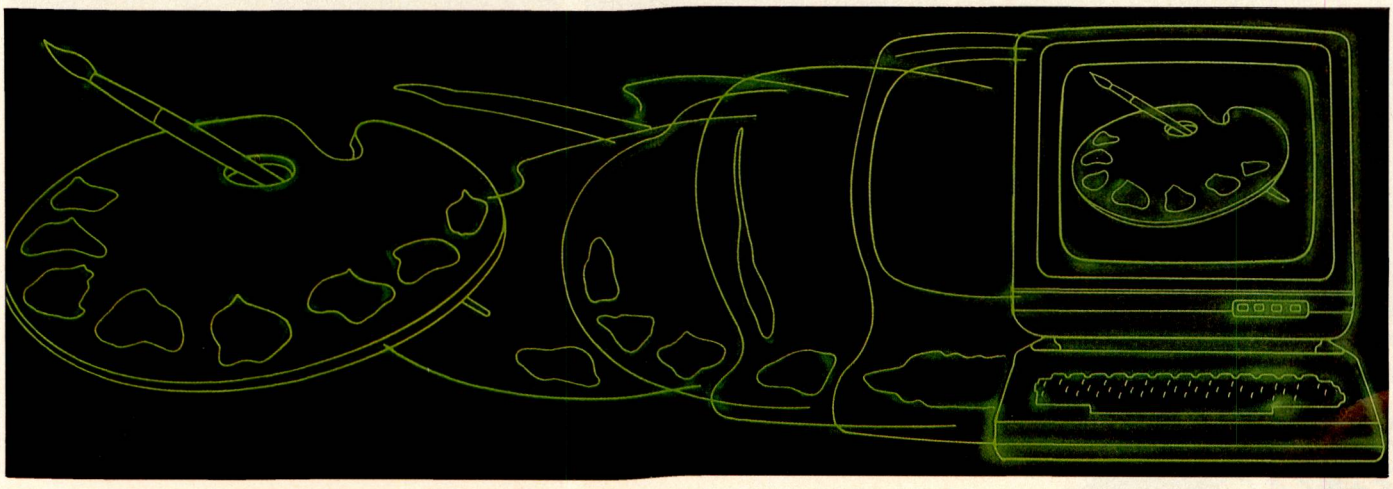
Next, the distance at which the model is to be drawn is asked for. This will depend on the size of the model but, on average, entering 500 will give a good view. Then the rotation of the object is requested. This is the number of degrees the model will be rotated about the X, Y and Z axes, Entering 0,0,0 will cause the object to remain still.

Following this, the screen will blank and pressing SPACE BAR will cause the model to be drawn. At the top of the screen, a line showing the distance to the model and its rotation about each axis will be displayed. The A and Z keys can now be used to alter the distance, the left and right cursor keys used to alter the rotation about the Y axis, the up and down cursor keys used to alter the rotation about the X axis and the DELETE and COPY keys used to alter the rotation about the Z axis.

Once the required distance and rotations have been set, pressing the SPACE BAR will cause the model to be drawn at the new position. To return to the menu press M.

If you type Y when asked if you wish to create a sequence file, a series of positions can be stored which the computer will later use to display the model automatically at these positions.

```
1710DEFPROCfindorder
1720LOCALX%,Y%,Z%,flag,start,pon,poin,val
1730CLS:PRINT''''"Please wait."
1740FORX%=1TOsurf:FORY%=1TOsurf
1750flag=FALSE:pon=pointer%(X%,1):start=pointer%(X%,0)-1
1760FORZ%=start+1TOstart+pon
1770poinx=point%(Z%,0):poiny=point%(Z%,1):poinz=point%(Z%,2)
1780val=poinx*equa(Y%,0)+poiny*equa(Y%,1)+poinz*equa(Y%,2)-1
1790val=val*EVAL(sign$(Y%)+"1")
1800IFval>.1THENflag=TRUE
1810NEXT:IFflag=FALSE THEN1900
1820flag=FALSE:pon=pointer%(Y%,1):start=pointer%(Y%,0)-1
1830FORZ%=start+1TOstart+pon
1840poinx=point%(Z%,0):poiny=point%(Z%,1):poinz=point%(Z%,2)
1850val=poinx*equa(X%,0)+poiny*equa(X%,1)+poinz*equa(X%,2)-1
1860val=val*EVAL(sign$(X%)+"1")
1870IFval<-.1THENflag=TRUE
1880NEXT:IFflag=FALSE THEN1900
1890table$(X%,Y%)="1":GOTO1910
1900table$(X%,Y%)="0"
1910NEXT:NEXT
1920count=0:top=1:bottom=surf
1930FORX%=0TOsurf:marker$(X%)="":NEXT
1940REPEAT:flg=FALSE
1950FORX%=1TOsurf:flag=TRUE:FORY%=1TOsurf
1960IF table$(X%,Y%)="1"THEN flag=FALSE
1970NEXT:IFflag=TRUE AND marker$(X%)<>"1" THEN PROCblankrow:flg=TRUE
1980NEXT
1990FORX%=1TOsurf:flag=TRUE:FORY%=1TOsurf
2000IF table$(Y%,X%)="1"THEN flag=FALSE
2010NEXT:IFflag=TRUE AND marker$(X%)<>"1" THEN PROCblankcol:flg=TRUE
2020NEXT
2030UNTILcount=surf OR flg=FALSE
2040IFflg=FALSE AND count<surf THEN lit=TRUE ELSE lit=FALSE
2050ENDPROC
```
PROCFind Order



C·O·M·P·E·T·I·T·I·O·N

After typing Y you'll be asked for a number of frames: this is the number of positions you wish to store. The model can then be displayed in the normal way. When the model is in a required store position, pressing the '@' key will cause the distance and rotations to be stored in the sequence file. When you've stored the positions you want (the number of frames stored is indicated at the top of the screen), in order to cause the model to be displayed at the stored positions, return to the menu and again choose option 4. This time, use reply 'Y' to the question: 'Do you wish to execute a sequence?' After entering the time for which each frame will be displayed, the computer will display the model at each of the stored positions and when the model has been displayed at all of these, the computer will start again at the beginning of the sequence.

Option 7 may be used to save a named sequence file and option 8 to load it back again.

Option 5 will print the data for a model either in paged mode or on a printer.

Option 6 may be used to alter the data for a model. This option cannot be used to alter the number of surfaces or points in a model. To do this, option 9 must be used. This loads a file, making room for the extra surfaces and points. The user can then alter the number of points in existing surfaces and specify the number of points in any extra surfaces. After doing this, option 6 should be used to alter any existing data, if required, and to add new data for the extra surfaces.

Pressing ESCAPE at any time causes a return to the menu — this is the only way to achieve this when the program is executing a sequence. If the menu is already being displayed then pressing ESCAPE will cause the program to end.

The program, with some modification, can be used to create simple animated sequences of solid objects. A routine can be inserted at line 595, which would save the entire screen memory to disk as a file, if a sequence were being executed (seq%=TRUE). When a number of screens have been saved to disk, a separate short program can be used to load rapidly each screen in turn, so producing the effect of animation.

An alternative would be to store the equivalent VDU code and data for every graphic instruction executed (PLOT, DRAW, and so on) during a sequence. By using a separate machine code routine to access the VDU codes, you can then execute them rapidly using an OSWRCH call, again creating the effect of animation.

Free offer

Included in this article is a procedure from 3D solids: PROCFind Order creates drawing routines. Instead of printing a full listing, we've decided to offer readers a free copy of the program instead.

To take advantage of this offer, send in the logo tab from the corner of this page plus a blank C15 cassette and a stamped, addressed, padded envelope.

As this is an experimental offer and we can only speculate as to the response, be prepared to wait a couple of weeks before you receive the program.

Rules & Categories

Due to lack of space we are unable to print the competition rules and categories this month. These will be printed in the June issue together with the entry form. The closing date for entries is 15 July, 1984.

Next month: Micro Animation at Lanchester Polytechnic.

END

Micro Animation Competition Prizes

Schools Overall Winner: Fujitsu 16S microcomputer (*)
Individual Overall Winner: Fujitsu 16S microcomputer (*)
Schools Category Winners: 48k Spectrum, Microvitec colour monitor, Sinclair Macmillan software
Individual Category Winners: Oric Atmos 48k microcomputer
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Special Category Winner: Fujitsu FM7 microcomputer (*)
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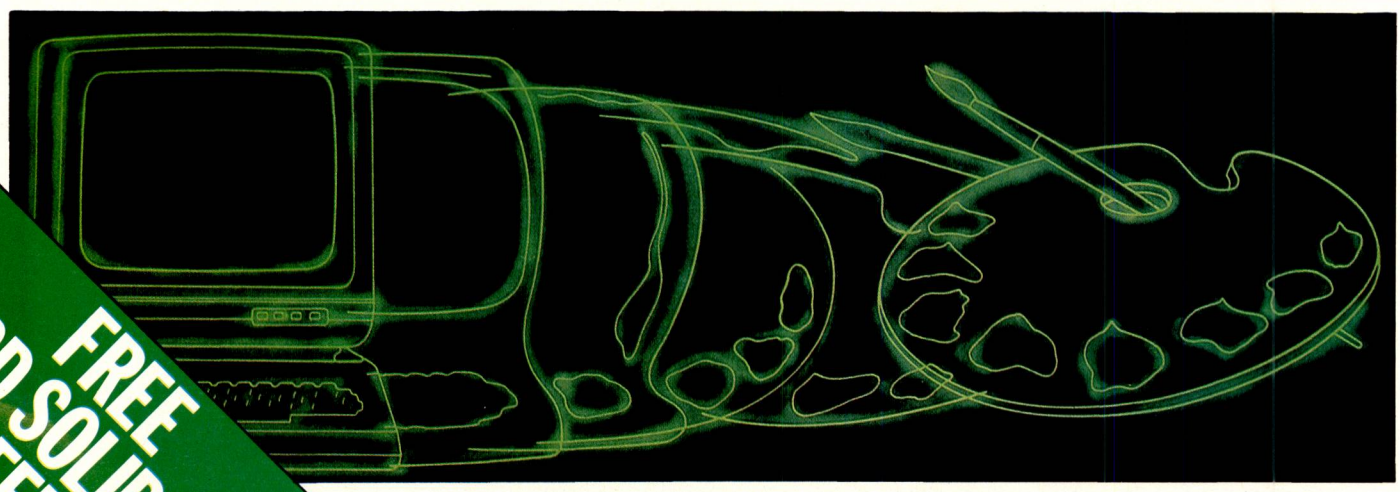
Other prizes to be awarded at the discretion of the judges: Atari 600 XL microcomputer; two £100 libraries of microcomputer books; and a host of software prizes for all makes of micros
(*) Fujitsu specifications
16S: 128k RAM, 2x320k double-sided, double-density drives, 6809 plus Z80A plus 8086 processors, colour monitor, CP/M-86, WordStar, Supercalc 2, FBasic, software selection to suit.
FM7: 64k RAM, 48k video RAM, 6809 and Z80A processors, colour monitor, CP/M-80, WordStar, Supercalc 1, FBasic, software selection to suit.

Our thanks to: *Fujitsu Mikroelektronic, Sinclair Research, Oric Products, Microvitec, Hantarex (UK), Brainwave Software, Atari Inc and Century Publications for their interest and sponsorship of this competition*



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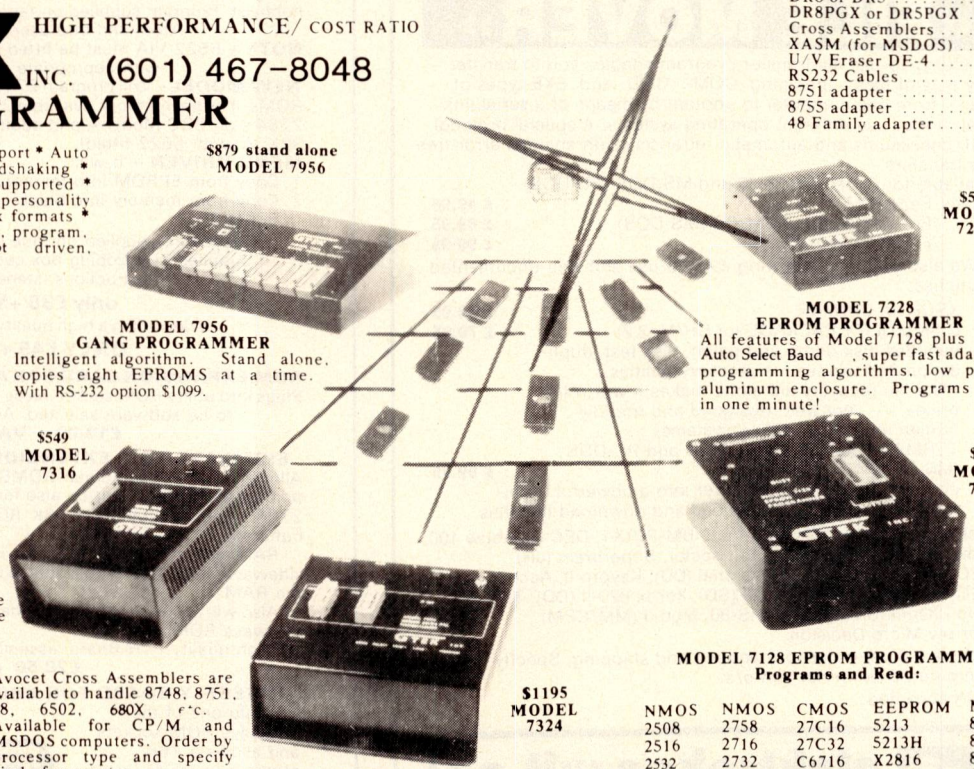

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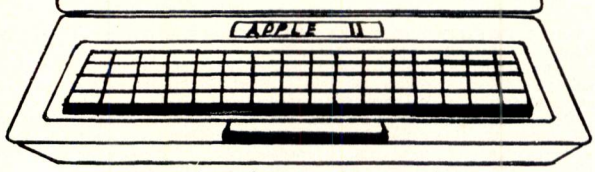

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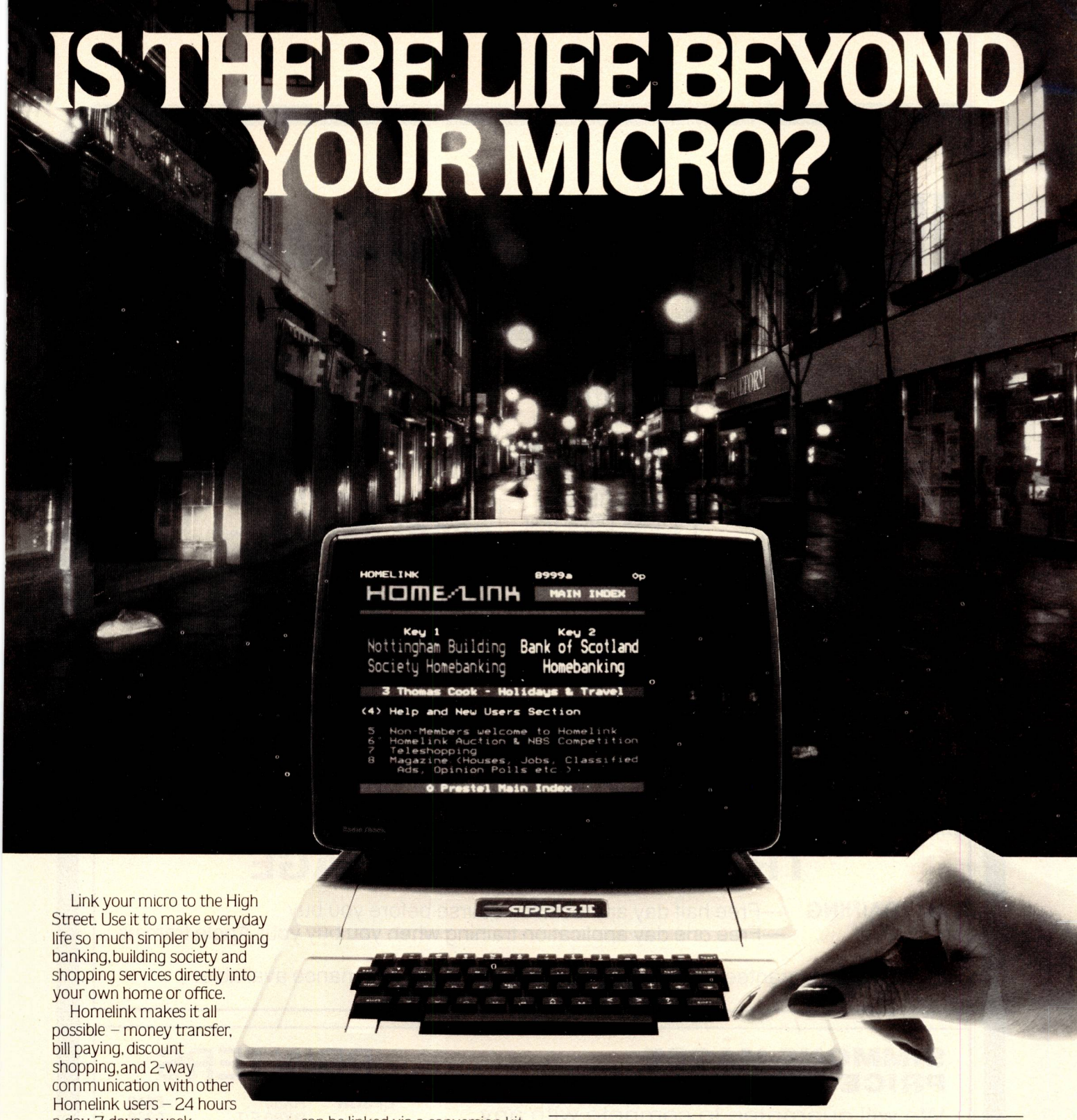

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Homelink

And now the moment you've all been waiting for. Jerry Sanders brings you details of the Nottingham Building Society's games competition for Homelink, its home banking system, and the great prizes to be won.

The Nottingham Building Society ('NBS') is offering first-class prizes\in return for great ideas from *PCW* readers. Homelink, the NBS's home banking system, runs on a 2Mbyte mainframe computer. At the moment it has a lot of spare capacity. One of the ways the NBS plans to fill it, is by offering Homelink members a computer game option.

This is where *you* come in. Submit your idea for a game playable on Homelink/Prestel-type technology. Successful games will almost certainly minimise the amount of 'live' telephone time required to play. You should also bear in mind that different kinds of equipment may be used by Homelink members, ranging from a 'dumb' alphanumeric keyboard without any memory to 16k micros. Other members will have access to microcomputers; therefore you might include options to allow owners of different kinds of equipment to take part, or submit an idea for the 'lowest common denominator' of terminal and suggest how the use of more sophisticated equipment could permit the game to be developed.

Possible alternatives would be for games playable against the mainframe, by individuals or families, or, using the mainframe, between participants in different houses.

The three best ideas submitted by *PCW* readers and considered suitable for implementation on Homelink will be awarded prizes as follows:

First Prize. £250 investment in the Nottingham Building Society plus £250 in cash, plus a Tandata Home Deck providing a full Homelink service.

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Each prizewinner will receive, in addition, a free Prestel subscription and use of Homelink for one year.

You may submit as many ideas as you wish, but only ideas received before the closing date of 30 April, 1984 will be valid. The winning entries will be published in *PCW*.

No copyrights will be acknowledged for the basic ideas submitted in this competition. It is intended that the software for the winning ideas will be written by the Homelink computer teams and used on the Homelink service as soon as possible. *There is no need, therefore, to submit any programs to illustrate your ideas unless you wish to do so.*

Entries should include sufficient information to indicate how the games would be played on Prestel/Homelink technology (see last month's *PCW* for a review of the Homelink system). The address for submissions is Homelink/*PCW* Competition, Nottingham Building Society, 5-13 Upper Parliament Street, Nottingham NG1 2BX, tel: (0602) 419393.

Remember the closing date for ideas is 30 April, 1984.

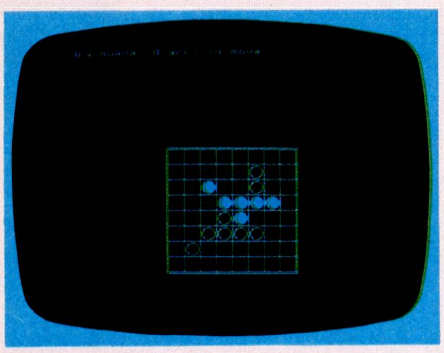


Illustration by David Draper

NewBrain software

If Jerry Sanders' ever-growing collection of software is anything to go by, the NewBrain is alive and well and showing remarkable versatility. Here he presents a selection of programs for this long-suffering but resilient micro.

This month we look at a selection of software for the NewBrain: programs have been received from all the major NewBrain software suppliers. It's surprising how much software is available for this machine, and encouraging to note that as far as the software houses are concerned, the machine is still very much a going concern.



Othello

Suppliers: Brainwave Software & Angela Enterprises
Price: £5.75

These two versions of Othello gave me the opportunity to play the programs one against the other, and turned out to be a real contest! Advantages can be won and lost very quickly, making it an enjoyable and gripping game. The idea is to populate an eight by eight grid with men of your own colour.

Both versions offer three levels of play, but whereas Angela Enterprises ('Angela') limits itself by offering a 40 or 80 column screen and reverse video if required, Brainwave bristles with options worthy of a chess program. Both contain on-screen instructions but you can only play against the computer with Angela, whereas Brainwave will play with itself, with you, or stand idly by while you and a friend make fools of yourselves. Moreover, Brainwave lets you set up positions before starting so that Othello analysis work can be done. It also lets you choose who starts: Angela always goes first, without any discussion.

Move-plotting times are the same for both programs, although I'm sure Brainwave put up its own conquests faster than mine when I played it. Thinking times differ though, with Brainwave taking three to seven seconds longer: Angela's maximum on level one was 23 seconds and I beat it. On level two, the machine's thinking time goes up to 27 seconds and the game gets harder. On level three, the machine first contemplates its chips for twenty seconds: if it finds a move it likes, it plays, otherwise it twitches (yes, twitches) and allows itself a further 20 seconds thought (my only hope was a power failure).

The programs use different move-entry methods. Angela asks for target square coordinates, but Brainwave gives you a cross-hair to move with the cursor keys. Angela acts on your input immediately (that is, two key strokes only for each move) but Brainwave demands a NEWLINE once you're on target. Although this is more gutsy than entering a coordinate, it's a lot less efficient when there are more than a dozen pieces on the board and your move is *over there*.

The Brainwave program loads in three minutes 40 seconds, much longer than Angela. Was all the extra used up in fancy options, or would it hammer Angela with its superior algorithm? Angela opened and for ten goes each it was neck and neck, but Angela got the upper hand in the end.

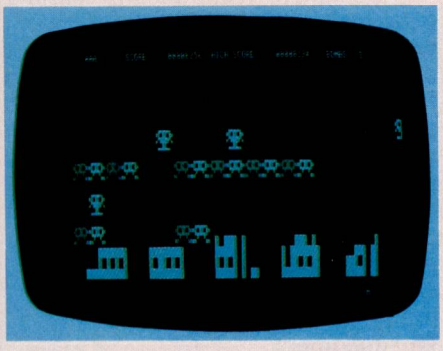
The game took an hour and a half to play. It doesn't prove Angela's superiority beyond doubt — what would have happened had Brainwave started? Editor Bird wasn't going to be pleased if I spent another hour and a half refereeing two psyched-up NewBrains. Incidentally, cheating wasn't possible as the score was kept by Brainwave.

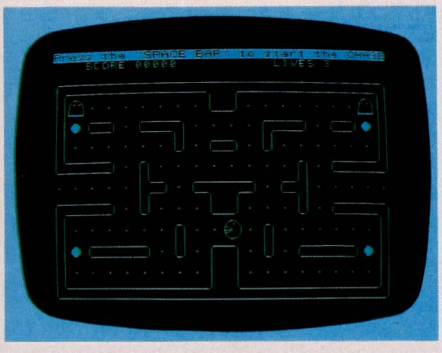
I used Brainwave's position options to start one game with a piece in each corner, making any move illegal. The program responded by crashing out with an error 28 (illegal switch value) and returning to Basic. Then — no call

	Angela	Brainwave
1.	F4 (After me)	D6 (See if I care)
2.	F3	C6
3.	E3	F5
4.	F6	D3
5.	C3	E6
6.	F2	G3
7.	H3	F1 (1st edge to Brainwave!)
8.	C5	C4
9.	B6	C7
10.	C8 (revenge)	A6 (The two programs mirror)
11.	D7	E8 (Brainwave's third edge)
12.	G4	D2
13.	C1 (mirror)	G6
14.	E7	E2
15.	D1	C2
16.	H6 (weeell..)	F7
17.	B1	G5
18.	B4	A3
19.	G8	B5 (I could do with a drink!)
20.	B3	H5
21.	H4 (	A2
22.	H7	D8
23.	F8	H2
24.	H1 (corner!)	G7
25.	H8 (another!)	B2
26.	A1 (another!)	— Brainwave cannot move
27.	B7	A8 (small compensation)
28.	A4	A5
29.	B8	A7
30.	G1	E1
31.	G2	(Last move: Brainwave loses 47/17)

Fig 1 Othello: Angela v Brainwave

code, no more Othello except by reload. If you do reorganise the start positions, make sure both sides have legal moves available to them. This reload nightmare is revisited in Brainwave's Woodcutter, also featured here.

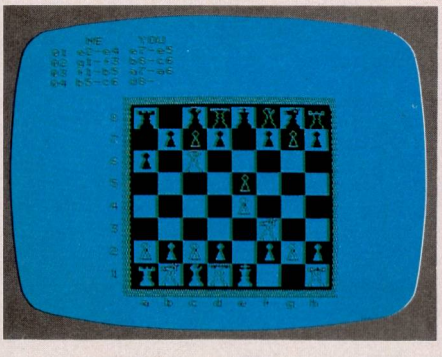




Invaders & Brainchase

Supplier: Angela Enterprises
Price: £9 each

At last the NewBrain can call itself a real computer. Why? Because you can play Pacman and Space Invaders! These examples from Angela Enterprises are true machine code versions, look like the real thing and give the player real wrist ache, too. For Atari and Spectrum freaks used to multicoloured splat!s and pow!s they will seem tame, but for NewBrain owners it might be a whole new experience!



NewBrain Chess 2

Supplier: GFG Microsystems
Price: £15

The Grundy Business Systems Chess program by CP Software is acknowledged by the few that know and love it to be a good one. Once again, the tape GFG Microsystems provided had a 'Copyright Deep Thought' label, but the Chess 2, once loaded (two minutes 55 seconds), had a CP Software copyright message on the screen. I loaded Chess 2 into the NewBrain that had lost at Othello, and Chess 1 (three minutes 15 seconds) into another. At level two of seven, fast mode for both programs and with Chess 1 playing white to try and even things up, Chess 2 still achieved checkmate.

Although Chess 2 has no documentation, it appears to have all the features of Chess 1: play and analyse modes, seven levels ranging from a five second response (for beginners) to hour-long responses. Moves are input algebraically with invalid moves rejected. Castling and *en passant* are supported: pawn promotion is automatic to queen, but can be altered if required. By keying 'R' during your turn, the programs will recommend a move which you can accept or not.

Altogether, two of the best games programs around for the NewBrain. What a shame they weren't entered for the 4th European tournament held last year.

Woodcutter

Supplier: Brainwave Software
Price: £5.75

A game in which you rush about madly in forests grabbing gold. Grab enough and you graduate from pine to birch and finally to oak thickets. A limited amount of strategy is required since you can munch trees that get in your way, but this scores minus points. The graphics are good but limited — the woodcutter figure about-turns as he weaves left and right through the forests. The three species of trees actually look different on screen.

Each level is timed to 80 seconds, and if you don't reach the required forest upgrade score you go no further. The screen redraws itself if you have another go, taking 20 seconds or 25% of playing time. Make sure you really want to stop when you decide you've had enough. If you say NO when prompted to play again it really is curtains — there's no program left to RUN, and there's no manual to help you.

NewBrain Draughts

Supplier: GFG Microsystems
Price: £15

The label on the tape says 'Copyright 1983 Deep Thought', but the welcome screen says 'Draughts Master, copyright CP Software 1983' — Whoops?

Nine skill levels are offered, together with the option of full capture search. After choosing your colour, pieces are drawn up and the game begins. Make a move by entering source and target square coordinates. For example, my first move was g3 h4, to which the program responded b6 c5. Unfortunately, after four moves each the program declared all my moves illegal and prompted me for new ones, so I couldn't take the challenge any further.

Word Processors

Brainwriter is **Brainwave Software**'s word processor. Written in relocatable object code, it loads in two sections: the second (main) part takes two minutes 47 seconds.

The first menu offers 13 options:
Create document
Load document
Save document
Print document
Display/amend document
Format document
Reformat document
Set printer speed
Search text
Search and replace text
Right justify
Copy
Finish

On selecting option 1, prompts are issued for left margin (min 2), right margin (max 80) and number of lines (max 66).

The document page is bounded at top and bottom by a rule in traditional word processor style, but has no menus. The left and right margins appear on the rule: if a page is greater than 25 lines in length scrolling takes place.

The search function highlights a found word in reverse video, but takes note of upper case. If you search and replace with a longer word, the new word oversteps the right margin and the text must be reformatted using main menu option six, format text. Option 7, reformat text, is used to change the format to a new layout. The search and replace function replaces all, with no reject option on individual encounters.

Block copies are enabled between pages and to the same page: no block is actually displayed and you are returned to the main menu once the copy has been effected. Wordwrap is standard and efficient.

The tape-based program allows for a maximum of two and a half pages to be worked on before saving to tape is necessary (an EPROM version holds three pages). The current page number is displayed on the main menu. Each page holds a maximum of 66 x 78 characters, or 1000 words. Documents are known to the program as Page 1, Page 2 to begin with, but when the save option is used a name can be given: up to eight characters are used. The delete page option is missing on the main menu. Once you've saved the pages you are working on, use the create page option and your previous work will be automatically erased as the new page is created.

According to the manual, the stop key should get you back to the main menu without saving the text, but my stop key did nothing. 'Stop' followed by 'escape' gives you this option.

The program comes with a five-page buff handbook, and overall it's a good

simulation of a 16-bit word processor — handy to use, with a back-up copy provided on side two of the tape.

Braintext is a mini word processor from Angela Enterprises. It loads in one minute 40 seconds, and offers a nine option menu:

1. Create page
2. Directory list
3. Load page
4. Display page
5. Print page
6. Save page
7. Delete page
8. Printer installation
9. End

The create page option gives the choice of a 40 or 80 column page (page length is initially 33 but may be reset by altering line two of the program). The page offered is a blank screen with no frills: no wordwrap is available, so you must end a word before the line ends. If you go over, you lose the first character of the new line. Control E exits from the page with a save page option. If you say yes, you are asked for a header (title). The number of free bytes is always displayed on the main menu to give an idea of how much text can still be input. Braintext will only load pages created by Braintext: if you try to load another word processor's file you get the message '??? Not a BRAINTEXT FILE???'.

The printer initialisation option asks for baud rate, and also asks which device is to be used (printer or comms), so the pages can be output on either (Brainwriter only accesses the printer port).

No copy option is given on the menu, but if you display a page and then exit immediately, choosing to save the page, you will be given a copy or replace option. 'Copy' makes a copy of the page on the next available page number: 'replace saves the current page as it now appears on the screen as the page number displayed.

Many pages can be created, as each empty 80 column page plus its header only occupies 13 bytes of memory. The free-bytes count indicates the amount of space you have left as each is used.

None of the word processors reviewed here use virtual screens. When you request a page, it types itself out on the screen as you watch rather than appearing all at once. Braintext comes on one side of the tape only. No manual is supplied, you have to rely on two sheets of A4 paper. One excellent feature is the use of control C (for 'cut') to mark the page end — this saves memory and paper. Printer control codes may be embedded in the text and output prior to printing.

After fiddling with the recorder volume settings, **Propen 32** from the **Elstree Computer Centre** loaded in two parts. Part one offers seven printer options: Oki, Epson, Star, Walters, Shinwa, CP80 and Matrix. A further two and a half minutes loading takes place, and you are asked for the number of lines required for a page (max lines 250, max width 79). These parameters remain set for the rest of the session. If you choose a 39-wide page you still get the small characters used on the 80 column wide screen. As soon as the second parameter is returned you go into a blank screen (the page): blank, that is, except for a single prompt character. This, and the fact that no menus are offered anywhere during use, leads to a rather unfriendly program after the initial prompt-response phase.

Unlike the previous two programs, Propen's text entry and cursor travel speed are not slower than normal immediate NewBrain operation. The functions available are comprehensive (see Fig 2) but didn't work in my version. Mr Fish at Elstree confirmed that there was a bug in some copies of Propen, but said that anyone who had bought this version will be supplied (for the cost of the postage) with a bug-free updated version which includes some extra facilities.

Forwarder Computer Resources has specialised in NewBrain software for some time in the area of complex forms processing for industry. It has now launched some of its range on the 'open' market, including **OE(t)** and **NewWord.** The remarkable thing about Forwarder's programs is that they are the first programs for cassette-based machines to work on the program generator principle. Each time Propen is used, you must wait for the printer specs to be loaded in. With NewWord, you create a custom designed program from the generator tape once, and then use the tailored version thereafter. You can, however, create more than one custom version.

The manual recommends starting with the customised example version, which I did. On entering RUN, a prompt OE(t)v.01 appears and you are asked to fill in the date. After a brief pause, the prompt Command> appears: type WORDS or RUN. At this point, the program begins to operate like a CP/M system — prompts and file names all conform to CP/M types. A menu appears:

Create Document
Print Document
Edit document
Directory
Change Settings
Exit

Selection is by moving the prompt arrow with the cursor keys. On selecting Create Document, the user is prompted for Output file and Document. Output file can be entered (for example, Myfile) and the system adds the extension .txt. Like CP/M, the true filename of a file includes the disk drive identifier, so by specifying t2: Myfile, in NewWord, output will be written to tape port 2. Once these parameters are entered, you are prompted to set the tape recorder to record, with a blank tape in position. On pressing return, the

Feature	Brainwriter	Propen	NewWord	Braintext
Price	?	?	?	?
Max pages in memory	2½***	5*	1**	30*
Set page width	YES	YES	YES	40/80 only
Set page length	YES	YES	YES	YES
Auto page number	NO	NO	YES	NO
Send printer codes	YES	YES	YES	YES
Search	YES	YES	YES	NO
Search/replace all	YES	NO	YES	NO
Search/replace select	NO	YES	YES	NO
Cut and paste	YES	YES	YES	NO
User-defined tabs	YES	YES	YES	NO
Right justify	YES	YES	YES	NO
Centre text	NO	YES	YES	NO
Insert system date	NO	NO	YES	NO
Word wrap	YES	YES	YES	NO
Reformat page	YES	YES	YES	NO
Mark page stop	NO	NO	NO	YES
On-screen directory	NO	NO	NO	YES
Cursor posn. indicator	YES	NO	NO	NO
Header/Footer line	NO	NO	YES	NO
CP/M compatible files	NO	NO	YES	NO

NOTES: * Depends on page size
** Automatic tape I/O
*** 3 in EPROM version

Fig 2 Word Processor Comparisons

details are written to cassette and the screen changes to show a header line and an end-of-page line, with Document name and page number also shown. Pressing newline again erases the header and leaves the page number written at the bottom of the page: typing can now take place. When the escape key is pressed, the top three lines clear (no text is lost, just stored in memory), the command prompt reappears and commands can be entered. These include Next (write current page to tape and clear screen), Print, Document (write new header to tape file and reselect page number to 1), Find, Page (write page number at specific line and column), Wipe (clear current page without saving to tape), Cut, Tabs, Justify, End and Quit.

A second series of commands operates at immediate level using the control key sequence. For example, word wrap may be set with Ctl R — it's slightly slower in operation than the Brainwriter program.

'. . . as far as the software houses are concerned, the machine (NewBrain) is still very much a going concern.'

NewWord Generation Tape comes with a 40-page manual and is designed to be used under OE(t). Its main advantage is that since all storage and access is via tape I/O there is no limit on the size of documents it can handle. It's a professional package to the standard of disk-based word processors, but has the disadvantage of slow recall time. NewWord files are CP/M compatible and can therefore be used if your system is upgraded to CP/M operation.

A quick word about Forwarder's OE(t) (Operating Environment (Tape)). This is the equivalent of a disk operating system utility package for tape based applications. 18 standard commands are supported, and it provides a standard base for applications development. It's a novel and original approach, which will enable NewBrain users to capitalise on the machine's two tape ports. It remains to be seen whether the slow response time of tapes against disks makes this environment a true alternative to a CP/M upgrade. Tab and margins can be changed at any time to create multi-column text.

On to a database now, with **Sum-It's General Database** program. The main transaction menu is split between field enquiry options and four transactions: create new database, sort data, add new data and closedown. I created a database for my NewBrain software with five fields, giving an average field length of 15 characters with up to 250 records — up to 12 fields are allowed. Once created, the main menu alters so that the enquiry options match my fields. Option 20 allows new data to be entered. Option 30, labelled 'Sort data in ascending fields', performs a strict alphabetic sort on field 1: curiously, this transaction is not documented in the 9-page (Grundy Business Systems) manual supplied. Option 40 allows the creation of a new database, while 99, the closedown option, is the gateway to saving your base onto tape.

As a point of comparison, I looked at another database program received from Grundy, **Solid State Database** by **Dean Software**. Before the database manager is loaded (NW1CDBV1.1) you need to run the SETUP program to create the database you will work on. Using two programs gives more space for manipulating records, and a better selection of options than the General Purpose Database from Sum-it.

On running the set up program you are invited to set up the page details for the database program. The first question asked is: 'Have you read the manual?' If you answer no, 'MESSAGE — WELL WE STRONGLY RECOMMEND THAT YOU DO!' appears on the screen and you are locked out of the program: no choice but to read the manual. Almost no choice . . . any key gets you on to question two. Do you wish to see a sample page? Question three asks for pages per record (1-10).

Whatever you choose, the next screen tells you how many records and fields this size of page will allow: one page gives 255 records of 10 fields. Question five asks for a page header of up to 20 characters: once entered the record is displayed on screen — any keys gets you through to the field naming menu. Fields are limited to nine characters. Print options for record and summary print are then offered, including printer baud setting menu: you then set up the report from the record order. Finally you are prompted to assign a name to the datafile (up to 25 characters). The set up base is then recorded onto tape, ready for its input into the management half of the program which must now be loaded.

Once in, reload the created base skeleton: this leads to a nine point menu:

1. Set up a record
2. Delete a record
3. View a page
4. Calculator
5. Browse
6. Search
7. Print labels/summary
8. Sort file
9. Save data and end program

The number of free bytes is also given. Option five, browse, scrolls through the base at about six seconds per record: this can be overridden using the F(orward) B(ack) P(rint) and L(ock printer on) keys. H(alt) resets the printer lock to off and halts the browse, which can be repeated using G(o). Browse direction can be R(eversed): any other key returns to main menu.

The calculator mode offers six options: A+B=C; A−B=C; A*B=C; A/B=C; A*CONSTANT and SUM OF FIELD A. Prompts are issued to enable you to specify the relevant fields: calculator mode fails if alphabetic data is in the chosen field.

This calculation mode is a very attractive feature of the database which is excellent throughout. The search option copes with numbers within a specified range as well as string data. The facility to reorder fields within a record means that, in practice, it's possible to sort on any field, since the key field will always be the first field on the first page. Thus, if the database has been set up with field five as SURNAME, by making SURNAME the first field on the first page of record one, all records will be sorted into surname order. ASCII code order is used, so all capitals will be sorted before lower case characters.

This database is the same as that marketed by Kuma on behalf of Dean Software for the MZ-80K, MZ-700 and Commodore machines. Although the version I saw came in Grundy Business Systems ('GBS') packaging, it is now available from Kuma and I highly recommend it.

Dean's other NewBrain program, **Solid State Accounts** has not been well received. Dean's managing director, Peter Nobblett, said that GBS had altered a line of code before duplicating the program, with the result that the program was ruined. The philosophy is the same as that of the database — run a SETUP program first to define the income and expenditure categories, save the record type to tape and then input it to the manipulation program. The SETUP program appeared to work, and NW1CACv1.4 (the account management program) loaded properly, as did the file cassette. However, when I attempted to enter data, an error 30 message flashed up and the program came to a stop with an END OF PROGRAM message. Peter Nobblett had told me that I should be able to type goto 2000 when this happened and get back in the program: when I did, I caught sight of the message ERROR 30 IN LINE 2120 before the END OF PROGRAM message recurred.

GBS are looking to correct this error so the accounts program may well re-appear, also through KUMA.

END

'Although the version . . . came in Grundy Business Systems packaging, it is now available from Kuma and I highly recommend it.'

The NewBrain State of Affairs



Take it from us: buying a NewBrain remains one of the best investments you can make.
As the Dutch importer, we were well aware of NewBrain's special features. Now we produce this tiny computer ourselves, and our research staff has analysed its lay-out and system software. And there is only one conclusion: the NewBrain belongs to the select group of ingenious British designs; the machine is a survivor.
Sounds like producer's propaganda? Sorry, but we know what we're talking about. Tradecom International is active in the world of big mainframe computers. We supply terminals, printers and other peripherals and adapt them, if need be, to our clients' requirements.
Designing data communications networks is another of our specialities; we offer multi-colour solutions connecting IBM, DEC, Burroughs and any other protocol in the book. Our clients rank among the big multinationals; the names which keep coming back in the headlines of the stock exchange pages.
In addition to mainframes, we also know what minicomputers are all about. We design and deliver, for instance, a system custom-designed for medical specialists, based on the Hewlett-Packard/250 minicomputer.
Tradecom International is no mass-producer; our products are made to measure.

The NewBrain fits well in our marketing philosophy. We don't regard it as a refined game-machine (although we do offer the best of these as well). It is, instead, a professional tool for professional applications.
Among the applications lies the field of education. So we've designed the Masternet, a module which can link up to 15 NewBrains, together with floppy disk drives, printer, cassette recorder and eventual sub-modules — each bringing into use another 15 NewBrains.
This sophisticated classroom network allows teaching by computer. The possibilities are myriad. Using the Masternet, the teacher can communicate with one pupil, a group or the entire class for lessons in more than computer programming. Geography, mathematics and more can be laid open to the pupil using our system.
And we've written a program for language training as well, which allows the loading and recording of correct spelling *and* pronunciation on the same tape. The image on the screen can be combined with instructions from the recorder; a handy and functional tool for any school.



These examples show the way we see the NewBrain. It gives the best performance in a professional environment; a quality you may benefit from at home.
We don't consider it our job to offer glib solutions. We provide tools to solve problems.
So don't expect yet another model from us every season. We aim for carefully thought-out extensions and improvements. (The term of depreciation on your NewBrain has taken a turn for the better, dear buyer. Take it from us: you've made a sound investment.)
Expansion interface, disk controller and disk drives (200, 400 and 800 Kbyte) are now available. Standard CP/M[1)] programs can be run on your NewBrain. And there is much more to come.
As you'll understand, reorganisation and rescheduling is currently the order of the day at NewBrain. But we'll surmount these problems and grow.
With a period of rumour and liquidation behind, it is now 1984: NewBrain's future has only just begun.

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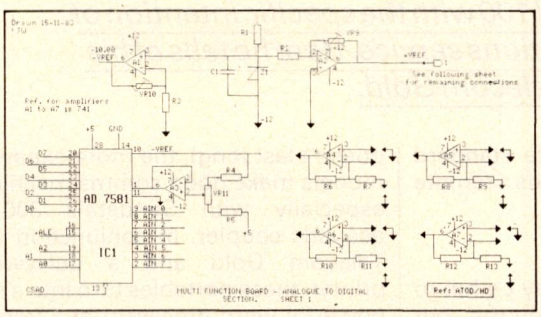

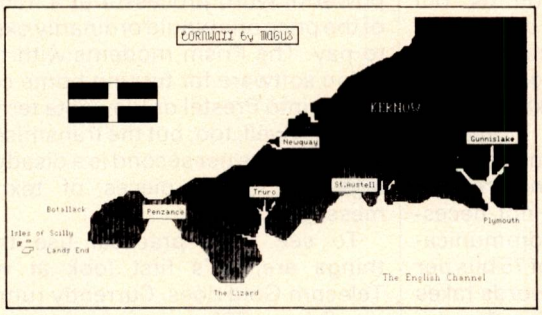

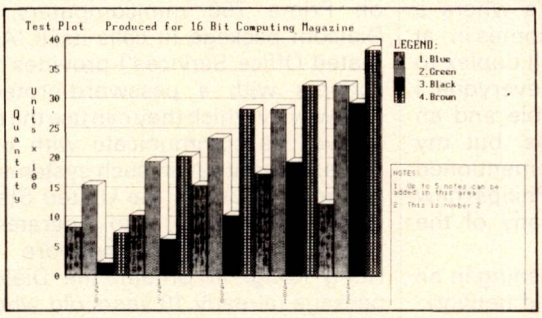

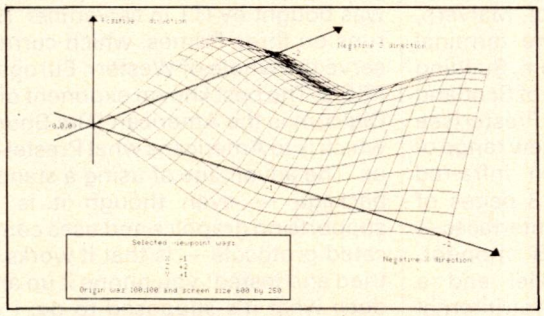

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24-Carat Gold

Menno Aartsen bought himself a Tandy Model 100 with the specific intention of using it for word processing via a communications service. Here he tells of his experiences with British Telecom Gold.

Tons of expert writing about computer communications bear witness to the fact that making microprocessors talk to each other is very difficult: even within one family of micros, differences are vast. They may be a challenge for the real computer buff, but the rest of us have increasingly come to rely upon services like Prestel, BL's Comet and Telecom Gold to give the answer to reliable computer communications. As long as an RS232 interface is provided, micros can chat to each other, and even that can sometimes be dispensed with: a lowly 16k Spectrum with Prism's VTX 5000 modem will do the job just as easily as Apple's Lisa.

Satellites

Even Arthur C Clarke never envisaged the use of satellites as a communications device enabling two-way traffic between ordinary citizens. What made me see the light was the conversation I had with a Dutch PTT official, who told me that I was, in fact, accessing my London Telecom Gold mailbox, via the Dabas network, from Holland via New York. Once you've conquered your amazement, it makes sense, but think of it — the most efficient way to talk to British Telecom's Prime 750 from Europe is through an Amsterdam satellite uplink, switched back to London by an ITT Dialcom system via the undersea cable linking New York and London . . . It puts New York in an entirely different perspective . . .

Don't for a minute think this facility is only for 'big' business — the eight minutes connect time I used cost me 12p exactly, on top of the standard charges. In fact, all ITT Dialcom systems (just one of the many communications networks, which happened to be the first to expand worldwide) are permanently interlinked through what is known as a 'packet switching system', enabling the user of any member system to call up any other, as long as he or she knows the system number. As a Telecom Gold user, I can talk to any subscriber to The Source without incurring more than local London call charges plus BT's computer charges (currently 10.5p per minute standard rate and 3.5p cheap rate), plus a remote connect charge of 30p.

Purpose

But what is the point? It may be fun to have access to 'computercomms', but does it serve a purpose? For those of you who subscribe to Prestel through Micronet, the answer is probably yes. Micronet has grown quickly, and its various communications services, from the Sympatico dating bulletin board to Micronet's Helpline are very busy. Prestel, however, is not necessarily the best medium for communications — at a sending speed of 75 bits per second, anything over 20 words takes an age to transmit. That's where a service like Telecom Gold comes in; at baud rates from 300/300 full duplex to 1200/1200, it is all things to everyone: I use Tandy's TRS-80 portable and an acoustic coupler to access, but my office can use the aforementioned Spectrum just as easily as Philips' new P2000C transportable on any of the speeds mentioned.

One of the companies cashing in on the success of viewdata and networking services is Tandata of Malvern, Worcs. Theirs is the home terminal supplied by the Nottingham Building Society and the Royal Bank of Scotland for the Homelink Service on Prestel (see *PCW*, p232, March '84). Its new range of terminals now feature an infra-red remote keyboard, up to 13 pages of memory and a full range of interfaces — UHF and VHF TV, RGB monitor, RS232C, Centronics parallel and a cassette port, not to mention an internal modem and an autodial facility with multiple number storage.

Obviously, most business micros will support Viewdata and Videotex in their standard software packages, but the latest success story originates in Japan, where Kyocera Ceramics produces NEC's PC, Olivetti's M10 and the Tandy TRS-80 Model 100. All three machines sport both a text editor and a telecommunications package in ROM. Although they're not much use in their cheapest version (8k of memory doesn't last long), the more expanded models make good comms machines, especially with Sendata's 300/300 acoustic coupler. In conjunction with Telecom Gold and a daisywheel printer, these portables turn into a very powerful word processor at a fraction of the price one would ordinarily expect to pay. The Prism modems with their Scion software for turning home computers into Prestel or Viewdata terminals work well, too, but the transmission rate of 75 bits per second is a disadvantage for longer pieces of text or messages.

To see what practical use these things are, let's first look at what Telecom Gold does. Currently running on Prime 750 minicomputers, the Dialcom package (it calls itself 'Automated Office Services') provides subscribers with a password-protected gateway by which they can use the mini as well as communicate with other users. Twenty seven such systems are currently in use in the United States, while the system also operates in Australia, Canada, Singapore and Hong Kong. In Britain, the Dialcom package (already 10 years old when it was bought by ITT in November 1982) runs on three Primes, which currently serve the whole of Western Europe via PSS's. The best known exponent of ITT Dialcom is the American 'The Source', which is to Americans what Prestel is to us. The advantage of using a standard package — even though it is old, supports no graphics and uses complicated protocols — is that it works. It's tried and tested: you phone it up and it does what it's supposed to do. I was impressed when I first acquired my mailbox: one set of application forms sent off, one Tandy bought off the shelf with only its built-in software, one telephone call and *voilá*: I was in! But what do you do if your're in and you've got bored with mailing friends and playing poker?

Since there is no standing charge and a cheap rate is available at night and at weekends, systems like Prestel and Telecom Gold can be used efficiently at low cost. Using a micro enables sub-

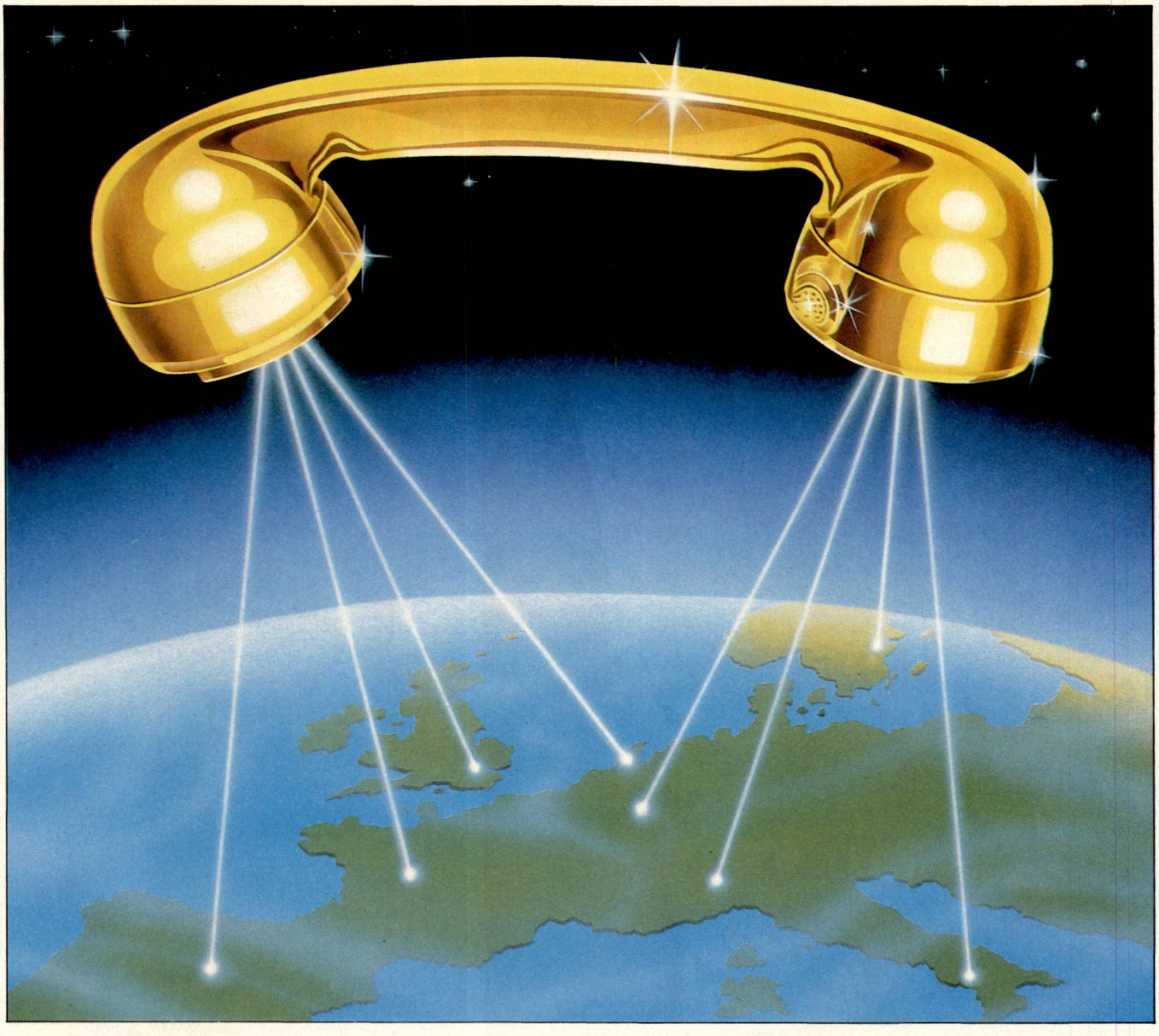

Illustration by Brian Bar

scribers to prepare their material during the day, and go online during cheap rate times. For word processing, machines like the Tandy are ideal — its own simple facilities let you do most of the work, while more sophisticated functions like right justification, copying and sorting are available online. Even a long document can be uploaded within 10 minutes at 300 baud, and since the graphics are non-existent a TV screen or monitor isn't a necessity — an eight-line display will do nicely.

Business users have many more facilities at their disposal. Telecom Gold's Infox will allow you to write your own programs to build and manage a database, do spreadsheet calculations and write reports. There is also worldwide telex access, which allows you to transmit telexes and telegrams worldwide from any telephone and give an instant copy of your output. By the end of 1983, more than 7000 mailboxes were in regular use, mostly by the 500 companies that subscribe, but some even by deaf people who can now use a telephone for the first time in their lives.

An estimated 20% of 'System 81', which is the Prime minicomputer British Telecom makes available to clients, is used by overseas customers. Elaine Sharp, customer support executive at Telecom Gold, put it all in a nutshell: 'I get to talk to people I would otherwise never have met,' she says. That argument is valid for any of the gateway services: it is as easy to communicate on Prestel with someone in Cardiff or Hull as it as on Telecom Gold with someone in Paris or Berlin. All you have to do is leave a message on the electronic bulletin board and someone will respond. Anything goes, from selling and buying cars via booking airline tickets to making a reservation in a night club (in the Dutch Viditel public viewdata system).

Efficiency

A very important feature of communications services is the timeshift they allow. For example, suppose a reader disagrees with me about some of the contentions in this article — he or she will phone me. Now you're never rude to readers, so you listen and respond, and lose valuable time.

If the same reader were to leave his comments in my mailbox (PR0001, by the way), I could attend to the comments when it suited me, and the reader could even check whether or not I'd read the message. He/she could even carbon copy his/her comments to like-minded friends (or solicitor) and let me know. All of a sudden, I'd be in touch with a group of interested people (anywhere) and they would be in touch with me.

I wouldn't advise anyone to try and do this on a Spectrum (unless they'd worked out a fast way of transmitting a carriage return) but it is possible. If you have any of the other micros, a modem and some telecomms software, do try. It's great fun — and a way to talk to *PCW* direct. Maybe the modem will do for us what CB did for truckers — come back?

For the record: this article was written on a 32k Tandy portable, justified on Telecom Gold using the Sendata 300/300 acoustic coupler, took nearly 10k of memory plus 2.0k for editing, while online computer time (24 minutes) cost 97p plus an additional 15p in telephone charges.

END

DON'T WASTE YOUR MONEY BUYING GAMES SOFTWARE—WRITE YOUR OWN

If you subscribe to ***Personal Computer World*** this month you will receive not only 12 issues of the best micro magazine in Europe just as soon as it comes off the presses, but you will also get a FREE copy of David Levy's book ***Computer Gamesmanship***, worth £7.95.

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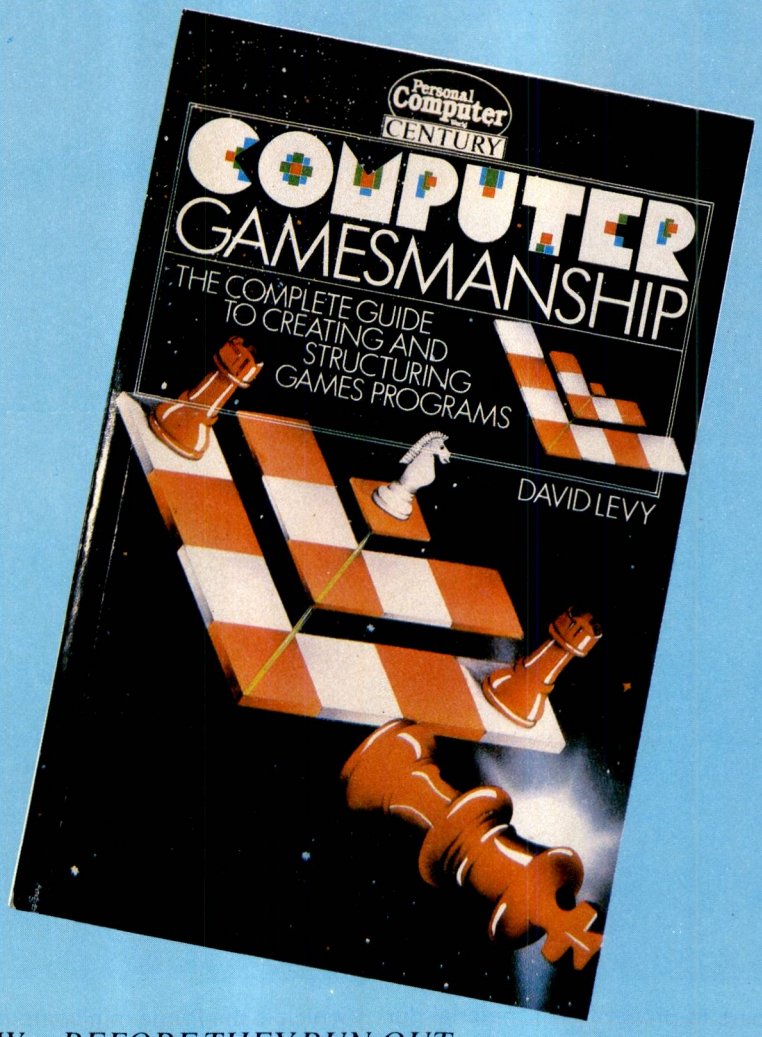

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PCW 3·84

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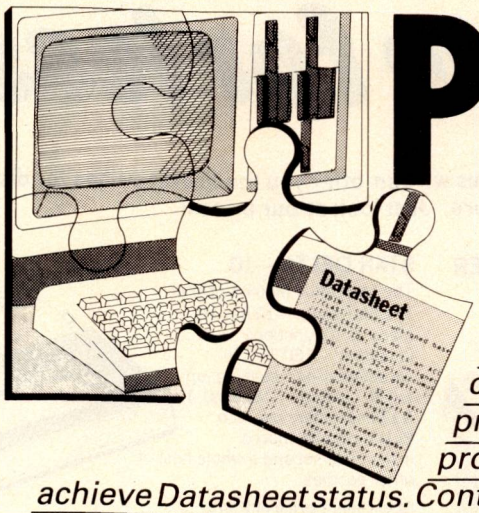

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ELEGANT SOLUTIONS

The problem, given in November's Sub Set, was to put graphics dot information (binary 00 to 11) according to dot number (0 to 3) in a target byte without disturbing any information relating to the other dots. The dot information and number were in the least two significant bits of two separate bytes. The format of the target byte was:

bit	7	6	5	4	3	2	1	0
dot	0	1	2	3	0	1	2	3

There was too big a response for all good entries to be mentioned. This is a mixture of the best and most unusual contributions.

6502

6502 solutions follow our convention of referring to zero page locations as M0—MF in the mnemonics and ZZ in the machine code.

The big decision was whether to get the information in the correct position by processing or by picking it from pre-arranged tables. Processed solutions tended to be shorter but slower. The best processed solution (if you sent a better one, we haven't received it yet) was from DA Stanford of Kinross:

* * *

```
Input—M0 low byte target
         address
       M1 high byte target
         address
       M2 dot number
       M3 dot information
Length—32     T-states—54 to 95
DOT1:  LDA M3      ;reform          A5ZZ
       LSR A       ;dot             4A
       ROR A       ;information     6A
       PHP         ;from            08
       LSR A       ;bit             4A
       LSR A       ;pattern         4A
       LSR A       ;000000AB        4A
       PLP         ;                28
       ROR A       ;to              6A
       STA M3      ;A000B000.       85ZZ
       LDA #$77    ;set mask to 01110111.  A977
       LDY M2      ;get dot number. A4ZZ
       BEQ INSRT   ;no shift if dot no. zero. F007
SHIFT: LSR M3      ;move mask and dot  46ZZ
       SEC         ;information to  38
       ROR A       ;correct         6A
       DEY         ;position.       88
       BNE SHIFT   ;                D0F9
INSRT: AND (M0),Y  ;reset dot data in target.  31ZZ
       ORA M3      ;get new dot pattern.  05ZZ
       STA (M0),Y  ;load new pattern in target.  91ZZ
       RTS         ;return.         60
```

By replacing the first 10 instructions of DOT1 with a 4-byte table and three instructions, DA Stanford produced DOT2, one byte shorter and 15 T-states faster. He doesn't think this is as elegant as DOT1, which raises the question many of you asked: 'What do you mean by elegant?' These are the replacement bytes:

```
DATA:  $00         ;reform dot      00
       $08         ;information     08
       $80         ;from bit        80
       $88         ;pattern         88
DOT2:  LDY M3      ;000000AB        A4ZZ
       LDA DATA,Y  ;to              B9YYYY
       STA M3      ;A000B000        85ZZ
```

The most table intensive, and the fastest solution, was given by Oscar Burke, writing from the United Oxford & Cambridge University Club. Some speed is achieved by entering with Y and X already loaded, which might well be the case in a complete application:

* * *

```
Input—M0 low byte target
         address
       M1 high byte target
         address
       M3 dot information
       Y index to target byte
         address at M0
       X dot number
Length—19 + 20 = 39     T-states—43
DOT3:  LDA MASK,X  ;store mask value to clear  BDYYYY
       PHA         ;previous information.      48
       TXA         ;                           8A
       ASL A       ;                           0A
       ASL A       ;                           0A
       ORA M3      ;                           05ZZ
       TAX         ;X=0000ppii                 AA
       PLA         ;mask part to be replaced   68
       AND (M0),Y  ;of old screen value.       31ZZ
       ORA VAL,X   ;insert replacement info    1DYYYY
       STA (M0),Y  ;and store the result.      91ZZ
       RTS         ;return.                    60
MASK:  DB %01110111,%10111011,
         %11011101,%11101110
VAL:   DB %00000000,%00001000,
         %10000000,%10001000          ;for dot0
       DB %00000000,%00000100,
         %01000000,%01000100          ;for dot1
       DB %00000000,%00000010,
         %00100000,%00100010          ;for dot2
       DB %00000000,%00000001,
         %00010000,%00010001          ;for dot3
```

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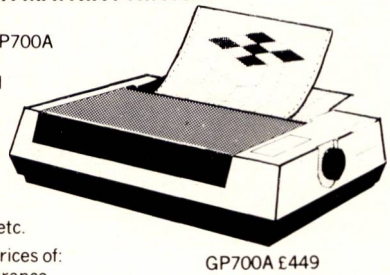

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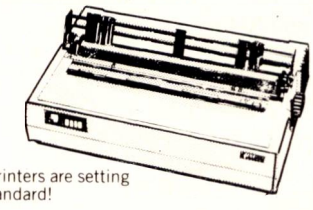

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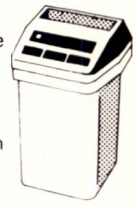

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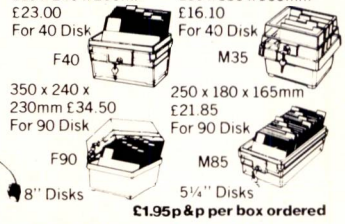

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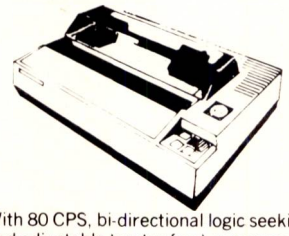

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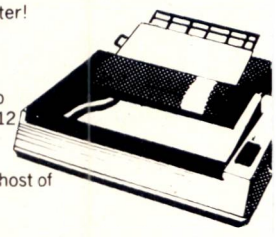

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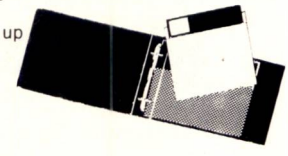

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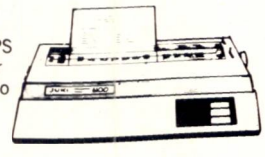

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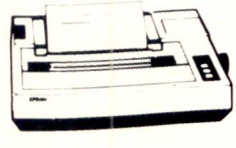

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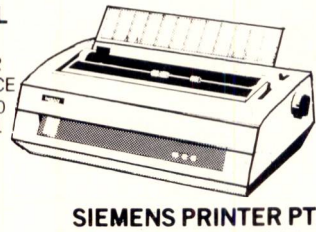

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A good compromise from Glen Slade of Southampton:

* * *

```
Input—M0 low byte target
       address
       M1 high byte target
       address
       M2 dot number
       M3 dot information
DATNO: BYT      $88,$44,$22,$11
DTINF: BYT      $00,$0F,$F0,$FF
DOT4:  LDY M2   ;choose DATNO byte by     A4ZZ
       LDA DATNO,Y ;value of dot number   B9YYYY
       PHA      ;and store it.            48
       EOR #$FF ;flip bits and AND        49FF
       LDY #0   ;with target byte to      A000
       AND (M0),Y ;get the unaffected     31ZZ
       STA M4   ;3 pixels into M4.        85ZZ
       LDX M3   ;choose DTINF byte by value A6ZZ
       PLA      ;of dot information & AND 68
       AND DTINF,X ;with DATNO byte giving 3DYYYY
       ORA M4   ;pixel. insert pixel.     05ZZ
       STA (M0),Y ;store new target byte  91ZZ
       RTS      ;and return.              60
```

Something quite different came from W Anderton of Hampton. He decided that the way to change information within a composite byte was to rotate it. As each successive bit is moved off the end of the target byte into the carry, it is changed there at the correct stage of the rotation before being rotated back into the other end of the byte. This ingenious method produces compact code at 32 bytes but is slow:

* * *

```
Input—M2 dot number
       M3 dot information
Length—32     T-states—average about 140
TARG:  EQU XXXX ;absolut ad of target byte.
DOT5:  LDA #$04 ;find position of          A904
       SEC      ;required 1s bit          38
       SBC M2   ;in target byte.          E5ZZ
       TAX      ;rotate 1s bit            AA
       JSR ROLL ;into the carry.          20YYYY
       LSR M3   ;put new 1s bit           46ZZ
       LDX #$04 ;into the carry.          A204
       JSR ROLL ;ms bit into the carry.   20YYYY
       LSR M3   ;new ms bit into the carry. 46ZZ
       LDX M2   ;rotate the               A6ZZ
       INX      ;target byte              E8
       JSR ROLL ;back home                20YYYY
       RTS      ;and return.              60
ROLL:  ROR TARG ;                         6EYYYY
       DEX      ;                         CA
       BNE ROLL ;                         D0FA
       RTS      ;                         60
```

Z80

None of the many Z80 entries used tables. Getting tired of counting T-states, we took timings of the 16 possible dot position and information combinations repeated 64k times at 2MHz. These are the times shown here.

Colin Hogben of Folkestone tried to find the smallest solution in Z80 code and did in fact provide the shortest routine received:

* * *

```
Input—HL = address of
         target byte
       B = dot number
       C = dot information
Length—21     Time—2 minutes 40 seconds
DOT7:  LD A,10H ;set bit 4 of A.           3E10
       INC B    ;increment B so not zero.  04
       CALL DOTA ;process low nibble target CDYYYY
       LD A,B   ;byte. recover bit mask.  78
       LD B,4   ;rotate 4 times for hi nbl. 0604
DOTA:  RRCA     ;rotate bit mask           0F
       DJNZ DOTA ;B times.                 10FD
       LD B,A   ;save copy of mask in B.  47
       OR (HL)  ;get byte and set bit.    B6
       RRC      ;do we want the bit set?  CB19
       JRC,DOTB ;yes—OK, else             3801
       XOR B    ;reset bit.               A8
DOTB:  LD (HL),A ;put byte back            77
       RET      ;and return.              C9
```

Several entries rotated the dot information and the bit mask in two separate loops. The secret of achieving speed was to arrange the code so that they were rotated in the same loop. The next two contributions both do this. First, the fastest received from PJ Greaves of Romsey:

* * *

```
Input—HL = address of
         target byte
       B = dot number
       C = dot information
Length—25     Time—1 minute 39 seconds

DOT8:  BIT 1,C  ;test msb of info bits.    CB49
       JRZ,SD1  ;go if it's zero           2804
       RES 1,C  ;else, reset it            CB89
       SET 4,C  ;and set bit 4.            CBE1
SD1:   LD A,3   ;A = maximum dot number.   3E03
       SUB B    ;A = 3 – dot number.       90
       LD B,A   ;put count in B register.  47
                ;B0 if dn 3, 1 if dn 2 etc.
       LD A,0EEH ;A=mask bits 11101110.    3EEE
       JRZ,SD3  ;go if count is zero.      2805
SD2:   RLC      ;move the info bits        CB01
       RLCA     ;and the mask. Decrement   07
       DJNZ SD2 ;count & go if non zero.   10FB
SD3:   AND (HL) ;reset old info bits       A6
       OR C     ;and insert the new.       B1
       LD (HL),A ;store revised target     77
       RET      ;byte and return           C9
```

Neither the shortest nor the fastest but a good compromise came from Paul Vaclik of Hayes. It could have been a bit shorter and faster had it used the B register for the dot number like most other entries:

* * *

```
Input—HL = address of
         target byte
       C = dot number
       B = dot information
Length—23     Time—1 minute 52 seconds
DOT9:  RRC B    ;place lsb in bit 7.       CB08
       JRNC,ZERO ;jump if bit 7 is 0.      3004
       RES 7,B  ;place bit 7 in bit 4.    CBB8
       SET 4,B  ;data now in bits 4 and 1. CBE0
ZERO:  LD A,0EEH ;bit 4 and 1 mask.        3EEE
       INC C    ;                         0C
LOOP:  RRC B    ;rotate data               CB08
       RRCA     ;and mask                 0F
       DEC C    ;until                    0D
       JRNZ,LOOP ;in correct place.        20FA
       AND (HL) ;mask out old data.       A6
       LD (HL),A ;                        77
       LD A,B   ;                         78
       ADD A,(HL) ;place new data         86
       LD (HL),A ;in required bits.       77
       RET      ;return.                  C9
```

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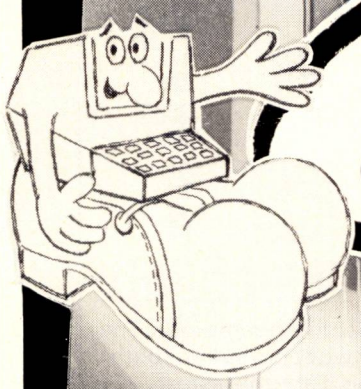

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Teletext adaptor

Teletext is the television broadcasting viewdata service available free to viewers with a decoder in their TV sets. For those without this utility, Acorn has produced an adaptor which converts the BBC Micro into a Teletext terminal. Richard Dearlove plugged in, watched and waited.

Teletext is the term used to refer to the BBC and IBA's viewdata service. It's offered free to viewers equipped with a decoder in their television sets. The information is received alongside the normal television service as digital information broadcast in the previously unused top lines of the television picture. It's possible to see this information on some older sets as a series of dots flickering at the top edge of the screen.

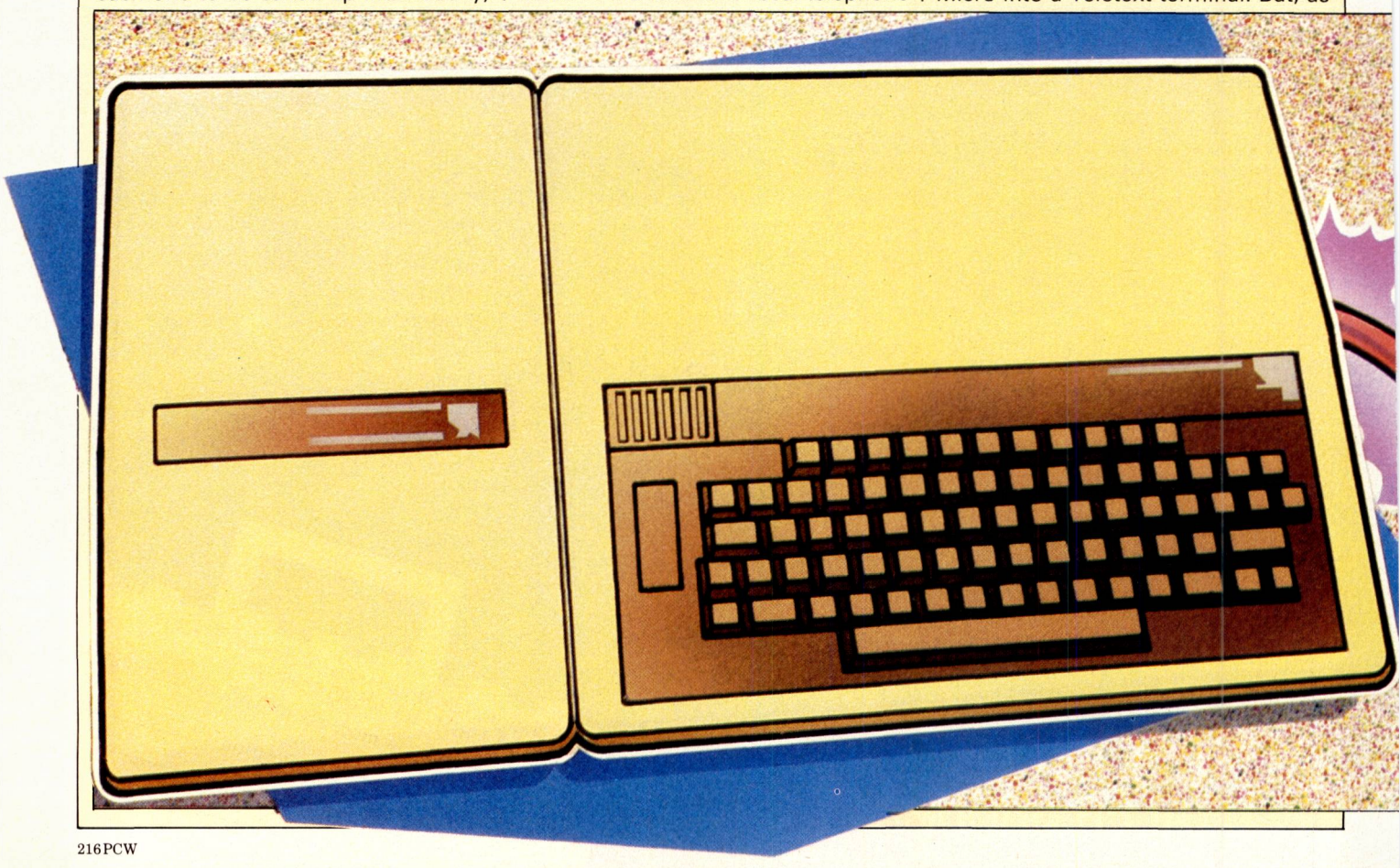
The decoder turns these signals into readable 'pages', broadcast in rotation: the service is similar to a computerised book which is only able to go through the pages one by one, in consecutive order. When the end page is received it cycles back to the start. As in a book, each page has a number which allows each one to be called up individually, but there is a time factor depending on where the current page is in relation to the page counter.

Information is displayed in the same format as that of Prestel. Both have a display of forty columns by twenty five lines, in eight colours with simple block graphics (six chunky pixels make up one character). The information can only be displayed in this low resolution due to the limits placed by a few screen lines devoted to carrying large amounts of information. Fortunately the display is very clear and pleasing to the eye.

Teletext differs from Prestel in two main ways. Prestel is accessed by connecting up a terminal to one of the many Prestel computers situated across the country: the connection is made in the form of a local telephone call. As the computer is linked by the telephone network the person accessing the information is able to communicate with the Prestel computer, enabling the user to perform tasks as diverse as ordering goods and booking tickets for an airline flight. Using the telephone network means there is a charge for the time spent using it, but there is also another charge for the use of the Prestel computer. Teletext is broadcast with the television signal, so the user is only able to receive information; it is thus one-way communication. This means the service is free.

Hardware

Acorn has produced a box which allows Teletext signals to be received and decoded, thereby converting the BBC Micro into a Teletext terminal. But, as



an added advantage, it allows BBC Micro owners to receive and download 'Telesoftware'. These are programs broadcast as Teletext information which the computer receives and translates in order that they may be saved on tape or disk and run.

The Acorn adaptor measures approximately 31cm × 6.5cm × 22cm and is the same style and colour as the BBC Micro. The overall effect is very professional. It connects to the computer by a 34-way ribbon cable, which is only long enough to allow the adaptor to be placed a few inches to the left or right of the computer. This presents no problems unless your computer is placed on a small workspace or is housed in an add-on box designed for the tidy storage of your peripherals. The cable slots into the 1MHz Bus connector.

Documentation

The documentation comes in the form of a 73-page ring-bound manual. It contains chapters on setting up, loading Telesoftware, the format of Teletext information, command words, fitting the Telerom, a large section devoted to using the adaptor at assembly level and technical information. Neatly set out in a similar format to the User Guide, it has step by step examples to give confidence to beginners. There is a chapter on how to fit a 1.0 operating system chip in cases where it is not already fitted. After going through some of the Telesoftware I found two commands not described in the manual, 'Hon' and 'Hoff', which turn the Teletext header, comprising of current page, date and time, on and off respectively. My manual was stamped Issue I, June 1983, so there may be changes in later editions.

'. . . a box which allows Teletext signals to be received and decoded, thereby converting the BBC Micro into a Teletext terminal.'

The adaptor alone is not enough to be able to start receiving and decoding signals: a new ROM must be fitted in one of the spare ROM sockets found on the bottom right of the PCB. If there are no spare ones left, it will be necessary to buy an expansion ROM board. The ROM is described by Acorn as a Telerom and, in keeping with the BBC Micro philosophy, is recognised as a filing system. Care must be taken while fitting the chip — I managed to bend two of the pins while holding it with the insulating material provided. It must be placed in the socket to the left of the operating system chip; if not, the Teletext ROM will be the default operating system after a hard reset or immediately after switching on.

In use

The adaptor must be switched on before the computer. If this is not done and Teletext is the default operating system, the screen will appear blank. To remedy this, press break. If Teletext is not the default operating system, then the screen will say:

BBC COMPUTER 32k
ACORN TFS
BASIC

If the adaptor is not correctly connected or is not switched on, it will say, after Acorn TFS, 'No Power'. To enter Teletext, the manual says that pressing break and 'T' simultaneously will achieve the desired result. This is not so: you have to type *Teletext, or the shortened version, *TE.

The first time you use the adaptor it won't be tuned in, so a tuning program is provided in the Telerom. To access it, press the red function key labelled 'F4' followed by the channel number, then the shift key and F4 simultaneously. To tune in the channel turn the red dials on the back of the adaptor. When the channel is nearly in tune a yellow bar will appear and move along the scale to show how strong the signal is. When the bar is as near to 100% strength as possible, press the space bar. The process is repeated for each channel. Care must be taken to get the right channel on the right dial as each one is capable of receiving all four signals.

In the area where I live, the BBC1 signal is good but not brilliant, whereas BBC2 and ITV are very strong. I have no problem with the latter two channels but Channel 4 is awful. On certain days, the signal appears to move around. As this channel is so difficult to tune into, it's extremely irritating to have to adjust the dial each day to receive a mediocre signal.

Another problem with Channel 4 and



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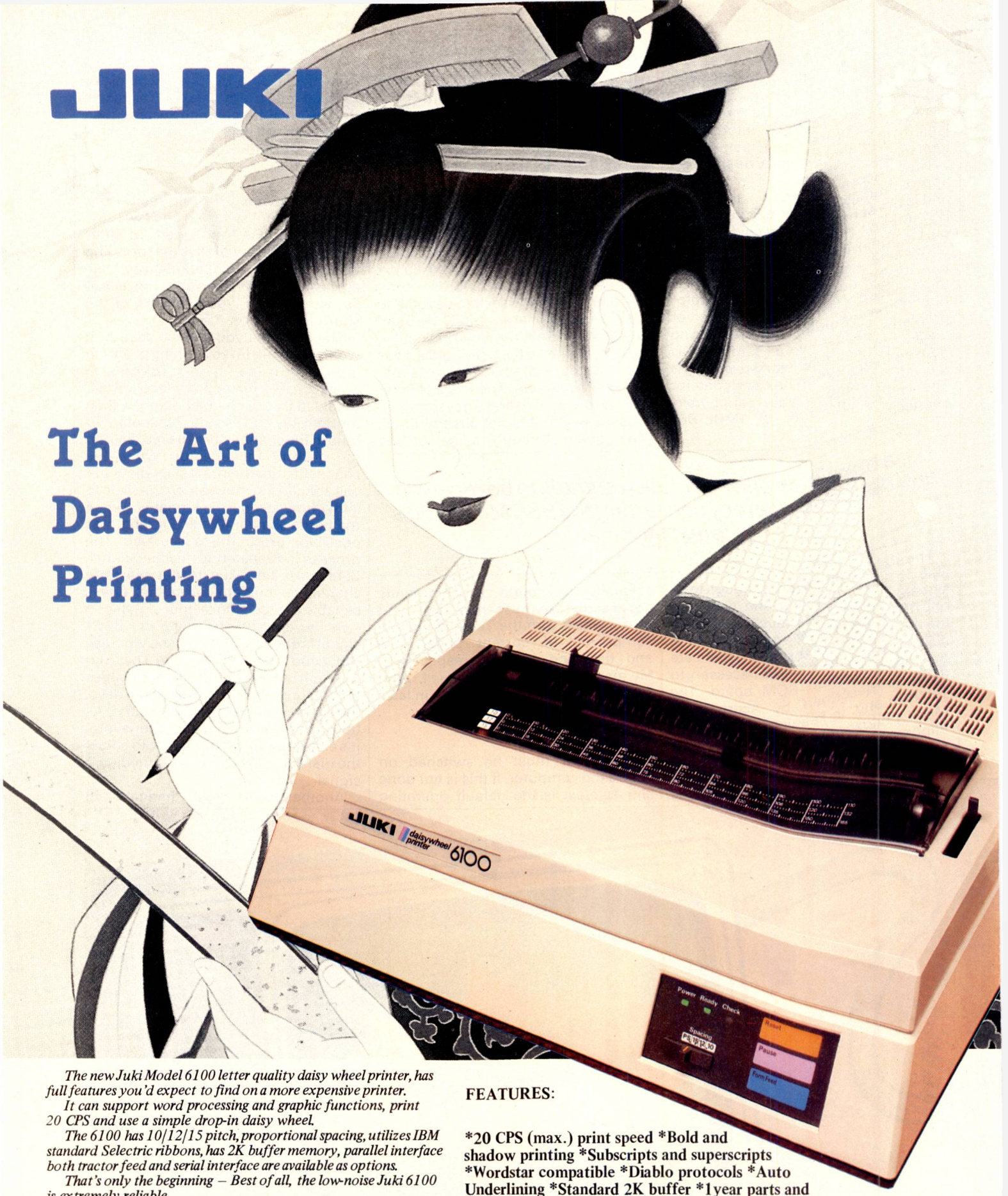

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ITV is that they don't carry status report signals and are thus difficult to lock onto properly. When tuning into Channel 4, I have to ignore the strength bar because, while the scale may depict a strength of 100%, on returning to the pages, the header carrying the page number and date changes into unreadable blobs, so this tuning scale is not totally accurate.

The best way to tune into this difficult channel is to find the area with the scale and revert to normal display then tune the channel in by watching the header until it becomes as steady as possible, normally when a regular series of numbers is displayed in the header. Unfortunately, the headers for ITV and Channel 4 pages do not have a completely regular series. On each of these channels, there are two sets of displayed page numbers and the header juggles between the two. On ITV the numbers are either in the 100s or the 300s, which leads to confusion as to whether or not the channel is completely in tune. ITV and Channel 4 pages always have a 'no check' message in the bottom right hand corner of the screen because there is no status report on which to check for errors.

'. . . as an added advantage it allows BBC Micro owners to receive and download "Telesoftware".'

The signals vary greatly in strength, so it's a good idea to find the best aerial position. The Teletext User Guide suggests moving indoor mounted aerials onto the roof to get a clearer signal. During the early days after receiving the adaptor I spent many hours climbing in and out of the loft to adjust the direction of the aerial. I wasted my time as although one day all the channels appeared to be perfect, the next day they were weak again. I now settle for a happy medium. If the Teletext Adviser were to ask for comments on the service I would suggest that the Telesoftware pages be duplicated on both BBC channels to enable people to load the programs on the stronger of the two channels.

To many users, the most important advantage of Teletext will be Telesoftware, but here another major problem may occur. If the Telerom has not been placed to the left of the Basic chip, it is impossible to load Telesoftware correctly. In order to do so, the user must initially have been in Basic and Teletext mode. Normally, when a program is loading, it scrolls up the screen at intervals and while waiting for a page it is replaced by the word 'searching'. If the chip is incorrectly positioned, 'searching' scrolls up the screen continuously.

I was faced with this problem, and left the adaptor seemingly trying to load a program for half a day. Experiments with aerials and tuning came to no avail. The next day I went to the *PCW* Show expecting an Acorn representative to be able to give some help. It transpired that Acorn had also been having problems; the company's advice was to change my aerial, but judging from past experience this was wrong. When I discovered the real problem, I rang Customer Services at Acorn headquarters to explain. I was informed that they already knew this. I then explained that I had received an electric shock from the aerial connection at the back of the adaptor — Acorn was very concerned and suggested I return it to the maker.

A call to Vector Marketing produced a label for free return postage, but I forgot to include my manual and fitting voucher. A week and a half later the replacement arrived along with another manual and voucher. The new adaptor also gave me an electric shock so perhaps it's not a fault after all!

One quibble with the terminal program (the name given to the operating system entered after typing *Teletext) is the location of the command used to dial a page. To achieve this you must press 'F O' followed by the page number. This may sound simple, but more often than not it's easy to forget to press the function key, so another command is entered instead. This command calls up linked pages which have something in common and have therefore been grouped together. In order that you don't have to type the page numbers of these linked pages, all that's required is to press the cursor keys in the direction required. At the moment this facility is not fully implemented but news pages carry sample links to test this feature out.

The chip also contains a 'help' menu like that found in the disk filing system (DFS). If *Help is typed in, the computer prints:

```
TFS 1.00
  TELETEXT
  TELESOFT
  OPT
OS 1.20
```

*Help followed by any one of these gives a list of connected commands. *Help Telesoft prints up a description of new commands which may be included in Basic programs. This enables users to access information such as shares figures, the headlines, or the daily recipe, for use within a larger program.

Telesoftware

Every two weeks the programs are updated: page 701 carries a list and page numbers of each program. Page 702 carries a description and page 703 contains 'Rem', a fortnightly information service.

At the time of writing the programs are of good quality and are primarily educational. Each fortnight a different sorting routine is broadcast to be included within a user's program. Other programs have been multiple choice tests, word shapes and number problems. A geography program included some excellent graphic representations of Ordnance Survey symbols on which children were required to answer questions. There has recently been a 'Star Trek' program but this was not included on the list of broadcast programs.

There is obviously a future for the system in the educational field as many of the programs have been written for the MicroElectronics program. It seems to be of less use at home for the time being, unless the programs change dramatically in content.

Price

Adaptor: approximately £225 inc VAT. It is available from: Vector Marketing Ltd, Dennington Estate, Wellingborough, Northants NN8 2HL. The adaptor requires a BBC Model B with a 1.0 or above operating system. A voucher is supplied to allow the purchaser to receive a new OS ROM free.

'There is obviously a future for the system in the educational field as many of the programs have been written for the MicroElectronics program.'

Conclusions

The question which all potential users must be asking is: 'Is it value for money?' If you had ordered the adaptor two years ago when the price was only £115, the answer would definitely be yes. Now that the price has been fixed at £225 it is an expensive buy. However, with the added advantage of Telesoftware and the extra commands, it is a useful piece of equipment which will prove invaluable to many users. I was very pleased with its ease of use and scope. END

Superstar

Tony Harrington examines the story behind the reluctant launch of the Superstar from SciSys and compares it with the Novag Constellation.

Last year was not a rosy one in the chess computer industry, at least from the suppliers' point of view. While the public took pleasure in the fact that there were more, and better, chess computers on the market than ever before, the large number of different sets available meant tight profit margins and hard times for the companies producing them.

For SciSys, one of the leading suppliers, it was a particularly tricky year. Its Mark V system, the set that won the Trevemunde World Microcomputer Chess Championship in 1981, had aged somewhat (although it will still beat most casual players). The Mark VI module that SciSys intended to be the natural upgrade path for Mark V owners found few takers, partially because of production problems and partially because it never really proved itself to be conclusively stronger than the Mark V.

Fortunately for SciSys, Hegener and Glaser ran into problems producing a working, bug-free version of the Mephisto III, and Fidelity dithered over the European launch of the new version of its Chess Challenger 9. Unfortunately for SciSys, Novag moved with great speed and had its Constellation in the shops by the end of 1983. Priced at around £150, the Constellation rapidly proved itself to be a very successful machine.

SciSys's answer to the Constellation, developed through 1983 and launched at the end of that year, is Superstar. Its first appearance, in pre-production form at the Budapest World Championships in October last year, was distinctly ordinary. It came 13th, with three out of seven points. The fact that this was the same number of points as that obtained by the commercial version of the Novag Constellation was little consolation.

Novag, Fidelity and the Mephisto people could all point to experimental versions which displayed great promise in Budapest. The Fidelity Elite finished top with six out of seven points. The Mephisto X (an extravagantly expensive machine costing around 5000 Deutschmarks), and the Novag X (due in the shops by July) tied for second place with five points each. Against this sort of showing, Superstar, as SciSys's best offering, didn't promise much.

But, as Andrew Page, SciSys's European marketing manager points out, no conclusions about Superstar's strength should be drawn from that first appearance.

'You have to consider the background to our participation in that event,' he explained. 'We decided in May last year to develop a new chess computer to be programmed by Julio Kaplan.

Originally, we expected a launch date around October this year. Word got out that we were at work on a new version and Lazlo Lindner, the organiser of the Budapest tournament urged us to enter. We told him well in advance of the event that there was no way we could get a version of Superstar ready in time, but he persisted and in the end we decided, at the last moment, to allow an early experimental version of Superstar to compete.'

This version, Page points out, was the twelfth in the development line. SciSys was already on version 16 at that time, but although version 16 was better in some respects, version 12 was deemed to be more reliable for competition purposes. Its major weakness was that the tournament clocks built into the set were not yet bug-free.

Page reckoned that SciSys intended version twelve of Superstar to be entered anonymously. The organisers overlooked that, and the Superstar started life under its own name. The result is that it now has a poor performance to live down. The main fact to bear in mind is that as a

Fig 1	1	2	3	4	5	6	7	8	9	10	Score
Superstar:	½	1	1	0	0	1	0	1	1	0	5½
Constellation:	½	0	0	1	1	0	1	0	0	1	4½
No of moves	56	81	66	27	22	57	57	67	89	40	

Micro Chess — a guide for beginners

Micro Chess covers all the news and events in the busy world of computer chess. With new chess programs and new chess computers appearing all the time, we evaluate their strengths and weaknesses as they become available. We shall be presenting profiles of programmers, both amateurs and professionals, which will cover their methods and their interest in chess programming, and we shall be talking to suppliers and looking at their plans.

Computer Chess affects computer enthusiasts in two different ways. For some, the fact that they can now play chess against either their home computer or a dedicated chess computer has opened up the delights of the game. For others, the real interest is not so much in playing chess as in trying to build a chess program. Micro Chess aims to meet the interests of both.

Chess is a game that can be as exciting for the beginner as it is for the grand master. So if you haven't played before, get yourself a good introduction to the game — there are dozens in the bookshops — and get to it. Remember, with computer chess a game can be as fast or as slow as you want.

development project, it was barely four months old on that first appearance.

So how does the finished version of Superstar now compare to machines like the Constellation? Part of that answer has been provided by SciSys. It asked KK Chang, the second highest rated chess player in Hong Kong (where SciSys is based) to carry out a series of games between Superstar and Constellation. Chang was also asked to make suggestions about possible ways of improving Superstar's play and to comment on its playing style.

Chang supervised ten games, with Superstar playing on level B2 and Constellation on level 6; both levels being equivalent to tournament play at the rate of 40 moves in two hours, followed by 20 moves per hour thereafter.

The result table is shown in Fig 1: Superstar plays the white pieces in all the odd numbered games.

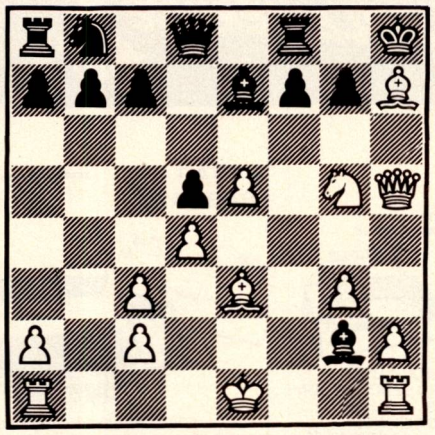
The openings, incidentally, were reasonably varied. In order, starting with game one, they were: Sicilian, Alekhine's Defence, Queens Gambit Accepted, Ruy Lopez, Ruy Lopez, Alekhine's Defence, English Opening, Dutch Defence and King's Indian Defence.

The one factor that emerges from these games, aside from the obvious fact that the two programs seem to be of approximately equal strength, is that the longer a game went on, the better Superstar's chances of winning seemed to be.

The two programs have very different styles of play. Constellation plays a relatively more aggressive game in the opening stages. This paid off in several of the games, where it caught Superstar with some sharp play directed at the enemy kingside. But Superstar is strong in the endgame (for a chess computer). It converted some drawn games into wins by capitalising on one or two relatively weak end games moves by Constellation.

With the honours about even in playing strength, one has to turn to the features each machine offers. Both are touch sensitive machines; both have LEDs down the two axes of the board and indicate moves by showing the rank and file of the piece to be moved; both are pleasantly designed and are roughly the same size. Superchess definitely has the more sophisticated level-setting mechanism, as well as offering a wider range of playing conditions. Unlike previous level setting devices, which have basically involved pressing the 'level' key five times if you want to play at level five, with Superstar you only need to press 'level', then the square that corresponds to the mode of play you want. You can also change levels during play.

Levels A1 to A8 are the 'casual play' levels. They range from a two second average response time to 10 minutes. Levels B1 to B8 are rather more complicated and need to be considered individually:



Fidelity Elite vs Mephisto Excalibur

B1 is what SciSys calls 'fast tournament' mode, 30 moves per hour.

B2 is standard tournament mode, 40 moves in two hours and 20 moves per hour after that.

B3 is Grandmaster tournament mode, 40 moves in two and a half hours and 16 moves per hour thereafter.

B4 is one hour for the entire game (though how anyone can know in advance how many moves have to be played to meet this criterion is a mystery to me).

B5 takes two hours for the entire game.

B6 is five minute chess.

B7 is a useful little feature which gives you 10 seconds per move, with an acoustic reminder when the 10 second period is up.

B8 is the analysis mode, where the machine will continue computing until you tell it to move.

Levels H1 to H8 are the problem modes with the level number corresponding to mate-in-one, mate-in-two and so on up to mate-in-eight. As Superstar has a replay key, you can step through all the moves leading up to a mate in eight once the computer has found the solution.

This replay key, used in conjunction with the 'take-back' key, enables the player to step backwards and forwards through an entire game. It's a useful way of recovering a game that you haven't recorded as you've gone along. Both Constellation and Superstar have excellent facilities for setting up problem positions or adjourned positions.

One point which augurs well for the future is that plans are afoot for Gary Kasparov (in London recently to play his semi-final world championship match against Victor Korchnoi) to mastermind an openings repertoire for a future Superstar module. Page took Kasparov out to dinner one night and the net result of their discussions is that you can expect to see a Kasparov endorsement of SciSys computers in SciSys adverts and packaging in the near future. Kasparov, it seems, was impressed enough to take one or two machines back home with him. Whether the openings module ever sees the light of day depends on the gods of the market-place.

Games section

White: Fidelity Elite. Black: Mephisto Excalibur. World Microcomputer Chess Championship, Budapest 1983. Vienna Gambit. Notes by David Levy.

1	e2-e4	e7-e5
2	Nb1-c3	Ng8-f6
3	f2-f4	

(An exciting opening dating from the 19th century, which is now rarely seen in master chess. It often leads to lively positions in which one error can be immediately fatal.)

3	...	d7-d5

(The best reply.)

4	f4xe5	Nf6xe4
5	Ng1-f3	Bf8-e7
6	d2-d4	0-0
7	Bf1-d3	Be7-h4+

(A wasted move. Correct is 7 . . . f7-f5 8 e5xf6 Be7xf6 9 0-0 Nb8-c6, with approximately equal chances.)

8	g2-g3	

(Naturally not 8 Nf3xh4 Qd8xh4+ 9 g2-g3?? because of 9 . . . Ne4xg3.)

8	...	Ne4xc3

(Forced, otherwise Black loses a pawn when the bishop retreats.)

9	b2xc3	Bh4-e7
10	Bc1-e3	Bc8-h3?

(Hoping to prevent White from castling K-side.)

11	Nf3-g5	Bh3-g2?

(If 11 . . . Be7xg5 12 Qd1-h5, and if 12 . . . h7-h6 13 Be3xg5 followed by 14 Qh5xh3. This would have offered roughly equal chances, and Black ought to have tried this continuation. The text, however, is an attempt to justify Black's previous move.)

12	Bd3xh7+	Kg8-h8
13	Qd1-h5	Be7xg5
14	Bh7-e4+	Bg5-h6
15	Be4xg2	

(White has won a pawn, and Black's king is now rather exposed.)

15	...	Kh8-g8
16	Be3xh6	g7xh6
17	Qh5xh6	Nb8-c6
18	Ra1-b1	Nc6-a5
19	Qh6-h5	Qd8-d7
20	Qh5-g5+	Kg8-h8
21	Qg5-h6+	Kh8-g8
22	0-0	

(Now White threatens 23 Rf1-f6, followed by Qh6-g5+ and Rf6-h6 mate.)

22	...	Ra8-c8
23	Qh6-g5+	Kg8-h8
24	Rf1-f4	

(This is just as good. On 24 Rf1-f6, Black can prolong the game with 24 . . . Qd7-e6.)

24	...	f7-f6
25	Rf4-h4+	Qd7-f7
26	Rh4xh7+	Kh8xh7
27	e5xf6	Resigns.

Not a great game, but a demonstration of the Elite's efficiency at capitalising on its advantage.

END

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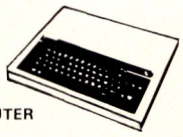

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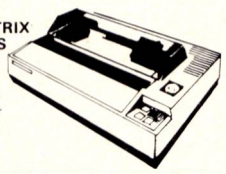

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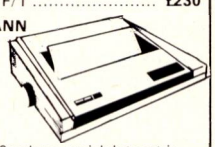

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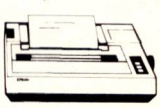

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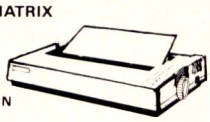

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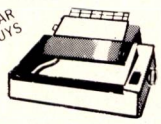

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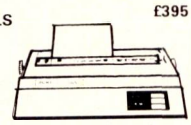

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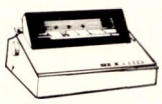

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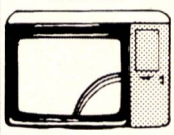

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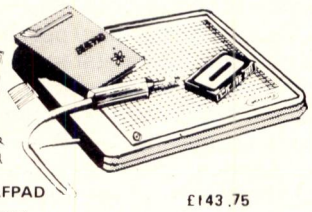

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A quantum leap

Recruited by Sir Clive Sinclair to work on the design and development of the QL, David Karlin stands foremost among the team of people responsible. Here he talks modestly to Tony Hetherington about himself, and particularly about his 'baby'.

David Karlin is one of a small group of people who stand almost unnoticed in the shadow of Sir Clive Sinclair, but it's now time for David to step into the limelight as the man behind Sinclair's new micro, the QL.

When he joined Sinclair in July 1982 he had a vision of the minimum machine he would like to find on his desk: the QL is that machine.

He was born 25 years ago in London and pursued his education at Cambridge before working for Fairchild in Singapore and America. He returned to England in early 1982 to concentrate on his main interest: chip design.

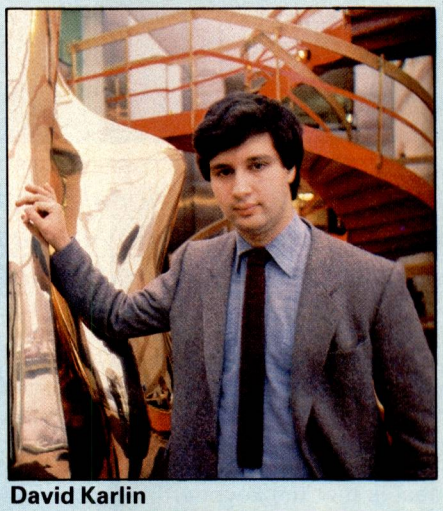
David is a shy, modest and retiring man, but he possesses the self-assurance often found in those who know exactly what they're doing.

In keeping with his character he inadvertently applied for and got that infamous position of 'the world's best computer designer', the job advertised at Sinclair Research. He was dealing with an agency regarding another position and found himself in an interview with Sir Clive. The rest is history.

David was brought in to work on the QL project leading the development team as senior computer engineer. Unlike the Spectrum and the earlier Sinclair machines, where the original concept came from Clive, the QL was more of a team effort. 'It came out of a melting pot of ideas after a long series of meetings to thrash out the details. There was a spec but this was modified almost every day.' It is characteristic of David Karlin to undermine his own influence on the project. Later on in our discussion he said of the QL: 'It was the machine I wanted to build, although it went through various permutations *en route.*'

Cost is always a limiting factor in the design of Sinclair computers, and David spent six of the 14 months it took to design the QL reducing the number of pins on the two customised chips to reduce drastically their cost.

It's impossible to list chronologically David's work during this 14 month period, since he was covering several areas at once. For example, while he was waiting for a prototype chip to be built he wrote part of the operating system. Karlin says that the development of the QL was almost trouble free. In fact, the most difficult problem the team encountered was how to assemble the case!



David Karlin

'It (the QL) was the machine I wanted to build, although it went through various permutations en route.'

Once the cut-down version had been designed, David had the unusual luxury of being able to add features to the machine, such as the 128k standard memory and the second processor (8049) to handle the graphics.

The main processor in the QL is the Motorola 68008 chip, and David is keen to clear up the confusion this chip has caused since the QL's launch. 'The 68008 is simply a 32-bit processor chosen for the amount of memory it can address. It has an 8-bit bus so externally it appears as an 8-bit processor. To add to the confusion it also has some 16-bit instructions in its instruction set.'

The omission of a cassette port, 'a useless addition', coupled with the fact that the winchester interface is coming soon means that the success of the QL rests largely on the reliability of the built-in microdrives. David was quick to leap to the defence of these stringy floppies and insists that they have greatly improved the mechanics since the early Spectrum models. They have regulated the motor speed and improved the low inertia mechanism, so reducing the risk of stretching the high quality video tape. 'Besides, if anyone saw inside a winchester (which has an excellent reliability record) they would be horrified.'

It is particularly illuminating to hear David talk about the QL's software, since his loyalties must lie with the hardware. Surprisingly, perhaps, he admits that 'You don't sell hardware, you sell the ability to use software'.

He's obviously pleased with QDOS and has absolutely no doubt in his own mind why the QL has its own operating system rather than uses one of the standard systems like CP/M or MS-DOS: 'All the others are so awful. WordStar's the best standard software available, but that's still unfriendly.' According to David, the problem with operating systems is the way they are designed: 'Most are designed to get in the way of you and the machine. Ours is designed to help programmers through features such as multi-tasking and device independent I/O.'

Potential

David agrees with Sir Clive about the marketing potential of the QL—he feels it will create its own market. 'The Spectrum had a piggyback on the ZX81 but the QL will find a new market. It should appeal to the professional and business market alike as it offers more than an intelligent terminal at a fifth or tenth of the price.'

David is full of fatherly pride for the QL. Quick to defend any criticism of his creation (for example, the membrane keyboard can be finely tuned), he is unhappy that anyone might want to attack his 'baby'.

As we all await the first production models and speculate about the QL's impact on the market, one thing is certain. From now on, David Karlin will be extremely busy. He's currently involved with production engineering but after that? 'No comment.' END



Unless you're an efficient touch-typist, the conventional qwerty keyboard can be a frustrating obstacle in the quest to master your micro. Conall Boyle unearths some historical facts and describes a future vision for this established means of communication.

The keyboard is, quite literally, the point of contact with your microcomputer. It also represents for many the first stumbling block. The layout of the keys is most illogical. How many millions of first time users have cursed the horrors of qwerty? And why is the keyboard set up like that? The simplest explanation, is that qwerty is the standard typewriter keyboard layout.

Qwerty is *the* standard layout throughout the known universe. Spain has it, Denmark has it, even Yugoslavia has it (but Y and Z inter-changed). Even those alphabets which look strange to English eyes — Greek, Cyrillic (Russian), and the like — use a local variant of the 'standard' keyboard. The only slight variation to this almost universal pattern is to be found on German and related language keyboards, where the Z and Y are switched.

It would be pleasing to think that this uniformity was based on widespread acceptance of the best available practice. Indeed, ask your average microcomputer user why such an inconvenient layout was chosen. Nine times out of ten the answer will be: it's the layout which allows the maximum speed of typing. Would that it were! The fact is that the keyboard layout as we find it today was designed, not to give the quickest typing speed, but to slow you down as much as possible.

Beginnings

To discover the reason for designing the keyboard to be as *slow* as possible, we must go back to 1873. In that year C Latham Sholes (1819-90) finally perfected his design for a writing machine. He signed a contract with the Remington Gun and Sewing Machine Company of New York to produce 1000 of what he called 'Type-writers'. As with all inventions, Sholes was building on the efforts of those who had preceded him.

Nevertheless, his was the first commercially successful typewriter. In essential detail, the Sholes machine was similar to the mechanical typewriter of today.

But to make it work Sholes had to overcome many hurdles. One of the most intractable problems he faced was that of jamming keys. The engineering of the day was just not up to the task of making a smooth striking set of keys. At this point, Sholes engaged the skills of his brother-in-law, a teacher of mathematics, to design a keyboard layout. The aim was to ensure that letters struck one after the other, as far as possible from opposite sides. After much experiment, the familiar qwerty keyboard layout was born.

Sholes was guilty of a monstrous fraud concerning his qwerty keyboard. He had the nerve to peddle his machine as 'scientifically designed'. He omitted to mention, of course, that the keyboard was designed scientifically to slow you down!

Of course, Sholes was not the only inventor working on a machine to produce writing mechanically. Many other designs of typewriter, with different keyboard layouts, came on the market after 1873. However, a dramatic, and quite unplanned event in 1877 sealed the fate of the chief rival, the Caligraph keyboard (the layout of this alternative typewriter is shown in Fig 1). Instead of the four rows of keys with a shift for upper-case, the Caligraph had *six* rows of keys, with separate upper and lower-case buttons. The event which proved Sholes' to be superior was a speed typing competition. Frank McGurrin, a touch-typist who used the Sholes keyboard, challenged Louis Taub, a Caligraph typist, who used four

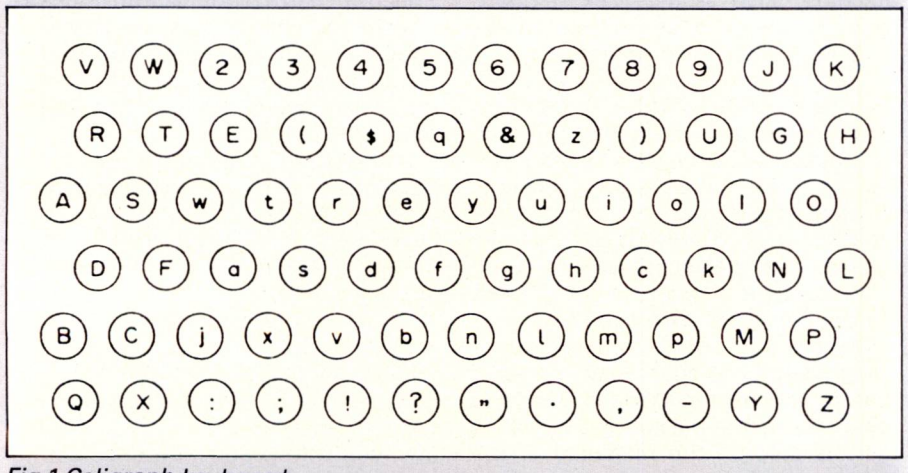


Fig 1 Caligraph keyboard

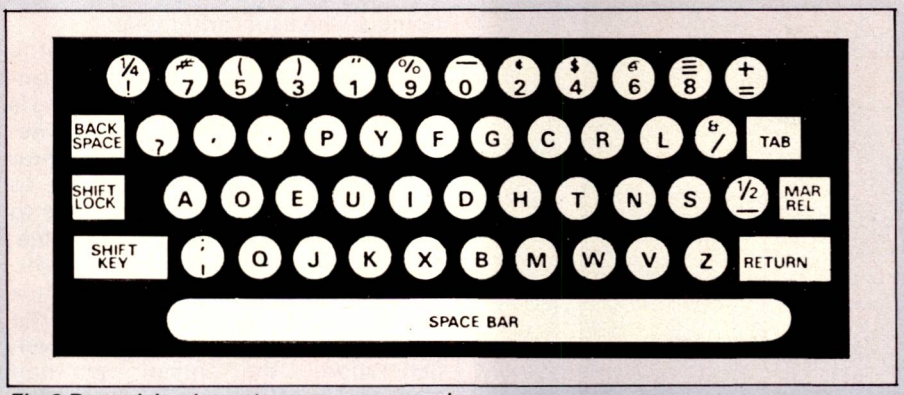


Fig 2 Dvorak keyboard

fingers; the winner being whoever could copy the most script inside forty five minutes. The contest became what we would now call a 'media event'. The convincing victory of the Sholes typewriter was widely reported. After that the reign of qwerty was assured. Manufacturers quickly changed over to the now standard layout.

Reform

As time went by, it was realised that qwerty was not just a poor layout for speed and convenience, it was probably the worst possible layout ever devised. A major conference was held in 1905 to thrash out a rational alternative. Although there was little enough agreement on the proposed keyboard, it was the teachers of typewriting who voiced the loudest opposition to any change. They had spent a long time learning the existing layout, and were reluctant to change, whatever benefits the users might gain.

The next significant development is attributed to Dr August Dvorak of Seattle, Washington. In 1932 he announced his rational keyboard, which he claimed would increase typing speed by around 35%. The actual layout is shown in Fig 2. Despite its obvious advantages, the Dvorak keyboard did not catch on. It is still a contender as an alternative to the Sholes qwerty keyboard. In the administration of at least one state in the United States, the Dvorak (pronounced Di-vor-ack) keyboard is enforced on all office machines. Apart from this one exception, Sholes' qwerty keyboard reigns supreme.

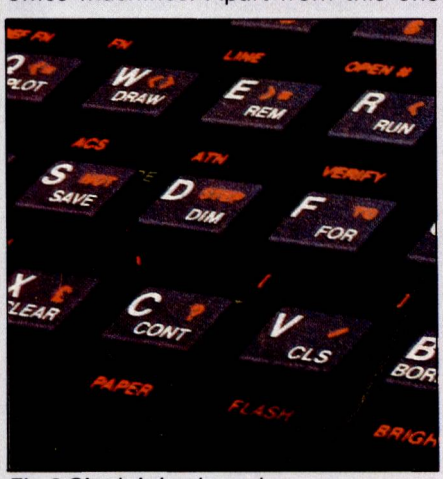


Fig 3 Sinclair keyboard

Microcomputer explosion

The advent of cheap microelectronics had many effects. One was to make it relatively cheap and easy to adopt any form of keyboard layout. Electronic typewriters could be re-tooled to the Sholes, Dvorak, or any other desired layout. However, most people had been brought up on qwerty, and wanted a familiar layout. This was true even for machines like card-punches and VDU terminals, which were used mainly in the office environment.

The arrival in the mid-1970s of the microcomputer brought in a whole new category of keyboard users — the home computing buffs. With a million computers already installed in homes in the UK the time must be fast approaching where most keyboards are attached not to typewriters, but to microcomputers.

In this whole new ball game, what keyboard should be adopted? For Tandy and Apple the answer was simple — standard qwerty. PET tried a slight variation: all characters used in Basic, such as ?,(,) — all normally upper case — were on lower case. Sinclair, on the other hand, adopted his multi-function key method, whereby a single key could have up to six different functions (see Fig 3 for Sinclair keyboard layout). It is interesting to note that PET (whose name was changed to Commodore because 'pet' means something rude in French!), has reverted to an absolutely standard qwerty keyboard. Yet again, Sholes 'scientific' keyboard layout seems destined to win out over all its rivals.

French directory

However, the days of the qwerty keyboard may yet be numbered. One interesting proposal has come from France, where, in an effort to modernise the telephone system, an online telephone directory is to be made available to every subscriber. France has about ten million telephone subscribers, most of whom do not use a typewriter, and would be baffled by qwerty. In this new situation, the decision was made to go for an ABCDEFG layout — alphabetic order, in other words. A picture of an ABCDEFG keyboard is shown in Fig 4.

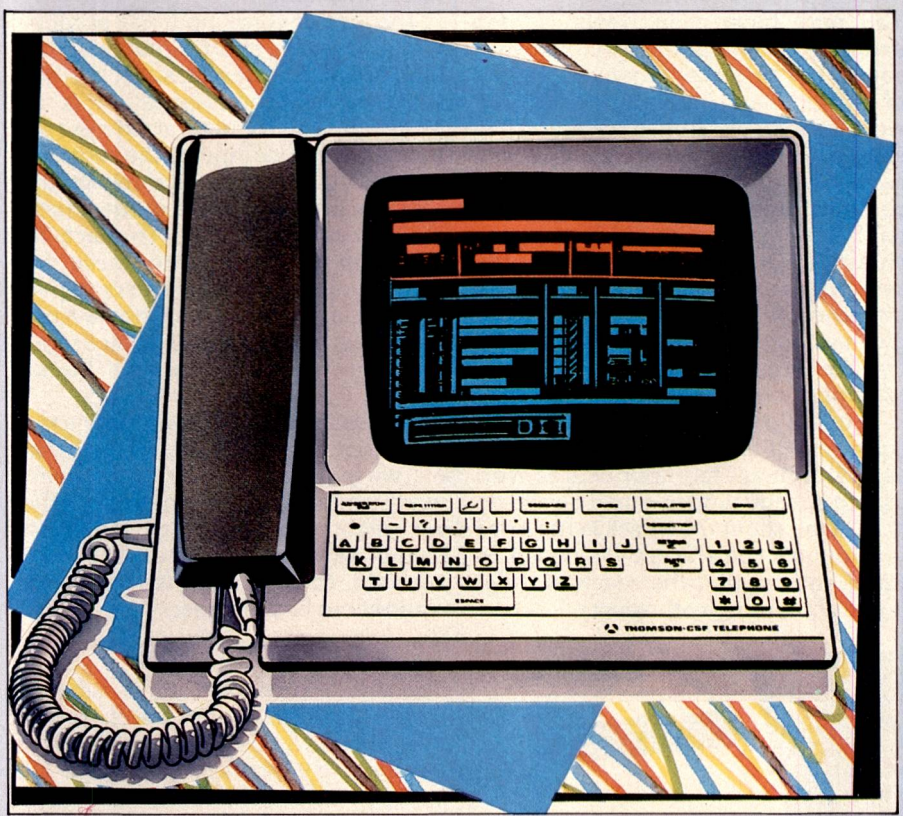


Fig 4 French telephone directory

This layout has also been adopted for the French version of Teletext. This is not only to make the keyboard user-friendly; it is also an attempt to distance it from the typewriter. One of the problems that's been found with computers to be used by management — such as Teletext terminals — is the degrading effect of using a keyboard.

Managers are reluctant to be seen using a keyboard; as this puts them in the same category as the office typist!



Whether this attempt to replace qwerty with ABCDEFG is successful is now open to some doubt. The election of a Socialist government saw the telephone directory project severely curtailed. It still exists, but only in a small area of Brittany.

Microwriter

You may have seen Denis Norden extolling the virtues of an innovative, if somewhat pricey alternative, method of setting data into your computer/word processor. This is based on the simple binary principle that six switches can give two-to-the-power-of-six combinations of code (that's 64 characters). The layout of the Microwriter is shown in Fig 5. You will notice that the keys are ergonomically positioned under each finger, with the thumb given a choice of two buttons. Characters are formed by pressing combinations of keys simultaneously.

To operate this device is not nearly as complicated as it sounds. Mr Norden assures us that a few hours will convert us into speedy typists, and if he can do it . . .! One slight drawback is the price — around £500 (recently reduced to £230) and beyond the reach of most home computing enthusiasts.



Fig 5 Microwriter

Voice input

Remember HAL, the voice controlled on-board computer in the film *2001, A Space Odyssey*? In the end, HAL got ideas above his space station and had to be dismantled. With his dying gasp, HAL gave us a tinny rendition of 'Mary had a little lamb'.

The idea of voice input has attracted much research effort, notably among the Japanese. After all, speech is how most of our communication is executed. It seems a natural extension of this to have voice input to the computer as well. At present, voice recognition systems are limited to a modest (*circa* 256 words) vocabulary. To teach the computer to respond to these few words, you have to train it to recognise your voice. There is still a long way to go before we have a HAL-like voice input, capable of decoding normal human speech.

As well as wondering whether a true voice input system will ever be possible, we might ask if voice input is really worthwhile at all. The implication that we might do away with writing in favour of speech would mean the end of all hard copy. Could we really do without our bits of paper?

Musical keyboards

The trendy present to have last year was a Casio VL Tone, which can be described as a calculator that thinks it's a piano! Fig 6 shows the layout. For £35 you set a device which plays tunes, a bit like an electronic organ. You can also record the notes you play, and play them back at will. At the flick of a switch it's a calculating machine, capable of doing all the usual arithmetic.

There's nothing startlingly novel in all this, especially for the 'Space Invader' generation. What I find fascinating is the historical echoes it creates. Remember C Latham Sholes, the inventor of the qwerty keyboard? Prior to Sholes, there were many attempts to perfect a mechanical writing machine. One reason why many of them came to grief was the impossibility of making a machine capable of working with the proposed keyboard. For the Beethoven generation, the most common keyboard was the piano. For exactly the same reason that qwerty was adopted for computers, early (unsuccessful) inventors struggled to make a piano-style typewriter.

Technically, it's now simple to achieve the early inventor's dream — a piano-style keyboard — but, as yet, I know of no manufacturer who produces such a keyboard.

On the face of it, a typing piano with one letter on each key would not be very efficient, worse even than our old friend qwerty. But sound feedback in the form of musical notes could be very helpful. Sound registers with the brain most effectively — have you ever played Space Invaders with the sound off? The bleeps are an essential feature in creating the excitement. In the same way, musical typing could be a boon to typists of all levels.

One aspect of piano playing which is markedly different to typewriting is the number of notes/letters struck simultaneously. In typing, the letters are hit one after the other: an essential requirement for real-time mechanical typewriters. On the piano, notes are usually struck together, in the form of chords. Taken together with the Microwriter technology of simultaneous key pressing to produce letters, perhaps there is the germ of a *genuine* learn-to-play-the-piano-and-type machine. I await future developments.

Conclusions

Qwerty has been with us now since 1873. After dominating the keyboard for 111 years, perhaps the reign of qwerty is drawing to a close. Who knows, we may soon be learning to type and play the piano at the same time!

END

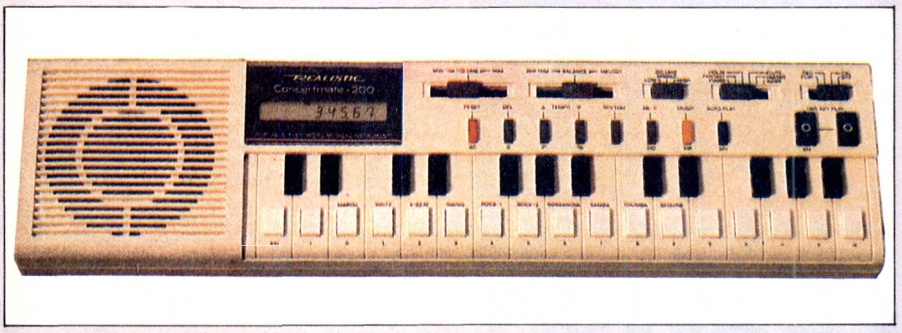


Fig 6 VL Tone keyboard/calculator

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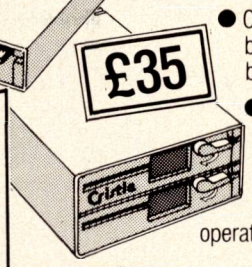

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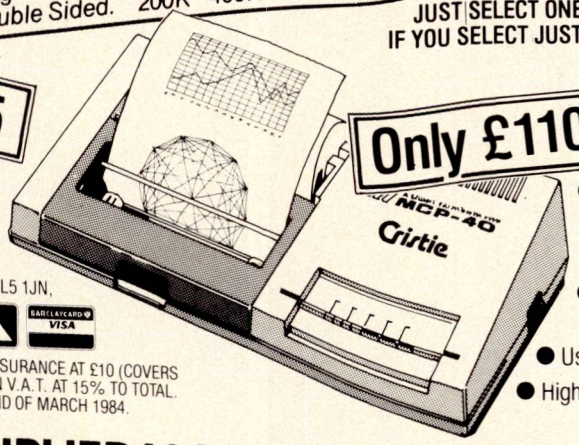

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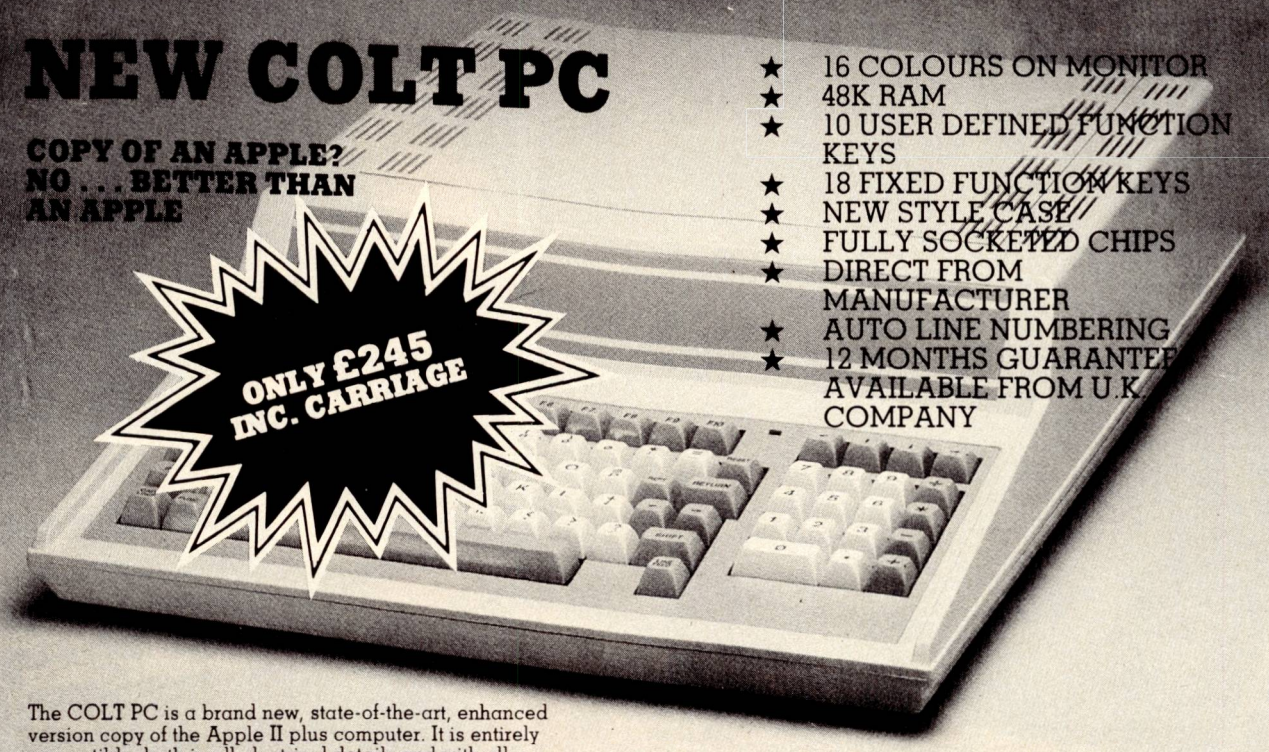

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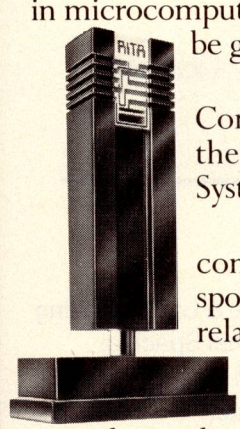

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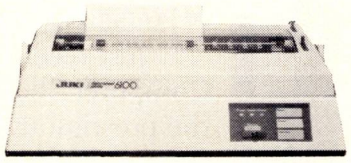

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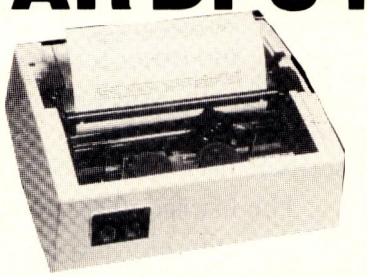

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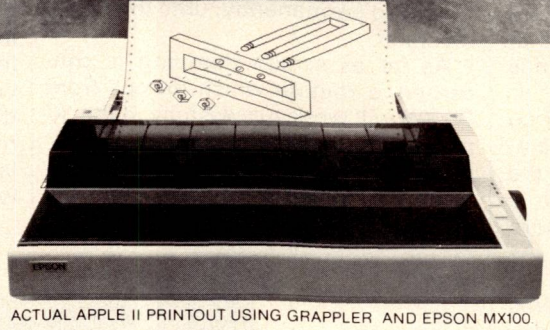

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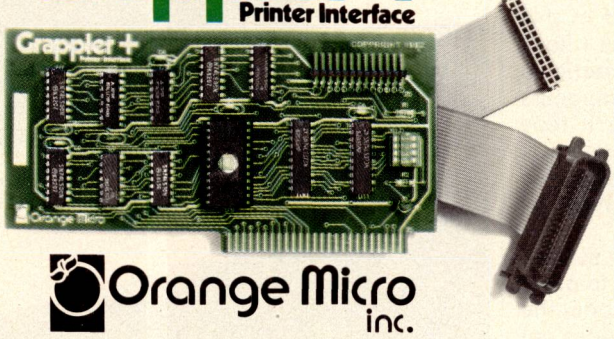

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Sharp contrast!

Maurice Hawes compares the Sharp MZ-80A with its predecessor, the MZ-80K, and provides upgrade tips and some helpful routines to improve performance.

The MZ-80A is laid out like the MZ-80K, but with a much improved keyboard. There are still one or two irritating features; in particular, the absence of a SHIFT LOCK key and an ALPHA LOCK facility. To stay in lower case it is necessary either to hold down a shift key, or do CTRL 'A'. Another CTRL 'A' will unlock the shift. A 'CR' will unlock the shift under SA-5510, but will not do so under SP-5025 or any of its extensions, without a special modification (see below). On the whole, the procedure is rather cumbersome because when the lock is in operation the whole keyboard is shifted. This means that the number keys in the top row produce their shifted symbols, and all the cursor keys produce the opposite of what you would expect.

The GRPH key toggles into and out of the graphics keyboard mode. This works very well and gives an excellent range of graphics characters from the keyboard. As with the MZ-80K, however, not all the characters in the machine's so-called 'ASCII' set are available from the keyboard. Those that are available are not always the same as on the MZ-80K.

Sharp has done nothing to clear up the confusion caused by its idiosyncratic character and display sets on the MZ-80K. The MZ-80A 'ASCII' set is non-standard and the display codes are different from the 'ASCII' codes. As neither set is exactly the same as on the MZ-80K, you may have some problems on this score when converting programs from the K to the A.

One of the selling points of the MZ-80A is that you can have a double-size memory area devoted to the screen and scroll the display around in this area. This could be useful, but I have found that the display sometimes becomes jumbled or disappears altogether when running under 'K' type interpreters in this mode. Fortunately, it is possible to switch the machine so that its screen memory map is the same as the MZ-80K's.

However, the double screen-handling routines do give rise to other problems. In the 'A' VRAM mode, the displayed part of the memory does not always start at D000H. To make room for the extra pointers needed by the more complex screen system, such as PAGETOP at 117D-EH, the 40/80 line pointers (48 of them) are stored as bits in six locations, instead of being stored as 24 bytes in 24 locations as in the 'K' mode. This means that any screen-dumping routine which works in the 'K' mode may not work in the 'A' mode, and vice-versa. Sharp has fallen into its own trap here — the new COPY/P1 command in Basic SA-5510 (not available in SP-5025) does not work on the MZ-80A when it is switched to its 'K' VRAM mode, because it picks up the 'address' of the first screen location from 117D-EH. In the 'K' mode, this is occupied by line pointers!

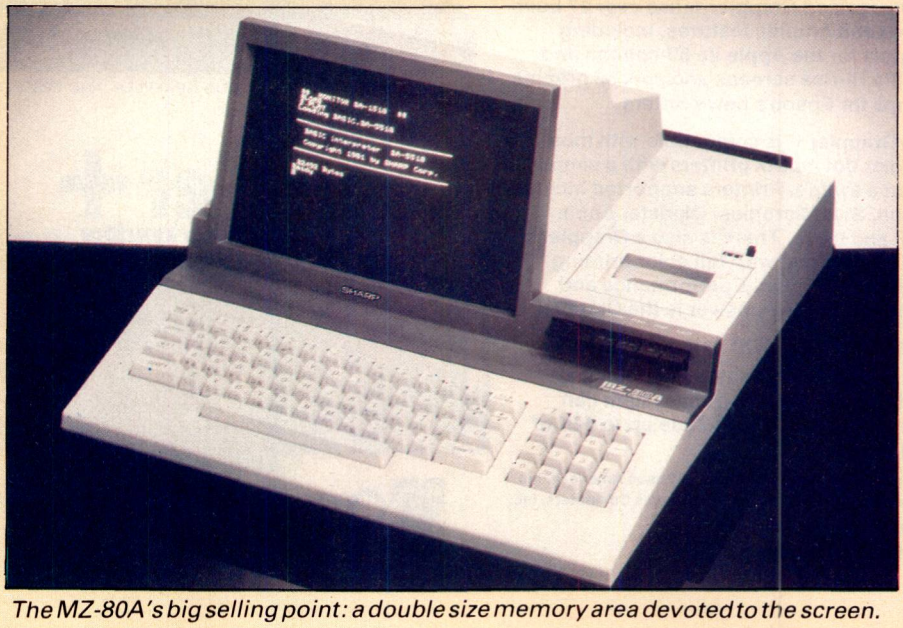
There are fairly simple solutions to the shift lock and screen dump problems. The shift lock flag (00 for the upper case and FF for the lower case) is stored in the monitor work area at 118FH. The appropriate value loaded into this location in a machine code program, or POKEd by Basic into decimal location 4495, will shift the keyboard permanently, until the flag is reversed.

As far as screen dumping is concerned, a routine which dumps from D000H will work successfully in the 'K' mode, and will also work in the 'A' mode providing that the display concerned is to a clear screen and has not been scrolled. I have even managed to get a routine working which picks up the 40/80 line pointers in the 'K' mode and sends full 80-column lines to the printer where these appear as two lines on the screen. This would be very difficult in the 'A' mode due to problems locating the correct 'bits' in the line pointer buffers.

If you wish to modify the COPY/P1 command in SA-5510 so that it always dumps from D000H, change the code at 33C6-33C8H from 2A 7D 11 to 21 00 D0.

MZ-80A monitor ROM (SA-1510)

On account of the different keyboard layout and the more sophisticated method of handling the screen memory, the monitor code for the MZ-80A is significantly different to that used in the MZ-80K (SP-1002). Nevertheless, there is a lot of built-in compatibility in this area, thanks to Sharp's method of routing calls to the most frequently used routines via a jump table which is in the same location in both monitors. In this way, most calls to the monitor will be intercepted by this table and directed to the correct code, whichever monitor is being used. This means that large parts of a machine code program written for an MZ-80K will be suitable



The MZ-80A's big selling point: a double size memory area devoted to the screen.



Cramped and unergonomic keyboard on the MZ-80K

for an MZ-80A, and vice-versa.

However, problems may arise when calls are made directly to monitor routines which are not in the table. In such cases there is some chance either that the routine does not exist in both monitors, or that it does exist in both monitors but not at the same location. The handbook provided with the MZ-80A (a very much better publication than the one provided with the MZ-80K) is a considerable help, as it contains a complete listing of the SA-1510 monitor code and a lot of other useful information on the layout and coding of the keyboard. Armed with this handbook and the listing of SP-1002 (which is still available), I have been able to solve individual problems. Some examples are given below, which illustrate the sort of problems that occur.

There is one other problem with SA-1510. The PRNT routine, called at 0012H, does *not* behave as stated on p125 of the MZ-80A handbook. Most of the codes in the range 00-20H are treated specially, and codes in the range 60-68H produce video control effects instead of graphics! Some of the implications are discussed below as they arise, but this appears to be a hardware error.

Monitor/Disassembler BA00

This very useful program, by Tanswell, runs without any modification on the MZ-80A, but with the following rather disconcerting results:

a) Screen locations which should be blank are filled with curly brackets.

b) In the 'D' command sequence, any response to the OPTION request other than 'T' reverses the video display.

c) The disassembler listing scrolls so fast that it is impossible to read.

d) Any line of disassembled code containing an instruction in the range 60-68H will upset the display; for example, a complete line will disappear altogether if it happens to contain the instruction 68H !!

The curly brackets arise from one of the changes in the MZ-80A 'ASCII' set. The solution is to change the code at BBFAH from 80H to 20H.

The video reversal is due to a routine which sends 00 to the screen if the key pressed is not 'T'; on the MZ-80K this prints a blank, but on the MZ-80A it reverses the display. The remedy is to change the code at BE9B from 0B to 0C.

Faster scrolling is normal on the MZ-80A. My solution here is to build in a delay routine to cause a pause between the lines of code as they are sent to the screen. I chose to make room for this by shortening the error message in the printer routine, which is at CD34H. The code is as follows:

CD34	DB 4EH, 4FH, 20H, 50H, 54H, 52H, 0DH; 'NO PTR'	
CD3B	PUSH HL	E5
CD3C	LD HL, 2000	210020
CD3F	DEC HL	2B
CD40	LD A,H	7C
CD41	OR L	B5
CD42	JR NZ, CD3F	20FB
CD44	POP HL	E1
CD45	CALL 0006	CD0600
CD48	RET	C9

The delay may be altered by changing the value loaded into HL at CD3D-EH, but I found 2000 to be about right. The routine above should be called at BD16H. Change the code there from CD 06 00 to CD 3B CD.

Characters in the range 60-68H do not upset the screen display on the MZ-80K, but they do on the MZ-80A. There is no room for code to cut them out exclusively, so I settled for replacing all codes below 20H and above 5FH by apostrophe marks. The changed section of code is as follows:

BCF6	CP 20H	FE20
BCF8	JR C, BCFE	3804
BCFA	CP 60H	FE60
BCFC	JR C, BD00	3802
BCFE	LD A, 27H	3E27
BD00	CALL BB72	CD72BB

With the above changes, Monitor/Disassembler BA00 works perfectly on the MZ-80A, and I used it to research all the information here. The effects of characters 00-1FH and 60-68H, when sent to the screen, are discussed in more detail in the next section.

Basic interpreters on the MZ-80A (SA-5510)

The most surprising feature of SA-5510 (supplied with the machine) is its size. It has very few extra commands compared with SP-5025, yet the start of the Basic source text is far higher — 505CH as against 4806H in SP-5025. Closer inspection reveals that Sharp has followed the pattern of SP-5025 by including a large unused area, which is presumably intended for future expansions. The interpreter code ends at 4231H; the work area does not begin until 4900H. Thus the unused area is 06CEH bytes long — slightly more than in SP-5025. Should you ever want more room than this for extra routines, the address 505C is stored at the following locations:

18B4 1958 1AC8 1AE2 1B14 1B1C 1C7E 1EC2 2D44 2F24 303C 3042 (All in hex)

One new feature of SA-5510 is a special routine, called at 11FDH, which copies the interpreter to tape but replaces itself with a C9 (RETURN) in the process. Thus copies cannot be made from copies.

The extra commands are AUTO, CHARACTER$, COPY/P1, CSRH, CSRV, CURSOR, PAGE/P, SPACE$ and STRING$. Full string comparisons are implemented, though the routine treats length before content and therefore will not give a true alphabetic sort unless all the compared strings are padded out to the same length. The COPY/P1 command will not work with the machine in the 'K' VRAM mode, as explained above.

Some of the new features of SA-5510 are not fully explained in the handbook, and others are not mentioned at all. The most useful of these is the facility to send control codes using CHR$(0)-(31). However, as these use the SA-1510 routine at 0012H, there are undocumented effects in many cases when such characters are sent to the screen, as shown below:

CHR$(0)	—	REVERSE VIDEO
CHR$(1)	—	PRINTS RIGHT ARROW
CHR$(4)	—	SCROLLS DISPLAY UP ONE LINE (IN VRAM MODE 'A' ONLY)
CHR$(5)	—	SCROLLS DISPLAY DOWN ONE LINE (IN VRAM MODE 'A' ONLY)
CHR$(16)	—	PRINT DOWN ARROW
CHR$(17)	—	CURSOR DOWN
CHR$(18)	—	CURSOR UP
CHR$(19)	—	RIGHT CURSOR
CHR$(20)	—	LEFT CURSOR

CHR$(21) — HOME CURSOR
CHR$(22) — CLS
CHR$(23) to CHR$(30) PRINT VARIOUS ODD GRAPHICS CHARACTERS

Characters omitted from the above list print a blank on the screen.

Linked with the above, CTRL Q to CTRL V also have undocumented effects. These are CURSOR DOWN, UP, RIGHT, LEFT, HOME and CLEAR SCREEN in that order.

CHR$(96) — CHR$(104) also produce undocumented effects, as follows:

CHR$(96)	—	DELETE LAST CHARACTER
CHR$(97)	—	INSERT FOLLOWING CHARACTER
CHR$(98)	—	CHANGE TO ALPHA MODE
CHR$(99)	—	CHANGE TO GRAPHICS MODE
CHR$(101)	—	REVERSE VIDEO
CHR$(102)	—	CARRIAGE RETURN
CHR$(103)	—	SCROLLS DISPLAY UP ONE LINE (IN VRAM MODE 'A' ONLY)
CHR$(104)	—	SCROLLS DISPLAY DOWN ONE LINE (IN VRAM MODE 'A' ONLY)

Since the 'ASCII' table on p210 of the MZ-80A handbook shows that codes 60-68H are meant to produce graphics characters, it would appear that some, if not all, of the above effects are unintentional. Moreover, as the effects stem from the SA-1510 monitor, they will affect all types of program (as has been seen already with Monitor/Disassembler BA00); the detailed discussion is put here only because SA-5510 demonstrates all the points very conveniently.

Overall, SA-5510 is a definite improvement over SP-5025, but still has to be classified as rather limited for its size. The most obvious omissions are RENUMBER and APPEND; and the data filing routines are still as SP-5025, and are therefore very slow compared with those in some other interpreters available. Furthermore, machine code segments written to run under SP-5025, and calling routines from it, will not run under SA-5510 because those routines, even if they exist in SA-5510, will be in different locations. This problem can only be solved by referring to complete listings of both interpreters, and I shall not attempt to deal with it here.

SP-5025

The SP-5025 interpreter, written for the MZ-80K, works satisfactorily on the MZ-80A. It is useful to have SP-5025 available on the MZ-80A, to run programs written for the MZ-80K, and may also be useful when memory space is at a premium. SP-5025, with the extensions written by Gladman, also works without modification. Extended SP-5025 may be used in place of SP-5025, and is more versatile.

Speed Basic

Speed Basic contains several calls and two conditional jumps to the monitor which are not correct on the MZ-80A. Some are to routines that no longer exist, and some are to routines that have been moved. The most obvious problem is caused by a small addition to the keyboard-handling code, which makes a conditional jump to a monitor routine that has been moved. This means that the moment you attempt to write *anything* from the keyboard after loading the interpreter, it crashes! You can't even type BYE to get back to the monitor!

Fortunately the MZ-80A has a reset switch, so if you load Speed Basic and then immediately press RESET to get back to the monitor, you may then load another program; for example, Monitor/Disassembler BA00 by Tanswell, modified as explained above to make the following changes:

1 At 3E19-3E1BH, change C2 DE 0F to C2 E5 0E. This is the conditional jump in the keyboard-handling code referred to above, to a POPPER routine.

2 At 41D9-41DBH, change CA 62 0A to CA 5F 03. This is in the code for DUMP and all it does is jump to the monitor to pick up POP HL:RETURN!

3 At 3DE8H, change 7C to 20. This puts the PAUSE control for LIST, DUMP and SLOW on to the Space Bar (7C is not available from the 'A' keyboard).

4 Rewrite the SPEED DATA filing routine at 43C2-43FFH, by changing all the Monitor addresses below, noting that some occur twice:

Change 04D4 to 04CB
Change 0733 to 071A
Change 06B2 to 06A3
Change 0563 to 0552
Change 0767 to 0D3E (twice)
Change 0780 to 0D57 (twice)
Change 0466 to 0461

5 The following routine needs to be put into some space location, and called at 4179H and 419FH:

C5 D5 E5 1A BE 20 0B 05 28 08 FE 0D 28 04 13 23 18 F1 E1 D1 C1 C9

It replaces the SP-1002 routine at 0180H, which has no counterpart in SA-1510, and is used by the new keyword handler, and by PRINT @.

If you are using the standard Sharp printer routine, you can shorten the long error message at 3CE0H to 'PTR OFF' and put the above code at 3CE8H.

If you are using a special printer routine, you may be able to find room in it to do something similar; otherwise, raise the start of the Basic source text to, say, 4850H (*PCW*, March '83, pp178–81) and put the code at 4806H. Wherever you put it, don't forget to call it at 4179H and 419FH!

Those are all the changes. But before you take a security copy of the modified interpreter, check for the known 'bugs' in Speed Basic, at 1BC9-AH (which should contain 57 45) and at 40C2H (which should contain 5C).

Speed Basic on the MZ-80A is quite a powerful tool for its size, since the features it lacks compared with, say, Basic Plus 2 are mostly provided by the MZ-80A itself. Furthermore, the fast data filing routine as rewritten above could be used with other interpreters on the MZ-80A.

Basic Plus

This package, by Hearn, contains a major rewrite of the MZ-80K keyboard-handling routine which will not work on the MZ-80A and would be very difficult to modify. If this routine is cut out by reverting to the MZ-80A user handler at 0003H, only two other modifications are necessary: one to cover a call in the Basic Plus 2 error-handling routine which is to a routine that does not exist in the 'A' monitor; and another to direct those keywords that are not applicable to the 'A' to a suitable error message.

You may load Basic Plus on the MZ-80A and it will not crash. However, if your copy has been recorded (as mine was) with the REPEAT function 'on', you will not be able to enter anything from the keyboard. Do BYE or a reset, and then load the Monitor/Disassembler and carry out the following modifications:

1 Check the flag at 3DEDH, which should be 00. Alter it if necessary.

2 At 1ED4-6H AND at 4064-6H, change CD 90 40 to CD 03 00. This reverts to the normal MZ-80A keyboard handler.

3 To sort out the error-display routine, two steps are required:

a) At 4277-9H, change the code from CD 99 09 to CD 20 43.

b) At 4320H, add new code as below:

4320	PUSH AF	F5
4321	PUSH BC	C5
4322	PUSH DE	D5
4323	LD B,05H	0605
4325	LD A,(DE)	1A
4326	CP 0DH	FE0D
4328	JP Z,0EE6	CAE60E
432B	CALL 0BB9	CDB90B
432E	CALL 096C	CD6C09
4331	INC DE	13
4332	DJNZ 4325	10F1
4334	JR 4323	18ED

This relocatable code replaces the SP-1002 routine at 0999H, which has no counterpart in SA-1510. The area 431B-43FFH is spare in Basic Plus.

4 Two steps are necessary to direct unwanted keywords to an error message:

a) Change the code to F0 3F at each of the following pairs of locations: 3EDC-DH, 3EDE-FH, 3EE0-1H, and 3EEA-BH.

b) Change the message at 3FFC-4013H to:
'Not on the MZ-80A!'

This version of Basic Plus offers AUTO, display of ERROR position, PAUSE on listing, LINK ('Progname') and CLS. It is well worth incorporating in an 'A' interpreter, but of course it is

even more useful if used in conjunction with Gladman's Extensions, to form Basic Plus 2.

Basic Plus 2

This interpreter is formed by adding a relocated version of Basic Plus to Extended SP-5025 by Gladman. Since the latter runs satisfactorily on the MZ-80A, the problems are the same as with the first version of Basic Plus, but at different locations. The changes necessary are as follows:

1 Set the flag at 4806H to 00.
2 At 1ED4-6H AND at 3E91-3H, change CD A3 49 to CD 03 00.
3 a) At 4B82-4H, change CD 99 09 to CD A3 49.
   b) At 49A3-B8H, write in the code listed at 3b) in the previous section.
   (There is no spare area in Basic Plus 2 except for that occupied by the now disused keyboard-handling routine at 49A3H. This modification overwrites the beginning of that routine. If you wish to keep the Basic Plus 2 keyboard-handler intact for experimentation, raise the start of the Basic source text (*PCW*, March '83, pp 178-81) and put the code in the space thus created.)
4 a) Change the code to D5 48 at 4C71-2H, 4C73-4H, 4C75-6H, and 4C7F-80H.
   b) Change the message at 48E1-F4H, to 'Not on the MZ-80A!!'

With these changes, Basic Plus 2 will work on the MZ-80A and, given the auto-repeat and numeric pad on the machine, will lack only the 'Single' feature.

Enhanced Basic Plus 2

If you have enhanced Basic Plus 2 by the method suggested, or by any other method, you must check any added routines to make sure that they do not make unacceptable calls or jumps to the monitor. The chances are that most of such calls or jumps will be acceptable, but the only way to be sure is to check them all to see that they make sense according to the monitor listing provided in the MZ-80A handbook, preferably by cross-reference to a copy of the MZ-80K monitor listing by Sharp/Newbear. If a call or jump turns out to be to the beginning of an SA-1510 routine, it is almost certain to be safe; if it is not, you must find out what the call or jump does in SP-1002, and then find the equivalent routine in SA-1510, or copy the SP-1002 code into some spare location and call it, or jump to it, there.

If you have added routines from Speed Basic, the necessary changes are noted above in the paragraph on that interpreter, but of course you will have to make allowance for the different location of the code. In particular, you must look for the call to 0A62H in the DUMP routine, and you must rewrite the SPEED DATA filing routine.

I have successfully modified my own enhanced version of Basic Plus 2 as described in *PCW*, March 1983, and I am using it on an MZ-80A, in conjuction with a word processing program, to write the present text. It is a much more powerful interpreter than SA-5510, and compares well with the Basics offered on many other machines in the same price range.

Advanced input routine

For some time now I have been using a version of the advanced input routine published in issue 6 of *Sharpsoft User Notes* as part of a program listing. The purpose of the routine is to allow input lines more than 80 characters long to define the characters that will be accepted, to disable the HOME, CLS, BREAK, INSERT and 'QUOTES' keys, and to limit the effects of the cursor control keys to the current 'line'

The original version contains a large chunk of unused code at the end, and I replaced this in my MZ-80K version with code which enables me to toggle from upper case to lower case and back again using the CAP key, without the need to do SHIFT/SML. This is a great help in a word processing program.

'It is useful to have SP-5025 available on the MZ-80A, to run programs written for the MZ-80K, and may also be useful when memory space is at a premium.'

When I tried the code on the MZ-80A I found that my modification applied to the GRPH key and worked perfectly on that, but that the cursor control keys were not functioning correctly, and that CTRL A was not being accepted to toggle in and out of lower case. After some thought I decided to dispense with the UP and DOWN cursor key, as I could move around the line without it, and used it to toggle the keyboard from upper to lower case and back again. The key works without SHIFT whichever case you are in. The code loads 0 or FF, as appropriate, into buffer 118FH. To get the LEFT and RIGHT CURSOR key operating correctly, I altered two calls to the monitor to suit the MZ-80A (0EAE to 0E95, 0E90 to 0E7B).

The code for the MZ-80A is listed in Fig 1 in the form of a Basic subroutine. When loaded, it sits at CD14-CE9FH, including the NOP's at the end. These define the end of the usable space for modifications, as I found after several unsuccessful attempts to write my modifications beyond them. The reason is that the routine uses its own input buffer from CEA0H upwards!

The routine is called by a Basic line with the format:

USR(IN),TT$,TT,A$

Where IN=52500, TT$ is a previously defined string which includes all the characters you wish to be accepted, TT is the previously defined line length, and A$ is the name you have assigned to the string variable input.

For the record, my changes are in lines 2580-2600, 2620, 2660-2680 and 2715.

If you wish to examine the code using Disassembler BA00, lower the limit IN and all the POKE addresses by, say,

```
2470 DATA229,197,1,255,0,33,160,206,62,32,205,217,15, 193,225,17,160,206
2480 DATA237,83,12,17,205,151,22,44,205,175,34,205,15,24,205,1,24,213
2490 DATA197,205,154,22,44,205,169,25,205,154,22,44,34,1,72,225,34,10
2500 DATA17,225,67,74,237,91,12,17,213,205,179,9,205,206,11,254,102,202
2510 DATA85,206,254,96,40,61,254,99,40,79,254,98,40,84,254,20,40,91
2520 DATA254,19,40,120,254,18,202,251,205,254,17,202,36,206,197,237,75,10
2530 DATA17,229,237,177,225,193,32,203,18,19,12,205,18,0,16,195,205,179
2540 DATA9,205,206,11,254,102,202,85,206,254,96,32,241,13,12,40,176,62
2550 DATA20,205,18,0,205,12,0,62,20,205,18,0,13,4,27,24,158,62
2560 DATA4,50,3,224,62,1,24,6,62,5,50,3,224,175,50,112,17,24
2570 DATA138,213,197,237,75,12,17,235,237,66,235,193,209,218,83,205,202,83
2580 DATA205,27,4,13,229,33,83,205,227,245,197,213,229,195,149,14,12,5
2590 DATA40,103,19,229,33,83,205,227,245,197,213,229,195,123,14,62,255,50
2600 DATA143,17,195,83,205,28,42,113,17,124,183,40,21,197,1,40,0,37
2610 DATA34,113,17,235,237,66,235,193,62,40,128,71,121,214,40,79,225,195
2620 DATA83,205,62,0,50,143,17,195,83,205,71,121,198,40,79,197,1,40
2630 DATA0,235,9,235,193,229,42,113,17,124,254,24,40,8,36,34,113,17
2640 DATA225,195,83,205,33,83,205,227,245,197,213,229,195,50,14,175,71,197
2650 DATA42,1,72,205,19,38,205,54,36,205,41,24,34,1,72,205,123,25
2660 DATA193,225,205,223,24,205,118,25,205,106,27,157,19,201,58,112,17
2670 DATA254,0,40,9,62,0,50,112,17,62,5,24,7,62,1,50,112,17,62,4,50,3,224
2680 DATA195,83,205,0,0,0,0,0,0,0,0,0,0,0
2690 IN=52500:LIMIT IN
2700 FORX=52500TO52895: READZ:POKEX,Z
2710 NEXT
2715 POKE52670,195:POKE52671,120:POKE52672,206:RETURN
```

This routine is written to work with SP-5025 and its derivatives, and will not work with SA-5510
Fig 1

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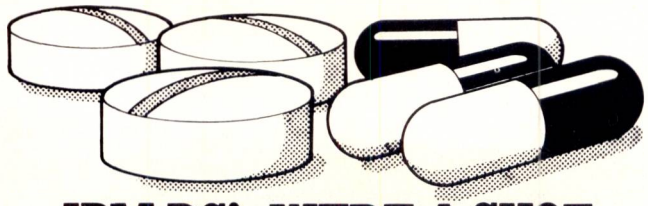

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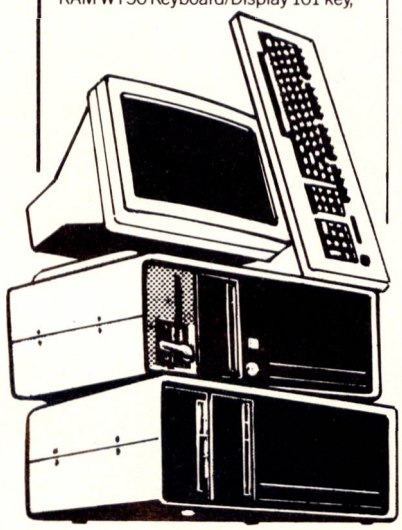

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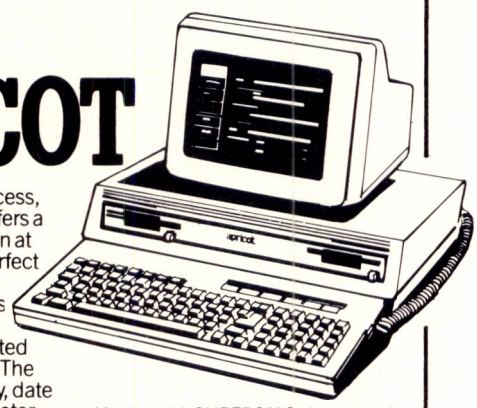

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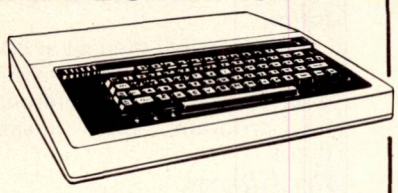

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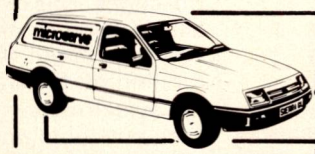

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4000H and run the subroutine in that form.

The code will then sit at 8D14H, and will make sense apart from the first hex digit of any location reference within the program, when disassembled there.

Problems

Keyboard and screen:
There are a few small residual problems when running 'K' type interpreters on an MZ-80A. They have already been mentioned in passing, but are discussed more fully below.

a) Shifted keyboard does not return to normal on 'CR'
This problem arises because the 'K' interpreters were not written to cope with this particular situation. It may be solved by inserting a very short routine at the beginning of the main Edit loop:—

1257	JP XXYY	C3YYXX
XXYY	PUSH AF	F5
+1	XOR A	AF
+2	LD (118F), A	328F11
+5	POP AF	F1
+6	LD A,(4565)	3A6545
+9	JP 125A	C35A12

The above routine is obviously relocatable, and may be put in any spare location, the appropriate address then going in at 1258-9H. This routine will work with any version of SP-5025 known to date.

In this connection it is worth reminding yourself that the value stored in 118FH when the keyboard is shifted is FF, not 01 as might have been expected from MZ-80K experience; and that location 1170H (4464D) stores the so-called KANA or graphics flag, the values of which are 00 (GRPH off) or 01 (GRPH on).

b) Display lost or muddled; INSERT jams up in first half of 80-column line.
These problems arose several times during my tests, but only when I was using a 'K' interpreter in the 'A' VRAM mode. In every case I was able to recover by jumping out of the program, switching to 'K' VRAM mode, and then jumping back in again. Clearly, the problem is caused by the different screen pointer storage systems referred to above. The simple solution is to work in the 'K' VRAM mode whenever you are running under a 'K' type interpreter. I have the feeling that a software modification to cover this one could be difficult.

c) Keys not available on the MZ-80A
In the course of changing the keyboard layout, Sharp has reduced the number of graphics and special characters available on the keyboard of the MZ-80A, compared with the MZ-80K. This means that in a 'K' program which requires the operation of graphics keys, you may have to change the code to find a suitable mode of operation on the 'A'. This comment applies to all types of program.

Interface unit and printer
The custom-built interface board is designed to be fed with +5V from pin 18 of the printer, though it can be modified to take +5V from the computer. It plugs straight into the MZ-80A slot. A modifier tape was supplied to enable the interpreter to send the correct ASCII codes for lower-case letters, and control codes. This modifier will work with all the versions of SP-5025 mentioned above. Without the modifier (that is, running on the Sharp printer routine) the system worked correctly in upper case but could not deal correctly with lower case or control codes. With the modifier tape loaded, the system coped with lower case automatically, and with control characters by special code sequences. I had no trouble in using these to select printer character style and size, and to set various parameters such as tabs and form length.

'In the course of changing the keyboard layout, Sharp has reduced the numbers of graphics and special characters available on the keyboard of the MZ-80A . . .'

Sharp seems to have got into a groove over its own private 'ASCII' set, and although one can see the point of compatibility with the 'K', it was an odd decision to make just a few changes rather than a clean sweep to the standard set. There appears to be a bug in SA-1510, which causes codes 60-68H to produce control effects instead of graphics when sent to the screen.

The least attractive feature of the MZ-80A package is its Basic interpreter. SP-5510 is just a little better than SP-5025, but that is hardly a recommendation, and the facilities offered by SA-5510 are very poor for its size. One can only assume that Sharp must have plans to offer more facilities in the space it has left unused. If it does not, it is hard to see the reason for the layout of this interpreter.

The advanced input routine given in Fig 1 improves any program very significantly. The ability to type in input strings up to 255 characters long, combined with the SHIFT LOCK toggle on one key and the disabling of CLS, HOME, BREAK and 'QUOTES' gives a professional feel to the machine. And fast data filing at about three times the speed of SA-5510 revolutionises one's approach to data handling.

'The MZ-80A is a pleasant machine to use, and its keyboard, though it has its weaknesses, is a great improvement over its predecessor, the MZ-80K.'

Conclusions

The MZ-80A is a pleasant machine to use, and its keyboard, though it has its weaknesses, is a great improvement over its predecessor, the MZ-80K. As I expected, Sharp's superb tape system behaved perfectly during a month of very hard use, including a lot of data filing and re-loading. The 40-column video display was clear and steady; the double-screen memory system is a good idea, but it is not compatible with SP-5025 or its extensions, and raises problems when these interpreters are used, or when the machine is in the 'K' VRAM mode.

Crystal Basic 3, when it appears for the MZ-80A, may well prove to be a strong competitor. My criticisms of Crystal Basic 3 on the 'K' were its lack of precision, and its lack of a numeric keypad facility. The 'A' has a numeric keypad. If Crystal Basic 3 for the MZ-80A turns out to offer higher precision, in addition to its already standard features of 'line input', fast data filing, a standard set of ASCII codes for lower case letters, and a built-in extended machine code monitor, it could be the best available. With all these features, the MZ-80A at its current price level is an attractive buy.

'K' machine code programs other than interpreters can be dealt with by the same general methods as have been used above to deal with interpreters and the disassembler. In principle, one must examine the code in detail to find any jumps or calls to the MZ-80K monitor which are not correct for the MZ-80A monitor. This sounds rather laborious, but in practice one soon builds up a list of addresses that are safe, and another list of addresses that are not, and the process then becomes relatively easy. Other minor changes, due to the different 'ASCII' and display codes or the slightly restricted range of graphics characters available from the MZ-80A keyboard will not be necessary very frequently, and will be quite straightforward in any case.

The interface card and modifier tape, supplied by Border Computing and Programming, offers an economical and convenient method of using a parallel-interface printer with the MZ-80A, if you are not considering other peripherals such as disk drives.

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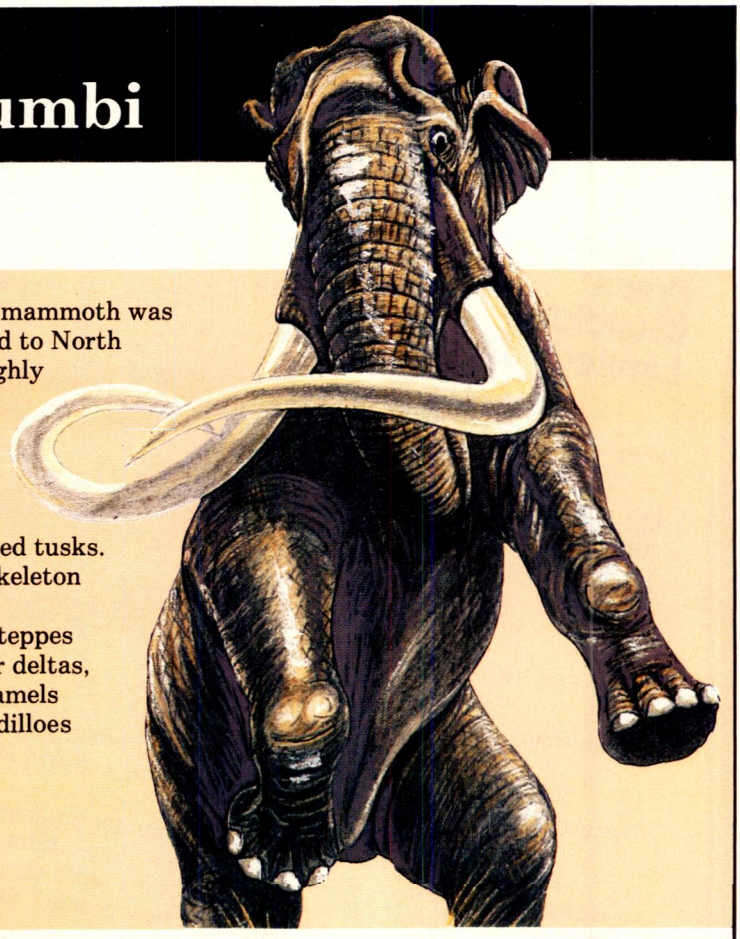
Circa 60,000 BC



Like the emperor mammoth, the Columbian mammoth was also a descendant of mammoths which immigrated to North America during the Irvingtonian time (which roughly approximates to the Holstein interglacial in Europe). It inhabited the south-eastern part of the USA (South Carolina, Georgia, Louisiana) and may have extended still further south into Mexico.

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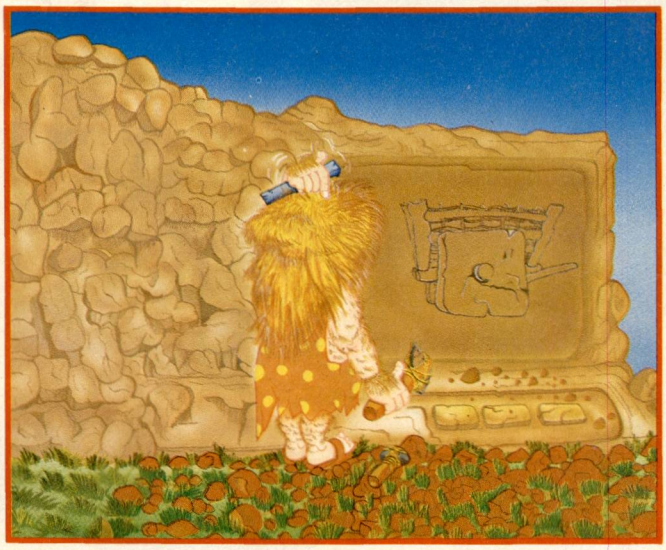

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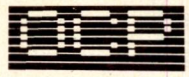

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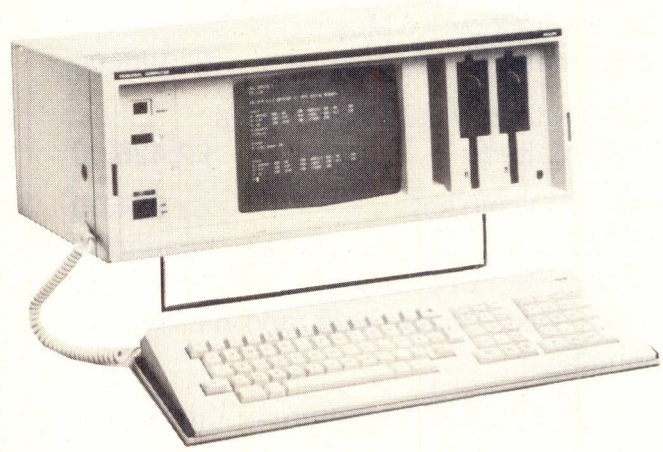

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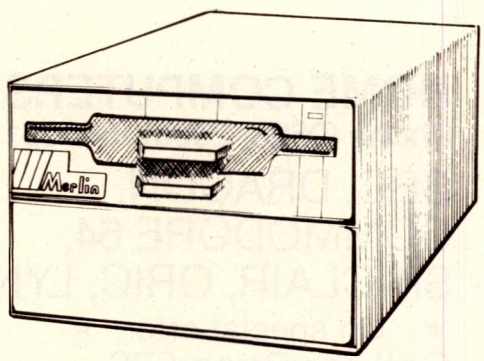

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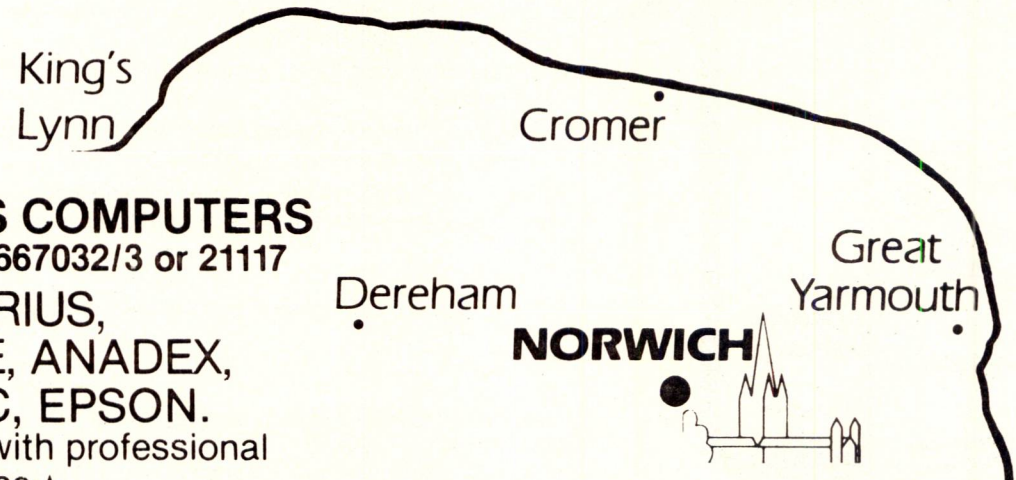

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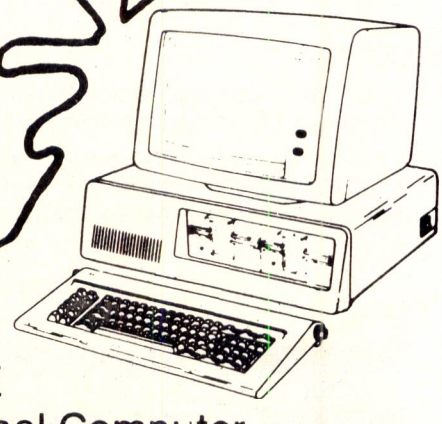

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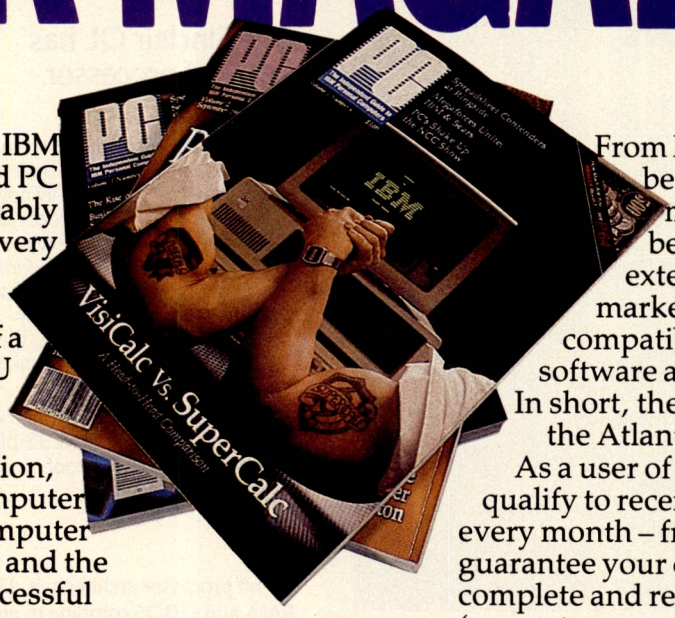

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New-Sinclair QL

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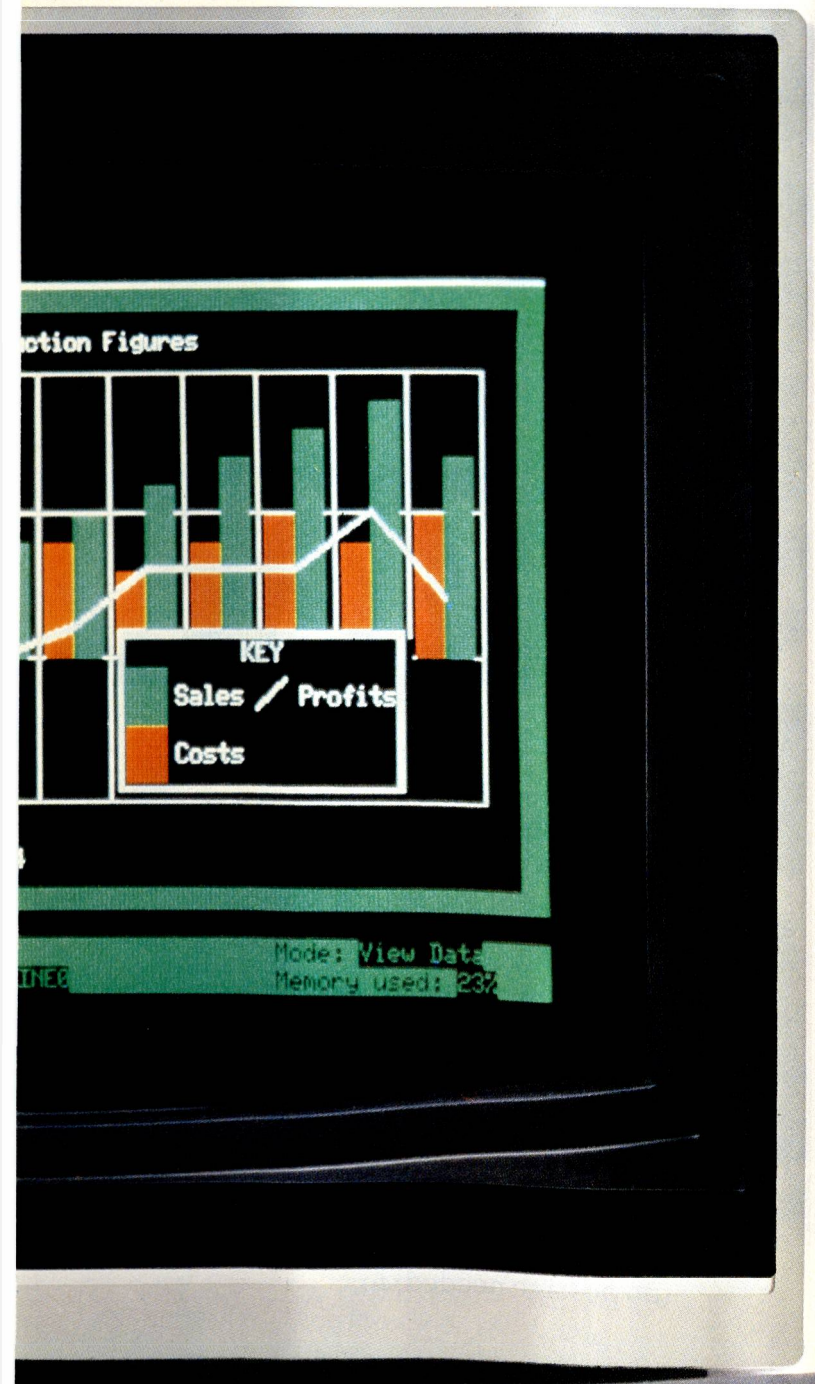

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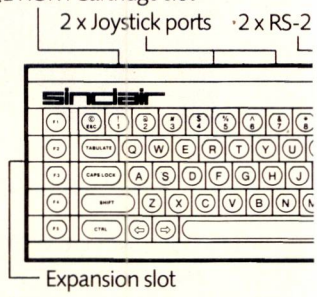
No competition! QDOS sets a new standard in operating systems for the 68000 family of processors, and may well become the industry standard.

QDOS is a single-user, multi-tasking, time-sliced system using Sinclair's new SuperBASIC as a command language.

One of its most significant features is its very powerful multi-tasking capability – the ability to run several programs individually and simultaneously. It can also display the results simultaneously in different portions of the screen. These are features not normally available on computers costing less than £7,000.

Eleven input/output ports

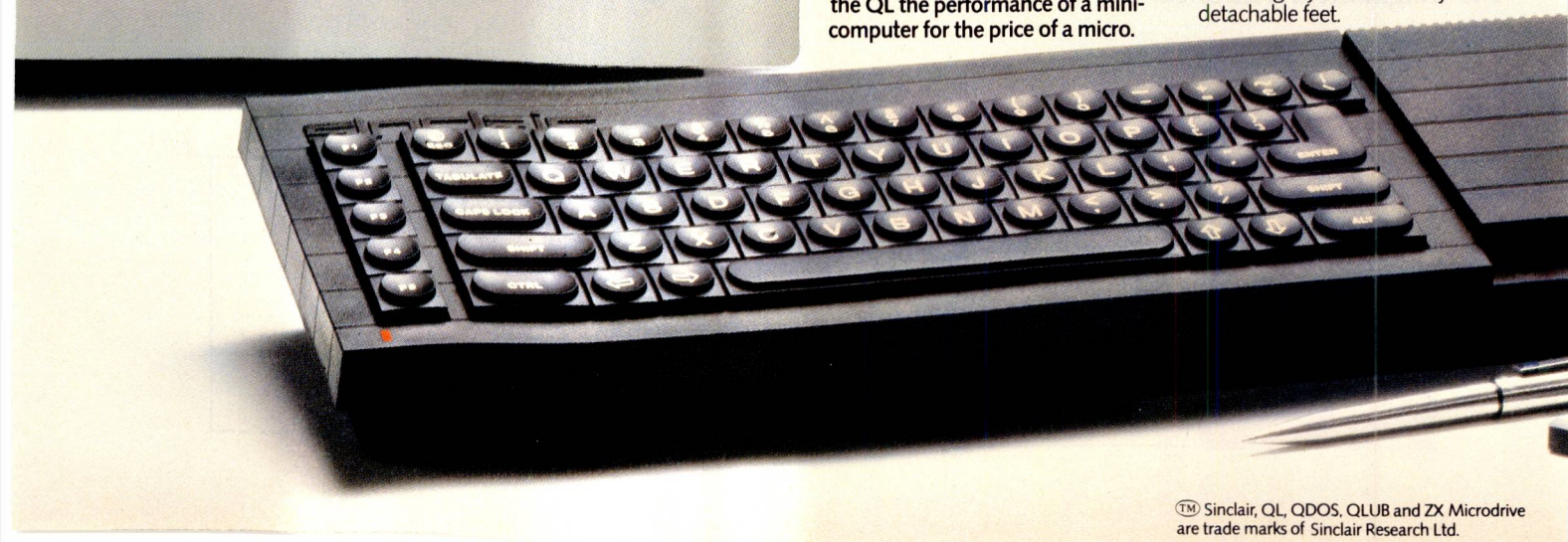


New professional keyboard

The QL keyboard is designed for fast input of data and programs.

It is a full-size QWERTY keyboard, with 65 keys, including a space bar; left-and right-hand shift keys; five function keys; and four separate cursor-control keys – key action is positive and precise

A membrane beneath the keyboard protects the machine from dust (and coffee!), and for users who find an angled keyboard more comfortable, the computer can be raised slightly at the back by small detachable feet.



™ Sinclair, QL, QDOS, QLUB and ZX Microdrive are trade marks of Sinclair Research Ltd.

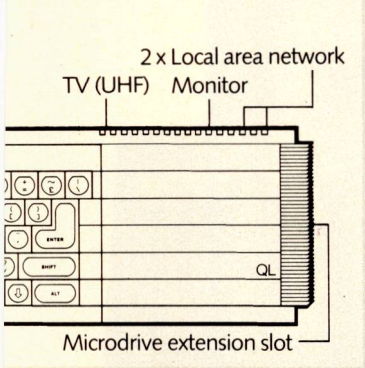
£399

ecause there's no comparison!

Advanced new friendly language – Sinclair SuperBASIC

The new Sinclair SuperBASIC combines the familiarity of BASIC with a number of major developments which allow the QL's full power to be exploited.

Unlike conventional BASIC, its procedure facility allows code to be written in clearly-defined blocks; extendability allows new procedures to be added which will work in exactly the same way as the command procedures built into the ROM; and its constant execution speed means that SuperBASIC does not get slower as programs get larger.



Two 100K microdrives built in

The Microdrives for the Sinclair QL are identical in principle to the popular and proven ZX Microdrives, but give increased capacity (at least 100K bytes each) and a faster data-transfer rate. Typical access speed is 3.5 seconds, and loading is at up to 15K bytes per second. The Sinclair QL has two built-in Microdrives. If required, a further six units can be connected.

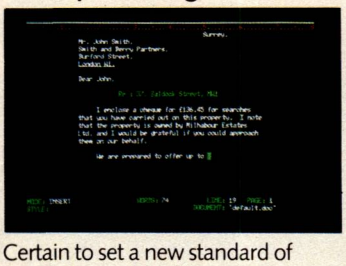
Four blank cartridges are supplied with the machine.



Included – superb professional software

The suite of four programs is written by Psion specially for the QL and incorporates many major developments. All programs use full colour, and data is transportable from one to another. (For example, figures can be transferred from spreadsheet to graphics for an instant visual presentation.)

Word-processing

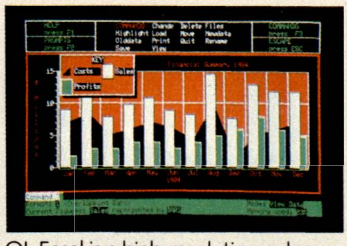


Certain to set a new standard of excellence, QL Quill uses the power of the QL to show on the screen exactly what you key in, and to print out exactly what you see on the screen.

A beginner can be using QL Quill for word-processing within minutes.

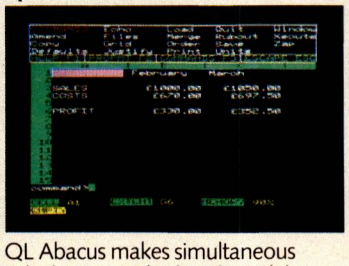
QL Quill brings you all the facilities of a very advanced word-processing package.

Business graphics



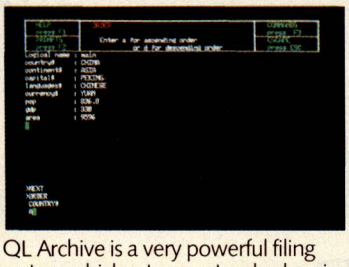
QL Easel is a high-resolution colour program so easy to use you probably won't refer to the manual! It handles anything from lines, shaded curves or histograms to overlapping or stacked bars or pie charts. QL Easel does not require you to format your display before entering data; it handles design and scaling automatically or under your control. Text can be added and altered as simply as data.

Spreadsheet



QL Abacus makes simultaneous calculations and 'what if' model-construction easier than they've ever been. Sample applications are provided, including budget-planning and cash-flow analysis. QL Abacus allows you to refer to rows, columns and cells by names, not just letters and numbers. Function keys can be assigned to change a variable and carry out a complete 'what if' calculation with a single key-stroke.

Database management



QL Archive is a very powerful filing system which sets new standards, using a language even simpler than BASIC. It combines ease of use for simple applications – such as card indices – with huge power as a multi-file data processor.

An easy-to-use labelling facility means that you don't have to ask for your file by its full name – a few letters are enough.

New – the Sinclair QLUB

The QLUB is the QL Users Bureau. Membership is open to all QL owners. For an annual subscription of £35, QLUB members receive one free update to each of the four programs supplied with the QL, and six bi-monthly newsletters. Sinclair has also made exclusive arrangements for QLUB members to obtain software assistance on QL Quill, Abacus, Archive or Easel by writing to Psion.

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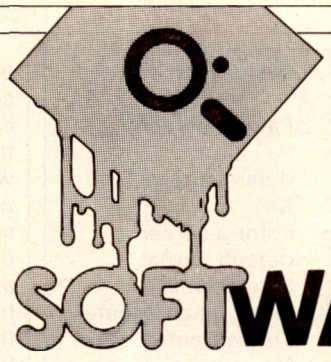


Information Management

Set up data files and store records simply and efficiently with this new database from BPI of Texas. Kathy Lang investigates.

Information Management from BPI of Austin, Texas is distributed in this country by Thames Computer Systems and is available on the IBM and Wang PCs, with other computers planned. It is based on a package widely available in the US on the Wang PC, where it has the name AIMS+Plus and is described as an applications generator. Information Management is exceptionally easy to use for a package with such a wide range of facilities, and for a while I almost forgot my dislike of menus. The good points include intelligent use of the IBM PC's highlighting capabilities and consistent use of its function keys.

The basic unit of information within Information Management is a record within a file: records are stored in a fixed format and use a fixed amount of space no matter what they contain. You can set up a data file very simply and the structure can be modified later. Records can be retrieved through any field, or a combination of fields, using some easily constructed rules. Reports are either the usual columnar type, or sets of repeated documents such as personalised letters. Facilities for combining files are limited to the reporting stage.

Information Management is distributed as a set of three program disks and a sample data disk, for the benefit of users with single-sided PCs; those with double-sided drives can combine the three program disks into two, with one being used for designing files and reports and the other for all ordinary data operations. Information Management distinguishes between the 'manager', who will carry out this design work, and who has one password, and the 'operator', who needs a separate password to gain access to data. Each file has its own operator and manager passwords.

The main limits imposed by Information Management are shown in Fig 1. The most noteworthy is the limit on the length of a field: you must not exceed 76 characters for the combined length of the data field and its associated 'description', or name. Another important limit on floppy disk systems is that there's no way to use both drives when changing the structure of a file, so in practice you are limited to a file half the size of the capacity of one disk. On the double-sided drives I used for the Benchtest, I got close to this limit with a file containing 1000 records, each of 153 characters.

Setting up a data file for simple applications is a very straightforward task. The minimum information you must specify is the name and the size of each field. If this is done, then all fields are assumed to be alphanumeric; that is, you won't be allowed to do arithmetic on them, and records will be displayed in the order entered. The layout of the record on the screen can be specified by using a simple version of the paint-a-screen approach: the field name and format are displayed, and the cursor keys are used to move around a picture of the format to the appropriate place on the screen. The Page Up and Page Down function keys are used to move between screen pages.

You may define up to nine highlighted fields, which is a very useful feature. Whenever records are displayed, they appear one per line with just the highlighted fields on the screen.

What is a Database?

If you want to process information which has some form of structure (such as accounts, personnel records, job costing), you can use an off-the-shelf package which will probably not be quite what you want, and hard to adapt. Alternatively you could write a program specially, which will cost a lot in time and money and still contain errors. The third possibility is to buy a data management package. These packages allow you to store, process and report on structured information.

Most of the cheaper packages are based on a traditional card index, where each card or set of cards about one person, order or item of stock is stored in a single record, *and a group of like records are stored in a* file *(corresponding to the index card box). Each item which would be recorded on the card — name, job title, part number, stock quantity — is stored in a* field *within the record. Usually, each record within one file must have the same number and size of fields — they are 'fixed length fixed format' records.*

Some more sophisticated packages can relate several files together, so that you can process groups of unalike but related records. The costs range from £155 for a simple card-index-like system to nearly £1000 for a complex package which can be used by several people at the same time.

Package	AIMS+/BPI −IM	Data validation	Good
Maximum file size	Disk size dept	Screen formatting	Paint-a-screen, default format
Max record size	1200 chars		
Max no fields	100	Unique keys	No
Max field size	75 chars	Report formatting	Paint-a-screen, default format, letter format
Max digits	NS		
Max prime key length	38		
Special disk format?	No	Store calculated data	Input, batch update
File size fixed?	No	Totals & Statistics	Totals & sub-totals
Link to ASCII files?	OP	Store selection criteria	No
Data types	N,C,D	Combining criteria	AND
Fixed rec structure?	Yes	>1 criterion/field?	No
Fixed record length stored?	Yes	Wild code selection?	String within
		Browsing methods	Any field
Amend rec structure?	By copying	Interaction methods	Menu
Link data files?	Reports only	Reference Manual	None
No. data files open	3	Tutorial Guide(max 5)	***
No. sort fields	5	Reference Card	None
No. keys	1	Online Help (max 5)	***
Max key length	38 chars, 5 fields	Hot-line?	£15 pa
Subsid indexes UTD?	No subsid indexes		

Fig 1 Summary of facilities

This is a good way to see a group of records together without overwhelming yourself with information. You have to decide these fields at the start in the file design phase, but can amend your selection later quite easily.

At the design stage you may also define numeric fields as being based upon calculations (irritatingly referred to as 'math'). Validation of fields is of two kinds: simple type checking on numbers, dates, and so on, and more complex definitions such as characters only and upper case letters only. You can specify that a field must have a value; you may also specify that the value of a field is to be carried over from the previous record.

You may specify the order in which the file is to be maintained, which may be up to five fields in all. When the whole file is printed or records from it displayed, this is the order used.

Once the file design has been set up, you are ready to enter information into the records. The structure of these records may still be changed after data has been entered, but this is a slow process — you will see the time for adding one new field to each of my records in Fig 2.

Data input and updating

When you want to enter or amend records, you may identify them directly using the sort key specified when the file was set up. However, the way this is handled means that it's important to keep this key as short as possible, since you must specify the key exactly; you can't choose to have a partial match, or regard upper and lower case letters as equivalent. If you have chosen a key of thirty characters or so, it's difficult to remember it precisely.

There are two alternative approaches to recalling records for amendment. You can look through the file in sort key order, starting at the beginning or at a record with a specified sort key value.

The alternative is to select a set of records and then use the techniques described to find and display the records to be edited. If you want to edit the records of all those people who are due to go on holiday next month, you can select them, list each record selected and edit as before.

When records are added to the file, or amended in a way which affects the sorted order, the order is not automatically maintained; you may still access the file in all the usual ways, but records which have been changed or added will not appear in their correct place in the sequence. To reorder the file, you must do a maintenance sort. This maintenance also expunges all records which have been marked for deletion; until then, these records still appear in the file, and the deletion marker can be removed if necessary.

Once you have found the record to be amended, information is enterd by typing into the appropriate display fields. You use the cursor arrow keys to move around between fields, and two of the adjoining keypad keys to move between screens of a record. The new version of the record can be saved at any editing stage using a function key. Information Management always asks for confirmation that a record is correct before saving it, and allows you to re-edit if you wish — any changes already made are preserved. Alternatively, you can abandon the edit altogether at any time, again using a function key.

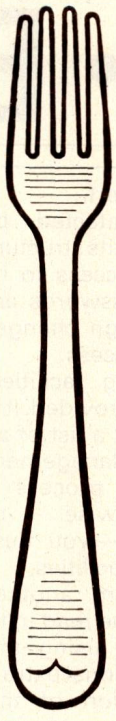
In addition to amending records directly on the screen, you may set up a batch update process; for instance, you can ask for a field to be incremented by 10%, or for a date to be replaced by 'today'. The batch update may be applied to all records, or to all which meet a set of selection criteria.

There are two main ways to display records on the screen: one record per screen or set of screens, using the format defined when the file was created; and one record per line, showing only those fields selected for highlighting. In addition, you can specify that printed reports must be shown on the screen, so that not only can other display formats be obtained in this way, but you can also carry out all Information Management's functions without a

BM1	Time to add 1 new record	2 secs/record
BM2	Time to select record by primary key	7 secs/record
BM3	Time to select record by secondary key	NP
BM4	Time to access 20 records from 1000 sequentially	6mins 7secs
BM5	Time to access record using wild code	7mins 7secs for 50 records
BM6	Time to index 1000 records on 3-character field	NP
BM7	Time to sort 1000 records on 5-character field	48mins 40secs
BM8	Time to calculate on 1 field per record and store result in record	21mins 45secs
BM9	Time to total 3 fields over 1000 records	NT
BM10	Time to add 1 new field to each of 1000 records	1hr 52mins
Time to import a file of 1000 records		44mins 50secs +BM7

Notes: NT=Not Tested NP=Not Possible

Fig 2 Benchtests



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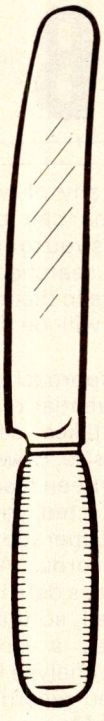

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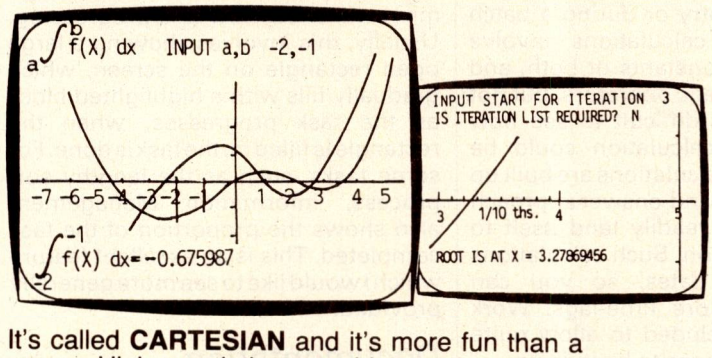

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printer if necessary — not a universal feature among data management systems. In addition to the display of data in these normal formats, you can also ask for display of bar charts.

Printed reports

Information Management provides two kinds of printed report. Standard reports show the data in columns; the format may be a default layout in which Information Management prints as many fields as possible in a five-line-per-record format, or the format may be defined by the user using a paint-a-screen approach as in screen format design.

In the standard reports, you may include information from another data file if you wish. Totals and sub-totals may be requested; if you are printing from the main file, then sub-totals will be calculated as the value of the sort key changes, while if you are printing from a set of selected records, then the sort order specified for that set will be used. Page-breaks will occur if you ask for them, after the printing of sub-totals.

Free-format reports are intended for use in constructing personalised letters. Such a report may contain one page of up to 88 lines, and within those lines you can ask for the inclusion of data fields from the file. Information Management automatically formats the report appropriately according to the amount of information in the data fields.

Selection

In addition to the exact matching of the sort key, records can be selected in two ways. Searches within fields are set up by filling in on the screen a 'blank' form showing all the fields in the file. A field value may be tested for equal to, not equal to, less than or greater than the given value; for equality, the test may be set up in such a way as to give a 'wild code' facility. For instance, a character field of four letters can be tested to see if it has the letter B in the second position, and any character in any other position. If more than one test is used, then all of them must be passed for the record to be selected.

If you are not sure which field to test; for instance, if you are looking for a post town which may be in any of two or three address lines, you can use a global search. This allows you to enter a word or phrase to be searched for, without specifying where in the record to look, so the match will be found wherever it occurs.

Either of these two approaches involves a complete sequential read of the data file, which takes several minutes for a file of any size. However, once all the records have been read and the matching records selected, you can then proceed to carry out operations on this subset of the records. All of Information Management's data handling facilities can be used, so that the process actually creates a kind of workbench of records to analyse further. Although the selected records are described by Information Management as being 'in a temporary file', any changes made to records selected from the temporary file are recorded on the records in the main file, so records can be selected for amendment in this way.

Alternatively, you can use the selection made as the basis for further selections; at each stage, Information Management will tell you how many records have been stored in the temporary file.

Calculation

Calculations on field values take place either at data entry or during a batch update. These calculations involve other fields or constants or both, and the usual arithmetic operators, but not parentheses. It's difficult to see how precedence of calculation could be changed, since calculations are built up using a question-and-answer approach which does not readily lend itself to such sophistication. Such calculations may also use dates, so you can calculate and store time-lags. Work fields can be included to allow quite complex calculations to be built up.

Facilities for aggregation across records are more limited — you can have totals, averages, and so on, as part of printing reports, and display bar charts of any field, but there are no more general calculation facilities.

Unfortunately, you cannot write to more than one file at a time, but information can be incorporated from several files in a single report.

Each file may be protected, by password, from changes to its structure and from unauthorised access to its information. Separate passwords are used for authorising design changes and for authorising data access.

The basic file handling facilities, deleting and copying, are provided. It is also an easy matter to get a list of all available Information Management files, and to change to process a different data file. Otherwise — to format a disk, for instance — you must use the operating system facilities.

An ASCII text file from another program or package may be read in to Information Management using the File Loader, which is an optional extra. I used a pre-release version of the program; the production version should be faster and more flexible.

User image

Information Management is clearly aimed at providing reasonably sophisticated facilities to fairly naïve users, and therefore its approach needs to be simple without being verbose. By and large, it succeeds in this aim very well as the package is controlled almost entirely by menus.

Once you have selected and set up a task, which does not require your intervention, then Information Management will show how it is progressing. Usually, this involves showing a large open rectangle on the screen, which gradually fills with a highlighted block as the task progresses; when the rectangle is filled in, the task is done. For some tasks, such as the lengthy sort process, Information Management also shows the proportion of the task completed. This is an excellent feature which I would like to see more generally provided.

Documentation

Information Management has one manual which acts as tutorial and reference guide. It also has a detailed index, but some of the finer points of the package — such as the wild code facility I noted — do not seem to be documented at all. Nor is there a road map or a reference summary.

Conclusions

Information Management is a reasonably powerful and flexible package, with a helpful approach which should prove popular with inexperienced users. It's a little on the pricey side, but if you have an IBM or Wang PC and are looking for a good data management package which is relatively easy to use, you should have a close look at this.

END

Summary

Package Type	Data management, menu-driven, fixed format, fixed length records. Good compromise between power and ease of use for straightforward tasks
Availability	IBM Personal Computer, Wang PC
Price	£395 (ex-VAT)
Manufacturer	BPI, Austin, Texas, USA
Supplier	Thames Computer Services Ltd, 41 North Road, London N7 9DP. Tel: 01-607-5599

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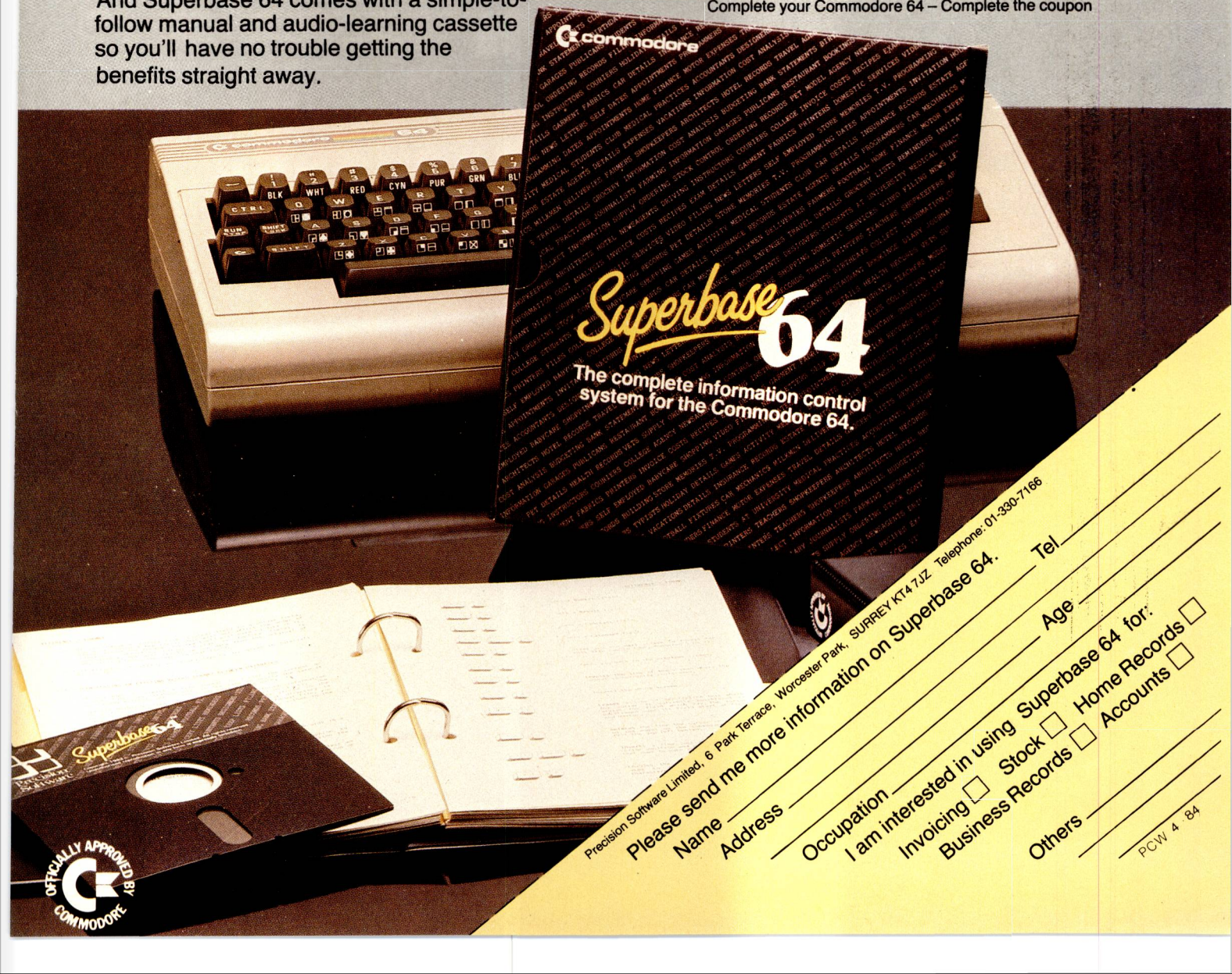

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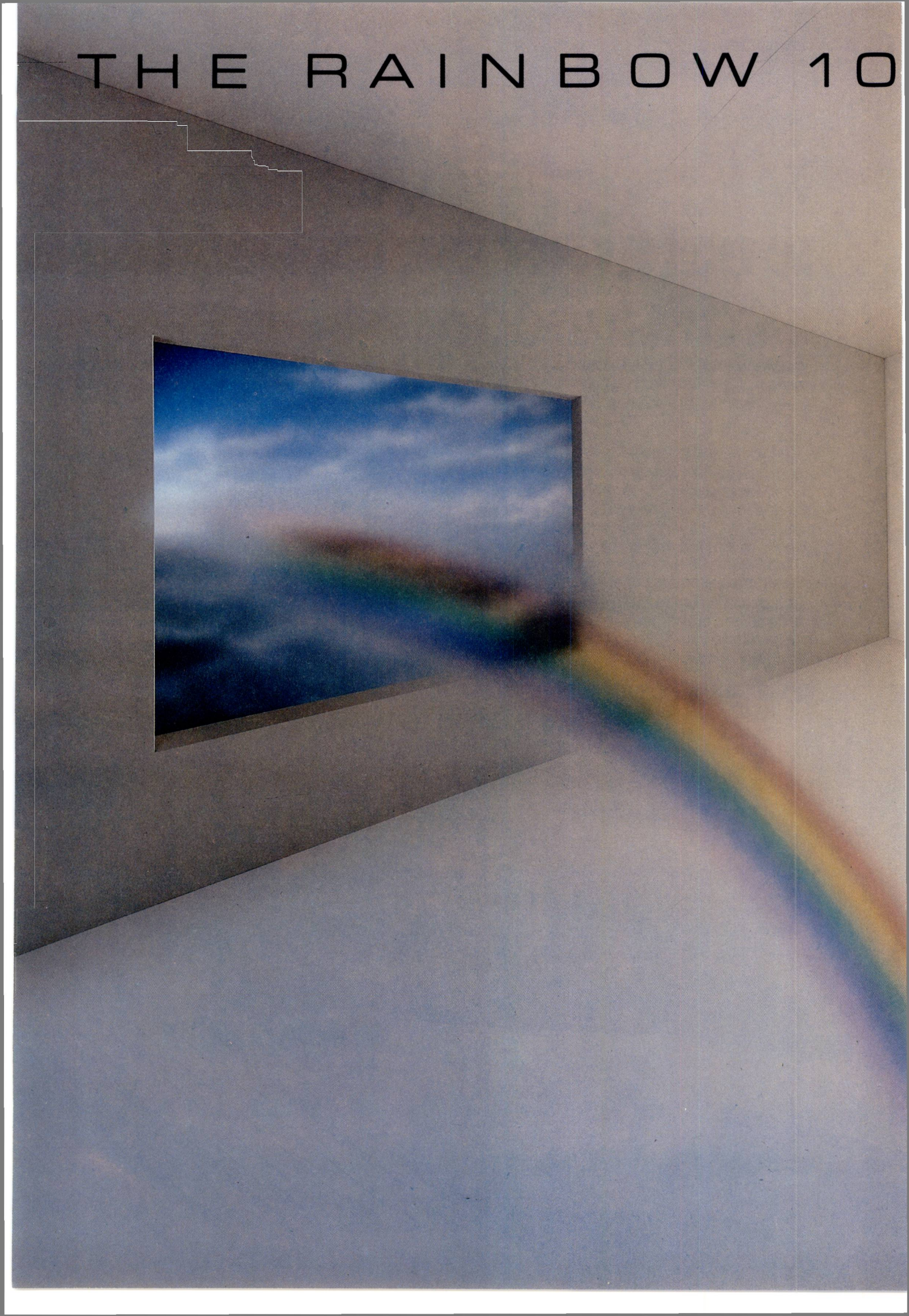

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NETWORK NEWS

Peter Tootill gives his summary of what's happening in the telephone networking world.

There is such an increase of interest in telephone networking that new boards are springing up all over the place! There are a couple more to report this month, as well as another German system.

System information

There are a few items to report on the BBS front this month. Firstly, the BASUG board had some teething problems with both hardware and software. However, all should now be well and it has been running 24 hours a day on (0742) 66 79 83 for a few weeks.

The *Computer Answers* BBS has also been running 24 hours a day on its permanent number. That number is (01) 631 3076. A bulletin board run by a micro magazine is a very interesting development, and there are a number of possible applications including telesoftware. *PCW* hopes to set up its own very soon (see box).

CBBS-Surrey is another new CBBS board. It runs 24 hours a day on (04862) 25174.

Hamburg University has started a mailbox system. The number is (01 01 49) 40 4123 3098. I haven't had a chance to try it myself, but knowledge of German would be useful.

Multi-mode modems

As most 'micro networkers' will be aware, there is a fundamental incompatibility between the modem standard used by bulletin boards and that used by the Prestel system. Prestel (and hence Micronet 800, Viewfax 258, and so on) uses the 1200/75 (V23 type) standard while the majority of other systems, including bulletin boards, use 300/300 (V21) type. This presents the prospective modem buyer with something of a dilemma: which sort of modem to use. Admittedly, you can use Prestel at 300 bits/sec, but you lose the graphics and it's only available on a London number, unlike normal Prestel, which is available as a local call in most parts of the country. One answer is to choose a multi-standard modem which will operate in V21 and V23 modes. The new generation of chips is beginning to make these accessible to the hobbyist and business user. Unfortunately, such a modem with BABT approval still costs more than a Micronet modem and a cheap V21 modem together! However, if demand rises, prices will fall (or is it the other way round?). I have listed below details of four readily available multi-mode modems, and I hope to be reviewing some or all of them in *PCW* in the near future.

Minor Miracles WS2000

This modem covers UK and US standards including CCITT V21 and V23 and Bell 103 and 202. An auto-dial, auto-answer option is also available at around £35 extra. It costs £99 plus VAT (£116 inc VAT and postage). Details from:
Minor Miracles, PO Box 48,
Ipswich IP4 2AB. Tel: (0473) 50304

Microprocessor Applications MPA2123

This modem also covers UK and US standards (CCITT V21 and V23, Bell 103 and 202) and includes auto-answer as standard. It was devised by a couple of hobbyists, and although they produce it in limited quantities, they are looking for a company which would be interested in taking it up and steering it through the approval process. It costs £180 (no VAT) plus carriage. Details from:
T Hutchinson, 41 Ashgrove Avenue,
Banbridge, Co Down BT32 3RG
Tel: (08206) 23996

Dacom DSL 2123

A BABT approved modem providing full V21 and V23 operation. There is also a GT version which includes auto-dial and auto-answer with automatic detection of whether the call is V21, V23 or even voice. The auto-dialler will store up to 32 telephone numbers, each of which may be up to 18 digits. The DSL 2123 costs £280 plus VAT. The DSL 2123 GT costs £480 plus VAT. Details from:
Dacom Systems Ltd
16 Alston Drive, Bradwell Abbey,
Milton Keynes MK13 9HA
Tel: (0908) 311885

Interlekt Portman

Another UK/US modem providing full CCITT V21 and V23 standards. Bell 103 and 202 standards are available by changing an internal link. BABT approval is expected shortly. An auto-answer option is available for £15, and software switching options and rack mounted versions are also available. It costs £199 plus VAT plus carriage. Details from:
Interlekt Electronics Ltd, Reacis House,
Portman Road, Reading RG3 1LU
Tel: (0734) 589551

Mailbox-80 Liverpool

Regular callers to Mailbox-80 Liverpool will have noticed that the board now has a **'messages to *PCW*'** section. Any messages can be left on the board, and will normally be read by us within 24 hours.

Peter has kindly arranged this facility, so please do make use of it. At present, we can receive messages **ONLY** on this board, but we are hoping to set up our own *PCW* Bulletin Board running TBBS software. In order that we can get an idea of the interest for this, please let me have your comments and suggestions — either by writing to me at *PCW*, or through Mailbox-80 Liverpool or TBBS London. In either case, please address messages to 'Surya'.

The *PCW* Bulletin Board would allow down-loading of *PCW* programs, message facilities, computer answers and (possibly) uploading of program submissions.

CCITT Modem Recommendations

Speed Bits/sec	Format: Asynchronous or synchronous	Full/Half Duplex	CCITT Reference	BT Datel Service	US Bell Ref.	Compatible? with CCITT
0-300	A	Full	V21	200	103	No
1200 2400	A&S	H/F	V22 V22bis	1200 —	212A	Yes at 1200b/s
1200 1200/75	A A	Half Full*	V23 V23	600 600	202	Sometimes

**** The Prestel 1200/75 type of service is sometimes referred to as 'asymmetric duplex'.***

NETWORK NEWS

Modem Operating Frequencies

Modem Type	Speed (Bit/s)	Duplex	Transmit Frequency 0 Hz	Transmit Frequency 1 Hz	Receive Frequency 0 Hz	Receive Frequency 1 Hz	Answer Tone Freq Hz
CCITT V.21 Orig	≤300	Full	1180	980	1850	1650	—
CCITT V.21 Ans	≤300	Full	1850	1650	1180	980	2100
CCITT V.23 Mode 1	600	Half	1700	1300	1700	1300	2100
CCITT V.23 Mode 2	1200	Half	2100	1300	2100	1300	2100
CCITT V.23 Back	75	—	450	390	450	390	—
Bell 103 Orig	≤300	Full	1070	1270	2025	2225	—
Bell 103 Ans	≤300	Full	2025	2225	1070	1270	2225
Bell 202*	1200	Half	2200	1200	2200	1200	2025

**** Bell 202 has no back channel as such, only a 5 bit/sec on/off signal (387Hz = on, no signal = off) used for handshaking. (CCITT V22 & Bell 212A do not use single frequencies like these and cannot be simply included in such a table.)***

UK systems run by commercial organisations, which are free at least in part:

DISTEL. Tel: (01) 679 1888. Run by Display Electronics (new and surplus electronic and computer equipment, components, etc). The system provides information about stock lines, credit card sales, and some message facilities. 300 baud only at present. Cost: free. 24 hours.

REWTEL. Tel: (0272) 236628. Run by *Radio and Electronics World*, the publishing side of Ambit (electronics components suppliers). Information on stock lines, some message facilities, credit card sales; the latter only for subscribers. 300 baud only at present. Cost: limited areas free, remainder £10 pa. 24 hours.

MAPTEL. Tel: (0702) 552941. Run by Maplin (electronic components and microcomputers). Provides information on stock levels, credit card sales to existing customers only. 300 baud only. Cost: free. 24 hours.

Subscriber commercial systems in the UK:

PRESTEL. Subscribers only: Prestel consists of a database made up of individual pages provided by many different organisations (not by Prestel itself). 1200/75 baud service at local call rates for a large percentage of potential users. 300 baud service on London telephone number only, at present. Cost: domestic subscribers £5 per quarter and no time charges outside peak periods, 80 per cent of pages are free. Business users: £15 per quarter and 5p/minute up to 6pm and Saturday mornings, no time charges outside these hours (time charges also apply to domestic users). Information: tel: Freefone 2296.

MICRONET 800. An organisation providing information within the Prestel database specifically aimed at microcomputer users. Service details as Prestel. Cost: £50-£75 joining fee (covers acoustic coupler and software—for a limited range of machines at present) and £8 per quarter on top of normal Prestel charges. Information: Micronet 800, 8 Herbal Hill, London EC1R 5JB. Tel: (01) 837 3699.

Subscriber business systems in the UK:

Commercial systems aimed at business users:

TELECOM GOLD. Info from: Julie Ireland, 42 Weston Street, London SE1 3QD. Tel: (01) 403 6777.

COMET. Message handling system giving user facilities for leaving and retrieving messages: costs £30 per month. Info from: John Douglas, BL Systems Limited, Grosvenor House, Prospect Hill, Redditch, Worcs. Tel: (0527) 28515.

UK networks:

CBBS North East . . . Tel: (0207) 543555. Hours: 2.30pm-9am daily. Hours: midnight-8.30am Bell (US) standards.

CBBS South West . . . Tel: (0626) 890014. Hours: 24 hours daily.

Mailbox-80, Stourport . . . Tel: (0384) 635336*. Hours: 6pm-8am daily (ring-back system).

Forum-80 Hull . . . (Forum-80 HQ) Tel: (0482) 859169. International electronic mail, library for up/down loading.

Forum-80 Users Group, PET Users section shopping list system. Hours: Tues/Thurs 7-10pm; Sat/Sun 1-10pm; nights, midnight-8am, US (Bell 103) standards.

Forum-80 London . . . Tel: (01) 902 2546. Electronic mail, library for down-loading. Hours: 7-10pm weekdays; midday-10pm weekends. Ring and ask for Forum-80.

CBBS London . . . Tel: (01) 399 2136. Facilities: electronic mail, program downloading. Hours: Sun 5-10pm.

Forum-80 Milton . . . (TRS-80 Users Group 80-Nett) Tel: (0908) 613004. Electronic mail, library, newsletter, TRS-80 information system. Hours: any reasonable time.

Mailbox-80 Liverpool . . . Tel: (051) 428 8924. Electronic mail, down-loading, TRS-80 information. Hours: 24 hours daily.

TBBS, London . . . Tel: (01) 348 9400. Hours: daily 9am-7am.

Note: Estelle. Tel: (0279) 443511 V21 (Datel 200); (0279) 441188 (Datel 600); (0279) 441222 (Datel 1200). For customers of STC Electronic Services. Office hours only.

Southern BBS. Tel: (0243) 511077. Messages, down-loading. Hours: 8pm-2am daily (ring-back system).

*Ring-back system—dial the number, let phone ring once and then ring back.

American/Canadian networks

TYPE	SYSTEM NAME	NUMBER	NOTES
Forum 80	HQ System	0101.816-861 7040	
CBBS	HQ System	0101.312-545 8086	
FBBS	HQ System	0101.312-677 8514	
ABBS	Ottowa, Ontario	0101.613-725 2243	
ABBS	HQ system	0101.703-255 2192	
MABBS	Fort Walton Beach	0101.904-862 1072	
Bull-80	Alabama	0101.205-492 0373	
Conn-80	Colour Computer	0101.212-441 3755	colour graphics for TRS-80 Colour

European networks

ELFA	ABC-MONITOR Sweden	010.468 730 0706	Half duplex
ABC-Banken	Halmstadt, Sweden	010.463 5110771	
ABC-MONITOR	ABC Club of Sweden	010.468 801523	Passwords required
CBBS	Gothenburg, Sweden*	010.463 1292160	75/1200 baud
		010.463 1690754	300 baud
	Helsinki	010.358 0722272	

*After receiving the tone and connecting your modem, either type <C/R> or type: <COM C/R>. The system then asks for a password which is: 'cbbs' *in small letters*!! If you only get '>' when you dial up, the system needs resetting and you type <I> C/R.

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Basicode

Despite the differences between individual Basic dialects, virtually every machine supports a minimal subset of this standard programming language. The Dutch Broadcasting Corporation, NOS, has used this subset to form Basicode, a computer 'esperanto'. Surya explains.

In 1962 at Dartmouth College a programming language was born. Intended only as an easy to learn beginners' language introducing people to the concepts of programming, the language caught on.

The original aim of the language — a first step to learning Fortran — was quickly forgotten as it was improved and developed. An endless succession of dialects appeared, firstly for mainframes, then for minis and finally for micros. Today, that language is the most widely used programming language in existence. Probably more than any other influence, it is responsible for turning computer programming from a specialist and mysterious activity into a popular hobby shared by millions around the world. I am, of course, talking about Basic.

Dartmouth Basic was extremely simple. It had a total of 30 statements and commands. Over a period of 22 years it has been added to, modified and adapted countless times. The result is literally hundreds of dialects of what purports to be the same language. Some of the differences between dialects are trivial (PLOT instead of SET, for example), while others reflect differences in approach and philosophy (the Pascal-like structure of BBC Basic against the more down-to-earth style of many other dialects). But, however incompatible different Basics may be in their more sophisticated features (sound, graphics, file-handling), the original Dartmouth standard remains evident in the core of many of the most popular dialects. It is this core which forms the basis of Basicode.

Basicode was developed after Hobbyscoop, a Dutch radio programme dealing with science and technology, began broadcasting computer programs over the air in 1978. These broadcasts eventually became a regular weekly feature, broadcasting Apple, Exidy Sorcerer, PET and TRS-80 software. The main problem with this arrangement was that each broadcast was aimed at only a tiny minority of listeners. The non-computerised majority objected to seven or eight minutes of loud, unintelligible noise!

Klaus Robers, an amateur radio operator, hit upon a possible solution. Given that each of the four machines supports a common subset of Basic, why not devise a new interpreter and broadcast programs in the hybrid language? To do this, he needed to devise a method of loading and saving programs in a standard format, as well as agreeing an acceptable subset of Basic. The result was the original Basicode. Basicode had several teething problems and limits, so an improved version, known as Basicode-2, was developed by Klaus Robers and Jochem Herrmann. Basicode-2 supports a much wider range of machines and is now the standard version for all Basicode broadcasts. (The terms Basicode and Basicode-2 are used interchangeably in this feature.)

Successful Basicode-2 broadcasts have been made regularly since the beginning of 1983, and listeners from various parts of Europe — including southern Britain — report that they have successfully downloaded Basicode programs.

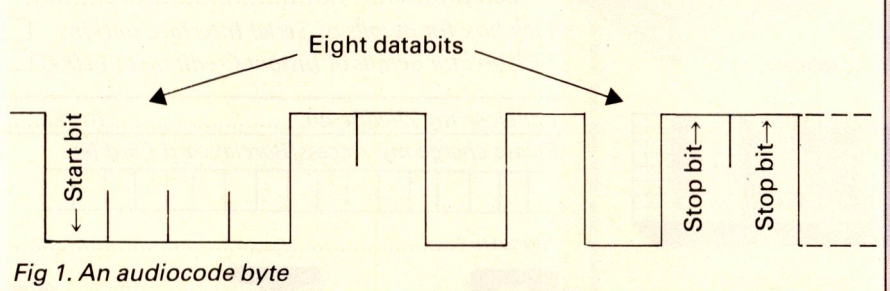

Fig 1. An audiocode byte

Basicode only attracted widespread interest in the UK when the BBC began making Basicode broadcasts in conjunction with 'The Chip Shop' programme on Radio 4. Although the first series of the programme has now ended, a second series is planned for later in the year.

Working Basicode

Basicode has to overcome two problems before it can be implemented on a particular machine.

The first problem is that of detokenising keywords. When you write a Basic program, the program is stored in RAM in tokenised form. The line '100 PRINT A', for example, is not stored as 11 characters. All the keywords in a program are compacted into keyword 'tokens', which are used because they are more efficient than the full keywords in terms of both memory and execution speed.

When a program is saved to tape, the micro transfers the contents of the appropriate part of RAM onto tape in tokenised form. The problem is that each micro uses a different set of tokens: we need to convert these tokens into a standard code before we can save them to tape in a standard form.

The second problem concerns the signals used to store programs on tape. Programs are saved to tape in binary form, '1's being represented by one pattern of audio cycles, '0's by another. Each byte must be saved as eight bits (known as databits — see 'Newcomers start here' in this issue for an explanation of bits and bytes). Other bits, known as start and stop bits, are used to mark the beginning and end of a block.

Again, although the principle is the same for all micros, different machines use different baud rates and pitches, and may also have a different number of start, stop or checksum bits.

Basicode overcomes the first problem by converting everything to ASCII form, the universally accepted code for communication between computers. The second problem is solved by developing a standard 'audiocode'. Once Basicode-2 has been loaded into the machine, all loading and saving is done using the standard code. This audiocode comprises one startbit (logic zero), eight databits (the ASCII byte, least-significant bit first) and two stopbits (logic 1). Ones are represented by two cycles of 2400Hz, zeros by one cycle of 1200Hz (see Fig 1). The overall pattern of a Basicode program is a leader (five seconds of stopbit), the ASCII code for 'start-text' (&82), the program, a checksum digit (an EOR of all previous bytes) and a trailer (five seconds of stopbit). The baud rate is 1200.

END

Next month: how to load and run a Basicode program and details of Basicode-supported machines.

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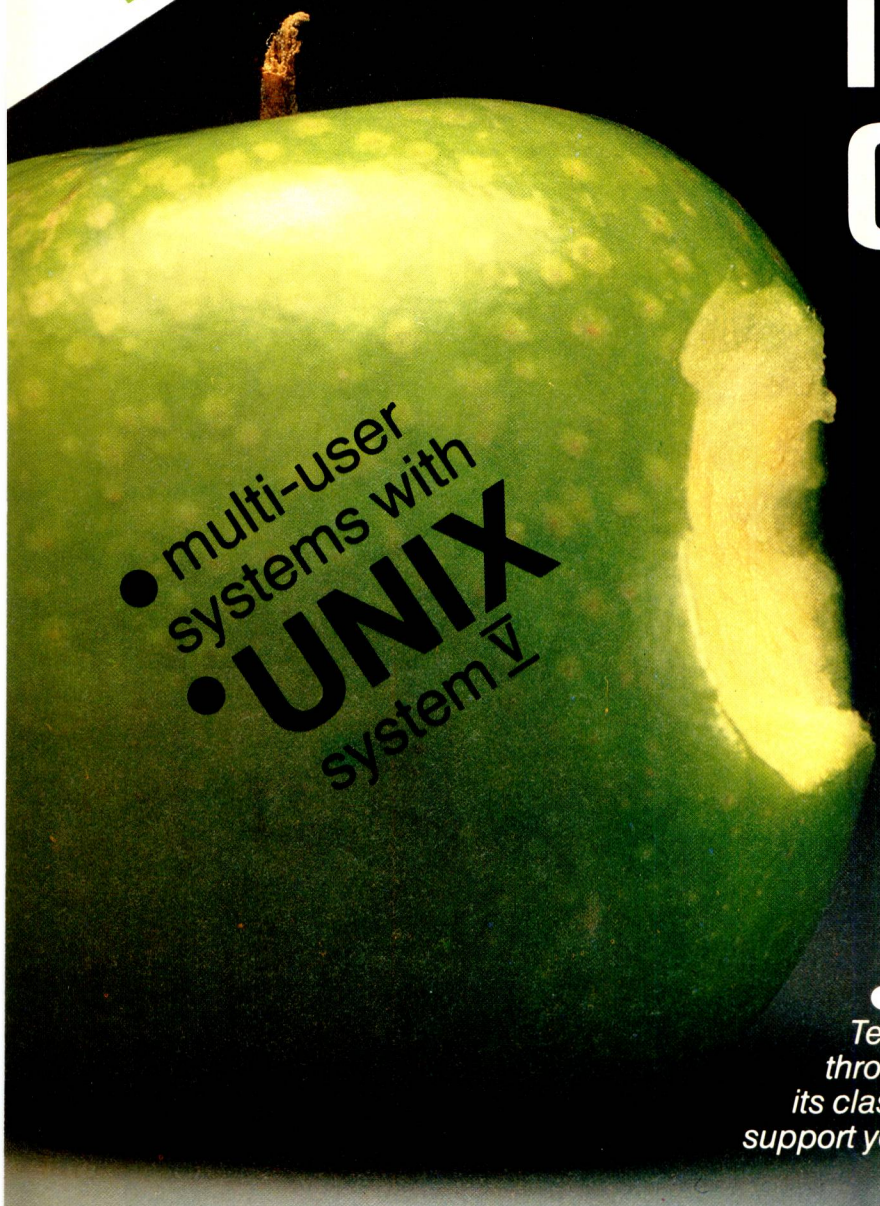

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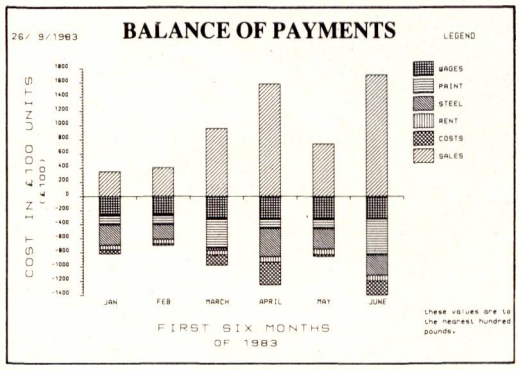

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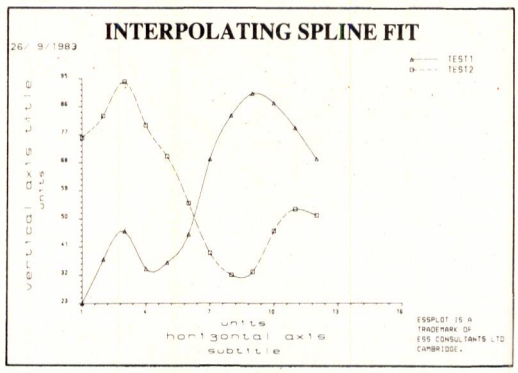

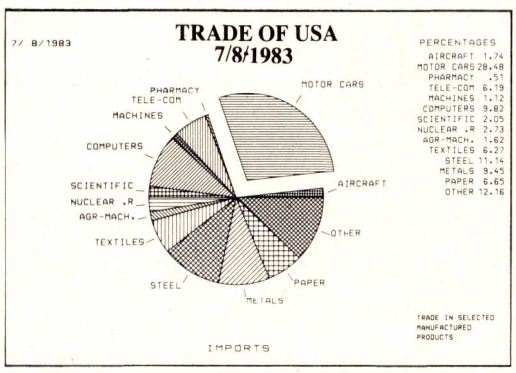

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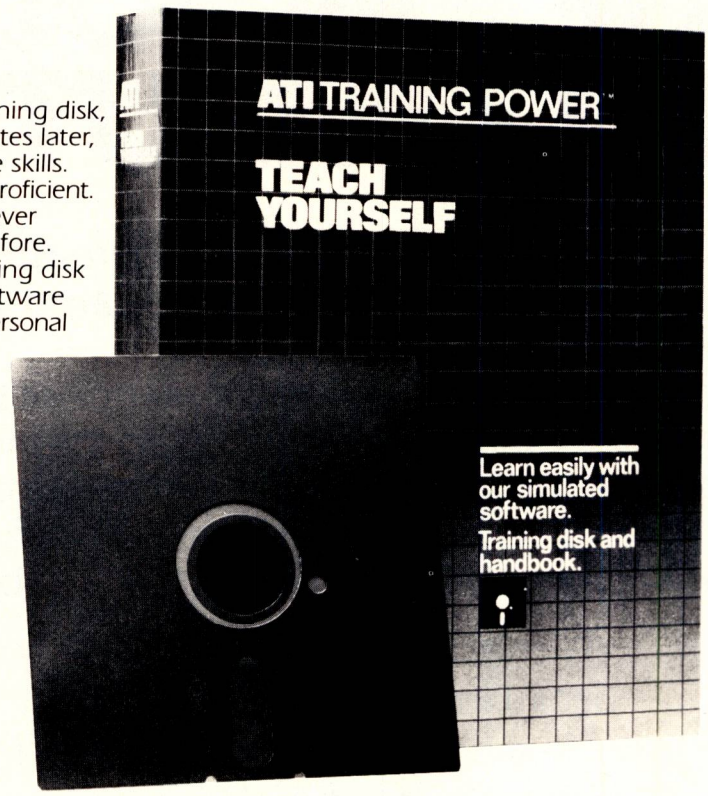

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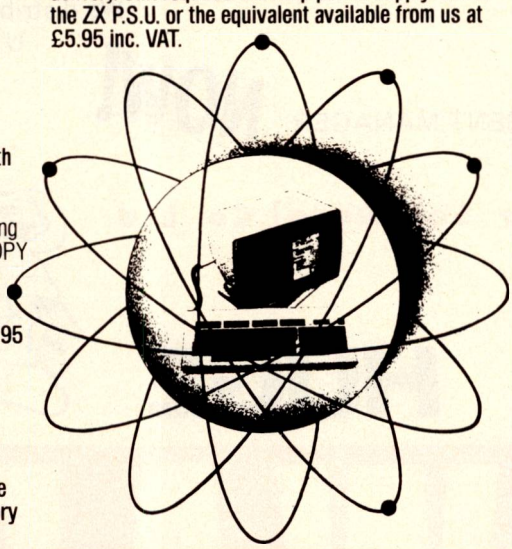

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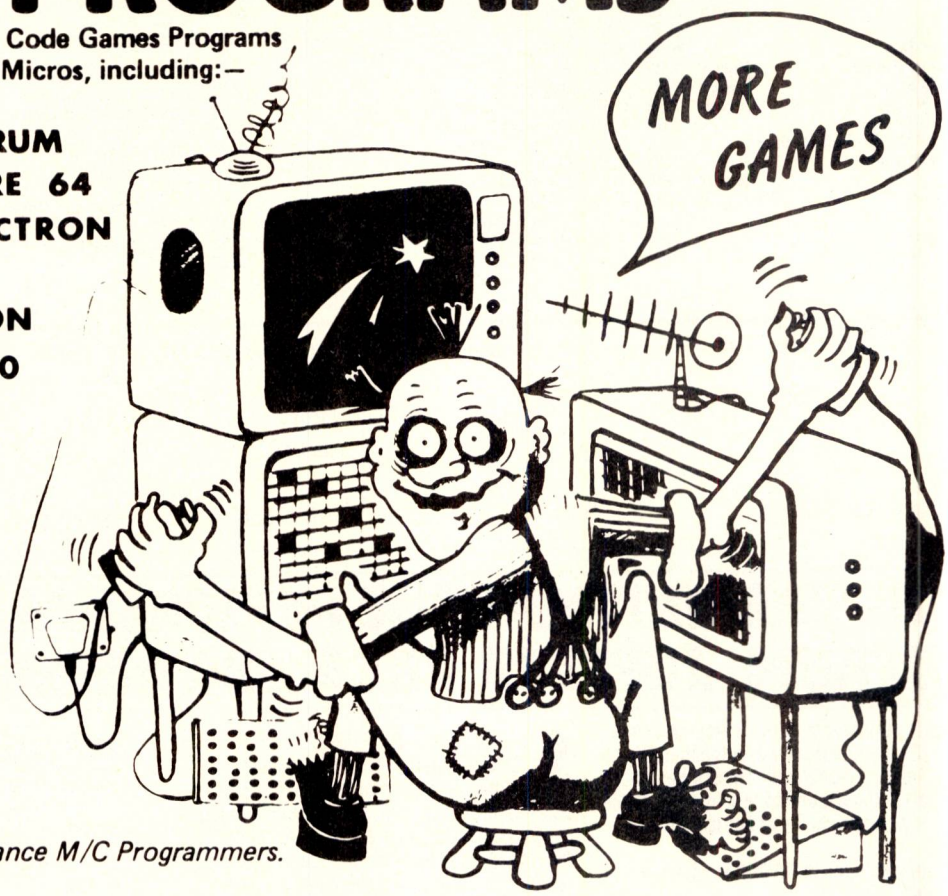

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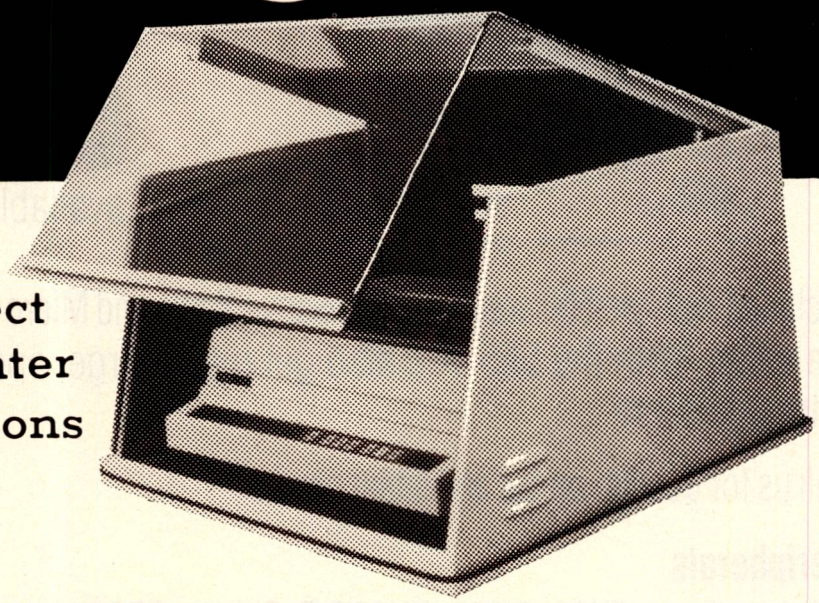

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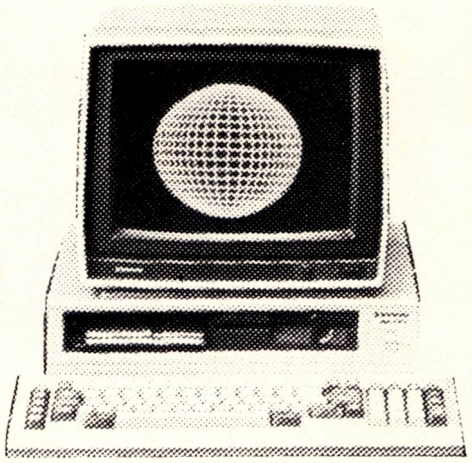

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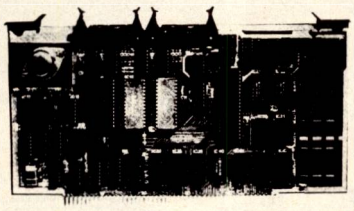

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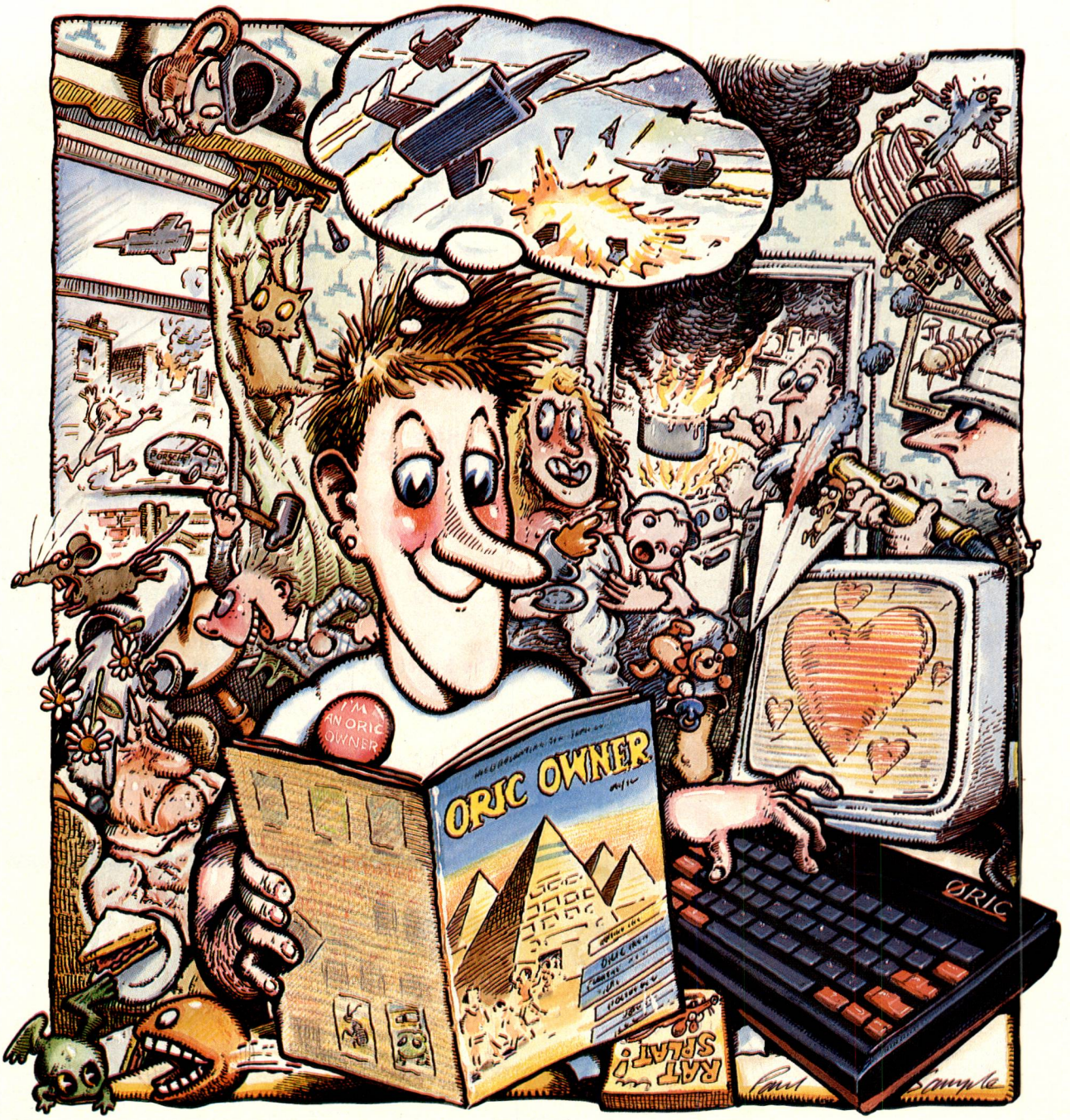

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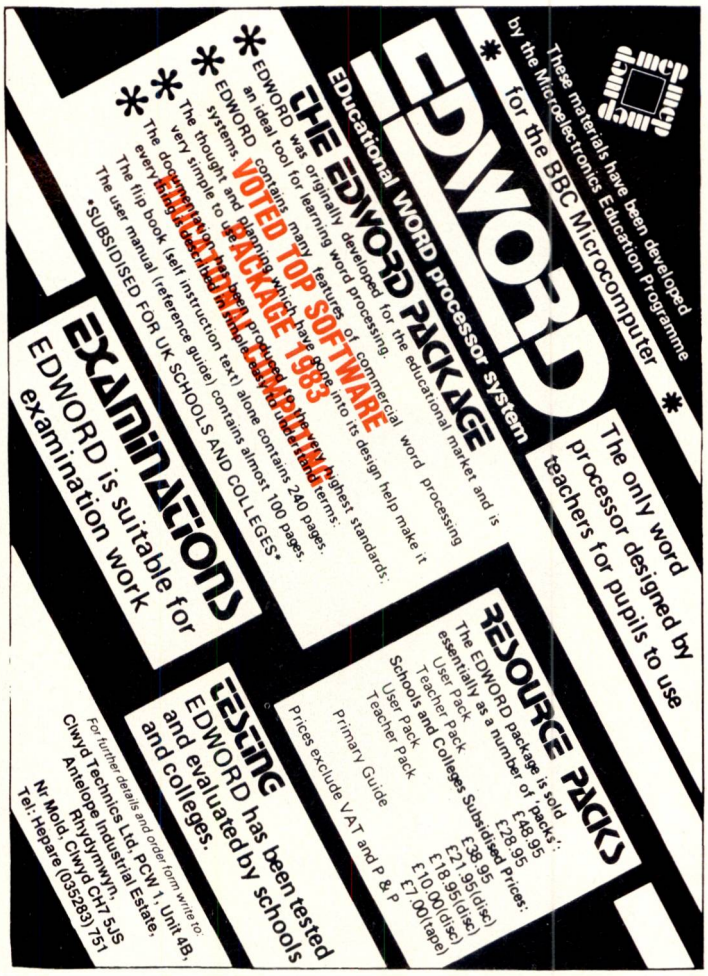

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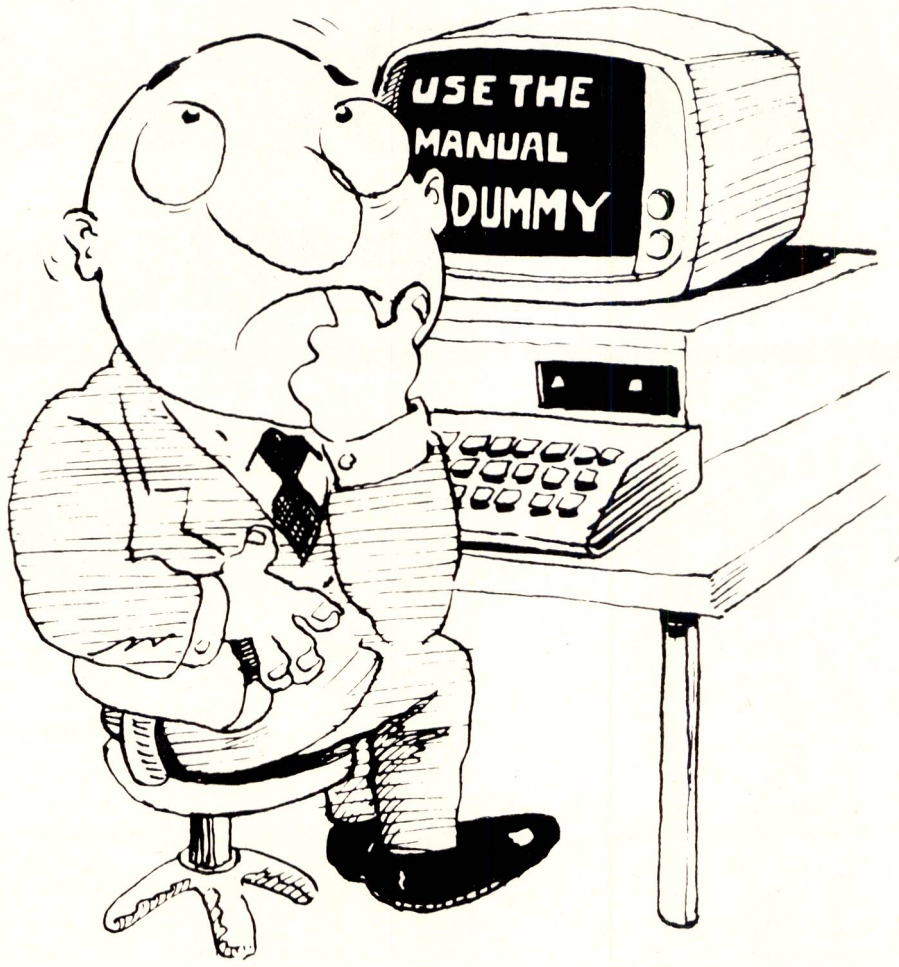

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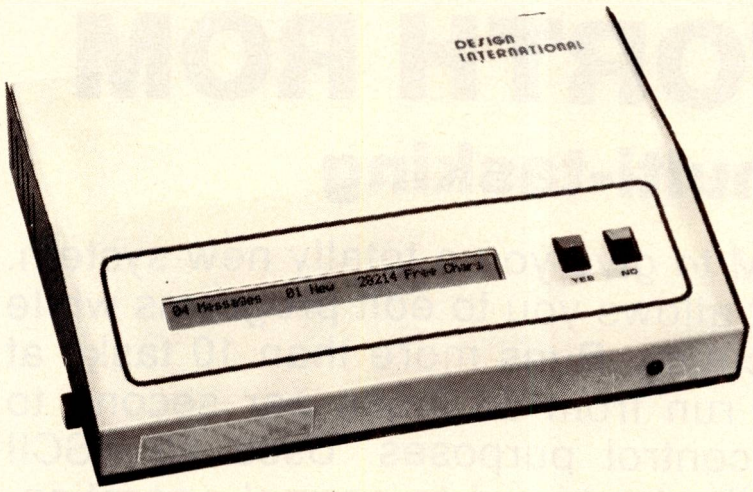

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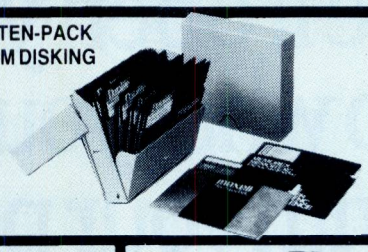

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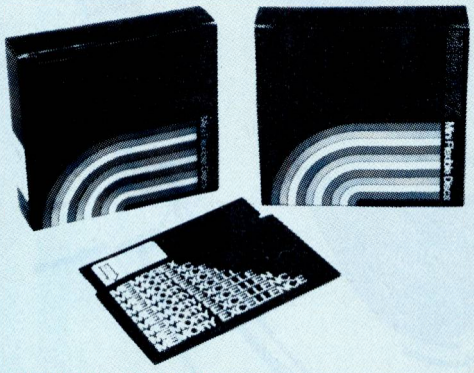

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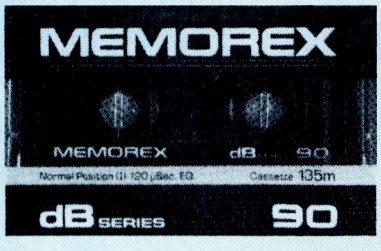

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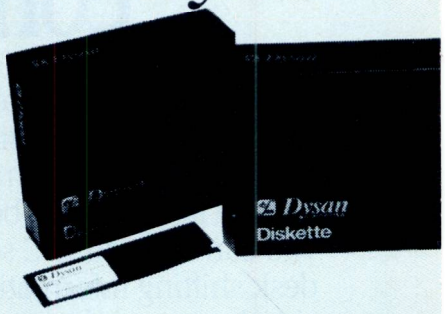

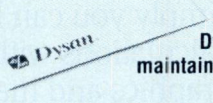

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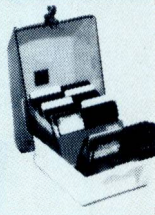

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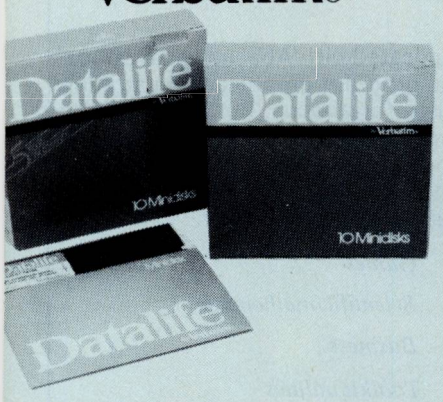

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(c) Comprehensive but brief documentation (d) A suitable sae
Please mark (a), (b) and (c) with your name, address, program title, machine (state minimum RAM where appropriate) and—if possible—a daytime phone number. All programs must, please, be fully debugged. Programs are paid for at the rate of £50 per page of published listing, plus a £100 bonus for the Program of the Month, and must be the original work of the author and not previously published. Send contributions to: Surya, PCW Programs, 62 Oxford Street, London W1A 2HG.

A program for each of the three Commodore home micros this month. 'Wordsquare' is an aid to designing puzzles of the same name on a PET. 'Tax analysis' is a VIC 20 program which calculates your tax liability for the preceding financial year. 'Plane attack' is a fast action game for the Commodore 64.

BBC users have five programs to choose from. 'Terminal programs' comprises two simple communications programs for the Model B. 'Splash!' is a complex board game — the instructions are straightforward, working out the best move is the complicated bit! 'Abacus' is an educational program graphically illustrating the use of an abacus. 'Pursuit Ship' is an enjoyable game with an annoying soundtrack. 'Disassembler' is included mainly on the merits of its speed and the easy-to-follow display.

Games
Scientific/mathematic
Business
Toolkit/utilities
Educational/Computer Aided Learning

Program of the Month
BBC SPLASH!
by Jeff Aughton

'Splash!' is an infuriating strategy game for a 32k BBC Micro. A colour display is essential to the game unless you happen to be a genius at working out grey scales!

The game is played on a 7x7 board and is based on waves. If you drop a stone into a pond, ripples will spread outwards from the centre. If you then drop another stone into a different part of the pond, the second set of ripples will interfere with the first. Predicting the way in which a further stone will affect the existing pattern of ripples is what the game is all about. Full instructions are given within the program.

Seasoned *PCW* Programs readers will spot the Jeff Aughton touch — who else could call a delay procedure with the statement PROCrastinate?

```
 10 REM SPLASH - A GAME BY J.AUGHTON (FOR P.K.)
 20 MODE7:VDU 23,1,0;0;0;0;
 30 PROCrules
 40 PROCinitialise
 50
 60 REPEAT
 70 MODE2:VDU 23,1,0;0;0;0;
 80 PROCstart
 90 PROCboard
100 REPEAT
110 M%=3-M%
120 COLOUR7:COLOUR128
130 IF M%=1 THEN PROCyou ELSE PROCme
140 IF Tot%(M%)>24 THEN Win=1
150 UNTIL Win
160 PROCgover
170 PROCyorn("ANOTHER GAME? (Y/N)")
180 UNTIL No
190 END
200
210 DEFPROCinitialise
220 DIM A%(11,11),Tot%(2)
230 DIM Tab1 24,Tab2 24,Board 121
240 Temp=&70:Tot=&71
250 Blank$=CHR$(30)+STRING$(20," ")+CHR$(30)
260 PROCtable(Tab1)
270 FOR I%=1 TO 11:FOR J%=1 TO 11
```

```
280 PROCupdate(I%,J%,-1)
290 NEXTJ%,I%
300 PROCass
310 ENDPROC
320
330 DEFPROCstart
340 CLS:RESTORE 2990
350 PROCtable(Tab2)
360 FOR I%=3 TO 9:FOR J%=3 TO 9
370 PROCupdate(I%,J%,0)
380 NEXT J%,I%
390 First=1:Win=0:Tot%(1)=0:Tot%(2)=0
400 PROCyorn("Want to start? (Y/N)")
410 IF Yes THEN M%=2 ELSE M%=1
420 PROCrastinate(200)
430 ENDPROC
440
450 DEFPROCboard
460 CLS
470 GCOL0,5:COLOUR6
480 FOR I%=96 TO 992 STEP 128
490 MOVE I%,64:DRAW I%,736
500 NEXT
510 FOR I%=64 TO 736 STEP 96
520 MOVE 96,I%:DRAW 992,I%
530 NEXT
540 PRINTTAB(2,6)"A B C D E F G"
550 FOR I%=1 TO 7
560 PRINTTAB(0,7+3*I%);I%
570 NEXT
580 FOR C%=0 TO 4
590 I%=11:J%=C%+4:PROCshade
600 PROCupdate(I%,J%,-1)
610 NEXT
620 COLOUR0:COLOUR135
630 PRINTTAB(0,31)"Score: You=0  Me=0 ";
640 ENDPROC
650
660 DEFPROCyou
670 PRINTBlank$;"Letter? ";
680 REPEAT
690 X%=GET-62
700 UNTIL (X%>2 AND X%<10) OR X%=19
710 IF X%=19 THEN PROCquit ELSE PROCcont
720 ENDPROC
730
740 DEFPROCcont
750 VDU X%+62
760 PRINTTAB(11,0)"Number? ";
770 REPEAT
780 Y%=GET-46
790 UNTIL Y%>2 AND Y%<10
800 VDU Y%+46
810 IF A%(X%,Y%)>=0 THEN PROCplay("Y") ELSE M%=2
820 ENDPROC
830
840 DEFPROCquit
850 PROCyorn(Blank$+"Want to quit? (Y/N)")
860 IF Yes THEN Win=2 ELSE M%=2
870 ENDPROC
880
890 DEFPROCme
900 PRINTBlank$;"It's my move..."
910 PROCrastinate(150)
920 IF First THEN PROCguess ELSE PROCthink
930 PRINTBlank$;"I will move to ";
940 VDU X%+62,32,Y%+46
950 PROCrastinate(200)
960 PROCplay("M")
970 ENDPROC
980
990 DEFPROCguess
1000 First=0
1010 REPEAT
1020 X%=RND(9):Y%=RND(9)
1030 UNTIL A%(X%,Y%)>=0
1040 ENDPROC
1050
1060 DEFPROCthink
1070 IF Tot%(1)>20 THEN RESTORE 3040:PROCtable(Tab2)
1080 IF Tot%(2)>22 THEN RESTORE 2990:PROCtable(Tab2)
1090 Max%=0
1100 FOR X%=3 TO 9:FOR Y%=3 TO 9
1110 IF A%(X%,Y%)>=0 THEN PROCchoose
1120 NEXT Y%,X%
1130 X%=X1%:Y%=Y1%
1140 ENDPROC
1150
1160 DEFPROCchoose
1170 ?(Temp)=11*Y%-11+X%
1180 CALL BEST
1190 IF ?(Tot)>Max% THEN Max%=?(Tot):X1%=X%:Y1%=Y%
1200 ENDPROC
1210
1220 DEFPROCplay(A$)
1230 PROCsplash(0,200,A$)
1240 PROCsplash(1,100,A$)
```


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PROGRAMS

```
1250 PROCsplash(2,100,A$)
1260 ENDPROC
1270
1280 DEFPROCsplash(D%,W%,A$)
1290 FOR I%=X%-D% TO X%+D%
1300 FOR J%=Y%-D% TO Y%+D%
1310 C%=A%(I%,J%)
1315 SOUND 17+D%,-9,4*RND(20)+40*D%,8-2*D%
1320 IF C%>=0 THEN PROCshade
1330 IF C%=4 AND D%=2 THEN PROCtake(A$)
1340 NEXT J%,I%
1350 PROCrastinate(W%)
1360 ENDPROC
1370
1380 DEFPROCshade
1390 IF C%=7 THEN K%=1 ELSE K%=(C%+1)MOD8-2*(C%=4)
1400 PROCupdate(I%,J%,K%)
1410 GCOL0,A%(I%,J%)
1420 MOVE128*I%-280,932-96*J%
1430 MOVE128*I%-168,932-96*J%
1440 PLOT81,-112,88:PLOT81,112,0
1450 ENDPROC
1460
1470 DEFPROCtake(A$)
1480 COLOUR0:COLOUR135
1490 PRINTTAB(2*I%-4,3*J%+1);A$
1500 PROCupdate(I%,J%,-1)
1510 Tot%(M%)=Tot%(M%)+1
1520 PRINTTAB(11,31);Tot%(1);
1530 PRINTTAB(17,31);Tot%(2);
1540 ENDPROC
1550
1560 DEFPROCupdate(X%,Y%,K%)
1570 A%(X%,Y%)=K%
1580 ?(Board+11*Y%-11+X%)=K%
1590 ENDPROC
1600
1610 DEFPROCtable(X%)
1620 FOR I%=0 TO 23
1630 READ Y%
1640 ?(X%+I%)=Y%
1650 NEXT
1660 ENDPROC
1670
1680 DEFPROCrastinate(W%)
1690 T%=TIME
1700 REPEAT UNTIL TIME>T%+W%
1710 ENDPROC
1720
1730 DEFPROCgover
1740 PROCrastinate(200)
1750 COLOUR7:COLOUR128:CLS
1760 IF Win=1 THEN PROCcomment ELSE PROCabandon
1770 ENDPROC
1780
1790 DEFPROCcomment
1800 D%=ABS(Tot%(1)-Tot%(2))
1810 A$="That was a near one!"
1820 IF D%>2 THEN A$="WOW!- a close game!"
1830 IF D%>4 THEN A$="What a good game!!"
1840 IF D%>6 THEN A$="An easy win !!"
1850 IF D%>8 THEN A$="A MASSACRE!!!!!!!!"
1860 PRINT'A$
1870 IF Tot%(1)>Tot%(2) THEN A$="YOU WIN" ELSE A$="I WIN"
1880 IF Tot%(1)=Tot%(2) THEN A$="IT'S A DRAW"
1890 COLOUR15:PRINT''A$:COLOUR7
1900 ENDPROC
1910
1920 DEFPROCabandon
1930 PRINT"GAME ABANDONED"
1940 PRINT'"SCORE:You=";Tot%(1);" Me=";Tot%(2)
1950 ENDPROC
1960
1970 DEFPROCass
1980 DIM Z% 60
1990 FOR I%=0 TO 2 STEP 2
2000 P%=Z%
2010 [OPT I%
2020 .BEST  LDX #100
2030        STX Tot
2040        LDX #23
2050 .LOOP1 LDA Tab1,X
2060        DEX
2070 .LOOP2 PHA
2080        CLC
2090        ADC Temp
2100        TAY
2110        LDA Board,Y
2120        BMI AGAIN
2130        CLC
2140        ADC Tab1,X
2150        TAY
2160        LDA Tab2,Y
2170        ADC Tot
2180        STA Tot
2190 .AGAIN PLA
2200        BMI TRISH
```

```
2210         EOR #255
2220         ADC #1
2230         BNE LOOP2
2240 .TRISH DEX
2250         BPL LOOP1
2260         LDY Temp
2270         LDA Board,Y
2280         TAY
2290         LDA Tab2,Y
2300         CLC
2310         ADC Tot
2320         STA Tot
2330         RTS:]
2340 NEXT
2350 ENDPROC
2360
2370 DEFPROCrules.
2380 REPEAT
2390 CLS:RESTORE
2400 VDU141:PRINTTAB(16)"SPLASH!"
2410 VDU141:PRINTTAB(16)"SPLASH!"
2420 PRINT''"SPLASH! is a brand new board game for"
2430 PRINT"two players.It is played on a 7 by 7"
2440 PRINT"board and the object of the game is to"
2450 PRINT"capture more squares than the opponent."
2460 PRINT"Thus,the first player to capture 25 or"
2470 PRINT"more squares is the winner."
2480 PRINT''"We take it in turns to play in any free"
2490 PRINT"(ie uncaptured) square - playing in a"
2500 PRINT"square affects those surrounding it."
2510 PRINT''"Initially,all squares are black.As the"
2520 PRINT"game progresses they change colour"
2530 PRINT"according to the scheme:"'
2540 REPEAT:READ X%:VDU X%:UNTIL X%=99
2550 PRINT''"If a square is left white at the end of"
2560 PRINT"a move,it is captured and initialled"
2570 PRINT"(Y=you M=me) by the moving player."
2580 PRINT'TAB(7)CHR$(136)"PRESS SPACE TO CONTINUE";
2590 REPEAT:X%=RND(7):UNTIL GET$=" "
2600 CLS
2610 PRINT"Playing in a square increases its colour";
2620 PRINT"by 3 steps (the sequence of colours is"
2630 PRINT"given by the side of the board to help"
2640 PRINT"you - I don't need it).The (8) squares"
2650 PRINT"immediately around it have their colours";
2660 PRINT"increased by 2 steps and the (16) cells"
2670 PRINT"around those are increased by 1 step."
2680 PRINT''"Any white cells left at the end of the"
2690 PRINT"move are captured and cannot be affected";
2700 PRINT"by further plays."
2710 PRINT'"Being a machine-albeit a clever one,my"
2720 PRINT"patience is almost inexhaustible and if"
2730 PRINT"a stalemate situation occurs (which is"
2740 PRINT"very unlikely) I will not surrender the"
2750 PRINT"game-the onus is on you to do that."
2760 PRINT''"If you wish to quit the game at any"
2770 PRINT"time,press Q when asked 'Letter?'"
2780 PRINT'"    Good luck - you'll need it !!!"
2790 PROCyorn(CHR$(129)+"WANT TO READ THE RULES AGAIN? (Y/N)")
2800 UNTIL No
2810 ENDPROC
2820
2830 DEFPROCyorn(A$)
2840 *FX15,1
2850 PRINT'A$
2860 REPEAT:A$=GET$
2870 UNTIL A$="Y" OR A$="N"
2880 Yes=(A$="Y"):No=(A$="N")
2890 ENDPROC
2900
2910 DATA 134,221,32,145,47,32,134,221,32,146,47,32,134
2920 DATA 221,32,147,47,32,134,221,32,148,47,32,134,221
2930 DATA 32,151,47,32,134,221,32,145,47,135,101,116,99
2940
2950 DATA 16,1,8,2,8,9,16,10,16,11,16,12
2960 DATA 8,13,8,20,8,21,8,22,8,23,8,24
2970
2980 REM ** NORMAL WEIGHTS **
2990 DATA -1,-1,5,2,1,0,0,0
3000 DATA 0,-1,-3,0,7,0,0,0
3010 DATA -2,-3,-2,6,2,0,0,0
3020
3030 REM ** WEIGHTS FOR DEFENSIVE ENDGAME **
3040 DATA -1,-2,7,4,-6,0,0,0
3050 DATA 0,-6,4,1,6,0,0,0
3060 DATA -5,-3,4,7,2,0,0,0
```



VIC 20 TAX ANALYSIS

by Cyril C Beer

'Tax analysis' is a tax assessment program for a 16k VIC 20. One listing is for a single person, the other a married couple. If the first four lines of either are

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PROGRAMS

omitted together with TAB statements (which have different effects on different machines), both listings should run on most machines without modification.

The idea of both programs is to check that your tax liability is being correctly assessed by the Inland Revenue. The programs ask a number of straightforward questions about your income, savings, investments and so on, and then calculate your liability.

'Tax analysis' should not be treated as a substitute for a consultation with a qualified accountant (of which the author is one), but it can be used as a rough guide. If you find that you are paying significantly more tax than the liability calculated by the program, you may well find it worthwhile to check with your tax office that you are being correctly assessed.

```
1 OPEN4,4
2 CMD4
3 LIST
4 PRINT#4:CLOSE4
10 REM "(TAX PROGRAMME-C.C.BEER,WINTERBOURNE, BRISTOL.)
20 PRINT
30 PRINT
40 PRINT"TAX ASSESSMENT 1983/4"
50 PRINTTAB(3);"SINGLE.PERSON"
60 PRINT
70 PRINT
80 PRINT
90 PRINT "N.B. ENTER ALL ITEMS NET OF TAX. (COMPUTER WILL GROSS-UP WHERE NECESSA
RY)."
100 PRINT
110 PRINT"■EARNED INCOME■:-"
120 PRINT
130 INPUT"SALARY &C.;£";S
140 PRINT
150 PRINT"OTHER EARNED"
160 INPUT" INC.      £";OE
170 PRINT
180 PRINT
190 PRINT"■INVEST.INC:-"
200 PRINT
210 PRINT"NAT.SAVS.BANK:"
220 INPUTNS
230 IFNS<=70THENNS=0
240 IFNS>70THENNS=NS-70
250 PRINTTAB(11);"£";NS
260 PRINT
270 PRINT
280 PRINT"DIVS.;"
290 PRINTTAB(2);"(GROSS)"
300 INPUTD
310 D=INT((D*10/7)*100)/100
320 PRINTTAB(11);"£";D;
330 PRINT
340 PRINT"BLDG.SOC."
350 PRINT "  (GROSS)"
360 INPUTB
370 B=INT((B*10/7)*100)/100
380 PRINTTAB(11);"£";B
390 PRINT
400 PRINT"OTHER TAXED"
410 PRINT"INVEST.INC."
420 PRINT  "(GROSS) "
430 INPUTO1
440 O1=INT((O1*10/7)*100)/100
450 PRINTTAB(11)"£";O1
460 PRINT
470 PRINT"OTHER INVEST."
480 PRINT "INC.NOT TAXED"
490 INPUT" AT SOURCE £";O2
500 IT=S+OE+NS+D+B+O1+O2
510 PRINT
520 PRINT"TOTAL INCOME:£";IT
530 PRINT
540 PRINT"■ALLOWANCES■-"
550 PRINT
560 PRINT
570 PRINT"CHARGES ON "
580 PRINTTAB(5);"INCOME:-"
590 PRINT
600 PRINT"DEEDS OF"
610 PRINTTAB(4);"COVENANT";"  £";
620 INPUTDC
630 DC=INT((DC*10/7)*100)/100
635 IFDC>5000THENDC=5000
640 PRINTDC
650 PRINT
660 PRINT"IS TAXPAYER"
670 PRINTTAB(3);"65 OR OVER Y/N.";
680 INPUTA$
690 PRINTA$
700 PRINT
710 PRINT"(IF UNDER 65,HIGHER PERSONAL ALLOWANCE OF £1785 IS GIVEN)";
720 PRINT
730 IFA$="N"THENX=1785
740 PRINT
750 IFA$="N"GOTO840
760 PRINT
770 AA=2360
780 X=INT(AA-(IT-7600)*2/3)*100)/100
790 IFX<1785THENX=1785
800 IFIT<7600THENX=2360
810 PRINT"AGE ALLOW:";TAB(12);"£";X
```

```
820 PRINT
830 PRINT
840 PRINT"OTHER ALLOW-"
850 PRINTTAB(4);"ANCES: £";
860 INPUTOA
870 PRINTOA
880 PRINT
890 TA=X+OA
900 ZA=IT-TA
910 U=14600
920 V=2600
930 W=4600
940 Y=7100
950 Z=7100
960 IFZA<=0THENTL=0
970 IFZA>0ANDZA<=UTHENTL=ZA*.3
980 IFZA>(U+DC)ANDZA<=(U+DC)+VTHENTL=(ZA-(U+DC)*.4+(U+DC)*.3
990 IFZA>(U+DC+V)ANDZA<=(U+DC+V+W)THENTL=(ZA-(U+DC+V))*.45+(U+DC)*.3+V*.4
1000 IFZA>(U+DC+V+W)ANDZA<=(U+DC+V+W+Y)THENTL=(ZA-(U+DC+V+W))*.5+(U+DC)*.3+V*.4+
W*.45
1005 LETES=U+DC+V+W+Y
1010 IFZA>ESANDZA<=ES+ZTHENTL=(ZA-ES)*.55+(U+DC)*.3+V*.4+W*.45+Y*.5
1020 IFZA>(U+V+W+Y+Z)THENTL=(ZA-(U+V+W+Y+Z))*.6+(U+DC)*.3+V*.4+W*.45+Y*.5+Z*.55
1030 PRINT"TOTAL TAX"
1040 PRINTTAB(3);"LIABILITY £";INT((TL)*100)/100
1050 PRINT
1060 NT=INT((B*3/10)*100)/100
1070 PRINT" LESS NOTNL.TAX"
1080 PRINTTAB(4);"ON BSI.  £";NT
1090 PRINT
1100 IFTL=0THENNT=0
1110 IFNT>=TLTHENNT=TL
1120 PRINT"NET TAX"
1130 PRINTTAB(3);"PAYABLE:  £";INT((TL-NT)*100)/100
1140 PRINT
1150 PRINT"TAX PAID"
1160 PRINTTAB(1);"(INC.TAX"
1170 PRINTTAB(2);" CREDITS): £";
1180 INPUTTP
1190 PRINT
1200 PRINT
1210 IFTP<(TL-NT)THENPRINT"TAX DUE: £";INT((TL-NT-TP)*100)/100
1220 IFTP>(TL-NT)GOTO1380
1230 PRINT
1240 PRINT
1250 PRINT
1260 IE=D+B+O1+O2+NS
1270 PRINT"TOTAL INVEST-"
1280 PRINTTAB(2);"MENT INC:£";IE
1290 PRINT
1300 PRINT"TOTAL EARNED"
1310 PRINTTAB(4);"INCOME £";INT((IT-IE)*100)/100
1320 PRINT
1330 IFIE<=7100THENAR=0
1340 IFIE>7100THENAR=INT(((IE-7100)*.15)*100)/100
1350 PRINT"ADDL.RATE TAX."
1360 PRINTTAB(2);"(INV.INC.S/CHG) £";AR
1370 PRINT
1380 IFTP>(TL-NT)THENPRINT"TAX REPAYT.£";INT((TP+NT-TL)*100)/100
1390 IFTA>=(TL-NT)ANDTP=0THENPRINT"NO REPAYMENT DUE";
1400 PRINT

READY.

 1 OPEN4,4
 2 CMD4
 3 LIST
 4 PRINT#4:CLOSE4
 10 REM"(TAX PROGRAM-C.C.BEER,WINTERBOURNE, BRISTOL)."
 20 PRINT
 30 PRINT
 40 PRINT"TAX ASSESSMENT 1983/4"
 50 PRINTTAB(3);"MARRIED COUPLE"
 60 PRINT
 70 PRINT
 80 PRINT
 90 PRINT "N.B. ENTER ALL ITEMS NET OF TAX. (COMPUTER WILL GROSS-UP WHERE NECESSA
RY)."
 100 PRINT
 110 PRINT"■EARNED INCOME■:-"
 120 PRINT
 130 INPUT"SALARY &C.;£";S
 140 PRINT
 150 PRINT"OTHER EARNED"
 160 INPUT" INC.      £";OE
 170 PRINT
 180 PRINT"WIFE'S EARNED"
 190 INPUT"  INCOME   £";WE
 200 PRINT
 210 IFWE<=1785THENWR=WE
 220 IFWE>1785THENWR=1785
 230 PRINT"■INVEST.INC:-"
 240 PRINT
 250 PRINT"NAT.SAVS.BANK:"
 260 PRINTTAB(3);"(SELF)"
 270 INPUTNS
 280 IFNS<=70THENNS=0
 290 IFNS>70THENNS=NS-70
 300 PRINTTAB(11);"£";NS
 310 PRINT
 320 PRINT"NAT.SAVS.BANK"
 330 PRINTTAB(3);"(WIFE)"
 340 INPUTWS
```


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PROGRAMS

```
350 IFWS<=70THENWS=0
360 IFWS>70THENWS=WS-70
370 PRINTTAB(11);"£";WS
380 PRINT
390 PRINT"DIVS.;"
400 PRINTTAB(2);"(GROSS)"
410 INPUTD
420 D=INT((D*10/7)*100)/100
430 PRINTTAB(11);"£";D;
440 PRINT
450 PRINT"BLDG.SOC."
460 PRINT "  (GROSS)"
470 INPUTB
480 B=INT((B*10/7)*100)/100
490 PRINTTAB(11);"£";B
500 PRINT
510 PRINT"OTHER TAXED"
520 PRINT"INVEST.INC."
530 PRINT  "(GROSS) "
540 INPUTO1
550 O1=INT((O1*10/7)*100)/100
560 PRINTTAB(11)"£";O1
570 PRINT
580 PRINT"OTHER INVEST."
590 PRINT "INC.NOT TAXED"
600 INPUT" AT SOURCE £";O2
610 IT=S+OE+WE+NS+WS+D+B+O1+O2
620 PRINT
630 PRINT"TOTAL INCOME:£";IT
640 PRINT
650 PRINT"ALLOWANCES-"
660 PRINT
670 PRINT"WIFE'S EARNED"
680 PRINTTAB(3);"INC.ALLOW: £";WR
690 PRINT
700 PRINT"CHARGES ON "
710 PRINTTAB(5);"INCOME:-"
720 PRINT
730 PRINT"DEEDS OF"
740 PRINTTAB(4);"COVENANT";"  £";
750 INPUTDC
760 DC=INT((DC*10/7)*100)/100
765 IFDC>5000THENDC=5000
770 PRINTDC
780 PRINT
790 PRINT"IS HUSBAND OR WIFE"
800 PRINTTAB(3);"65 OR OVER Y/N.";
810 INPUTA$
820 PRINTA$
830 PRINT
840 PRINT"(IF UNDER 65,HIGHER PERSONAL ALLOWANCE OF £2795 IS GIVEN)";
850 PRINT
860 IFA$="N"THENX=2795
870 PRINT
880 IFA$="N"GOTO970
890 PRINT
900 AA=3755
910 X=INT((AA-(IT-7600)*2/3)*100)/100
920 IFX<2795THENX=2795
930 IFIT<=7600THENX=3755
940 PRINT"AGE ALLOW:";TAB(12);"£";X
950 PRINT
960 PRINT
970 PRINT"OTHER ALLOW-"
980 PRINTTAB(4);"ANCES: £";
990 INPUTOA
1000 PRINTOA
1010 PRINT
1020 TA=WR+X+OA
1030 ZA=IT-TA
1040 U=14600
1050 V=2600
1060 W=4600
1070 Y=7100
1080 Z=7100
1090 IFZA<=0THENTL=0
1100 IFZA>0ANDZA<=UTHENTL=ZA*.3
1110 IFZA>U+DCANDZA<=(U+DC+V)THENTL=(ZA-(U+DC))*.4+(U+DC)*.3
1120 IFZA>(U+DC+V)ANDZA<=(U+DC+V+W)THENTL=(ZA-(U+DC+V))*.45+(U+DC)*.3+V*.4
1130 IFZA>(U+DC+V+W)ANDZA<=(U+DC+V+W+Y)THENTL=(ZA-(U+DC+V+W))*.5+(U+DC)*.3+V*.4+
W*.45
1135 LETES=U+DC+V+W+Y
1140 IFZA>ESANDZA<=ES+ZTHENTL=(ZA-ES)*.55+(U+DC)*.3+V*.4+W*.45+Y*.5
1150 IFZA>(U+DC+V+W+Y+Z)THENTL=(ZA-(U+DC+V+W+Y+Z))*.6+(U+DC)*.3+V*.4+W*.45+Y*.5+
Z*.55
1160 PRINT"TOTAL TAX"
1170 PRINTTAB(3);"LIABILITY £";INT((TL)*100)/100
1180 PRINT
1190 NT=INT((B*3/10)*100)/100
1200 PRINT" LESS NOTNL.TAX"
1210 PRINTTAB(4);"ON BSI.  £";NT
1220 PRINT
1230 IFTL=0THENNT=0
1240 IFNT>=TLTHENNT=TL
1250 PRINT"NET TAX"
1260 PRINTTAB(3);"PAYABLE:  £";INT((TL-NT)*100)/100
1270 PRINT
1280 PRINT"TAX PAID"
1290 PRINTTAB(1);"(INC.TAX"
1300 PRINTTAB(2);" CREDITS): £";
1310 INPUTTP
1320 PRINT
1330 PRINT
```

PROGRAMS

```
1340 IFTP<(TL-NT)THENPRINT"TAX DUE: £";INT((TL-NT-TP)*100)/100
1350 IFTP>(TL-NT)GOTO1510
1360 PRINT
1370 PRINT
1380 PRINT
1390 IE=D+B+O1+O2+NS+WS
1400 PRINT"TOTAL INVEST-"
1410 PRINTTAB(2);"MENT INC:£";IE
1420 PRINT
1430 PRINT"TOTAL EARNED"
1440 PRINTTAB(4);"INCOME £";INT((IT-IE)*100)/100
1450 PRINT
1460 IFIE<=7100THENAR=0
1470 IFIE>7100THENAR=INT(((IE-7100)*.15)*100)/100
1480 PRINT"ADDL.RATE TAX."
1490 PRINTTAB(2);"(INV.INC.S/CHG) £";AR
1500 PRINT
1510 IFTP>(TL-NT)THENPRINT"TAX REPAYT.£";INT((TP+NT-TL)*100)/100
1520 IFTA>=(TL-NT)ANDTP=0THENPRINT"NO REPAYMENT DUE";
1530 PRINT

READY.
```

COMMODORE 64 PLANE ATTACK

by B Houlsworth

'Plane attack' is an action game con- full instructions are given within the verted from a PET program by program.
P Toogood. A joystick is required, and

```
  2 REM******PLANE ATTACK******
  3 REM**BY P.TOOGOOD (ON PET)*
  4 REM**CONVERTED BY        ***
  5 REM**B HOULSWORTH TO     ***
  6 REM**RUN ON COMMODORE 64***
  7 REM************************
  8 REM**USES JOYSTICK AND*****
  9 REM**USER DEFINED GRAPHICS*
 10 REM**************************
 11 POKE53248+24,31
 15 GOSUB60000
 20 BG=11:POKE53281,BG:POKE53280,1
 90 PRINT"■■■BY P.A.TOOGOOD 1980 FOR THE PET"
100 PRINT"■CONVERTED BY B HOULDSWORTH FOR COMMODORE 64 1.4.83"
110 GOSUB30000:GOSUB10000
121 REM * START *
200 PRINTPL$;:PX=PX+K1:X=X+K1
210 POKE1983-79,31
240 IFX>CCTHENB=K1
300 P=PEEK(PX+K1):IFP<>K3THEN55000
310 POKE53281,BG
320 K=127-PEEK(D7):IFBTHENK=KP
330 IFK=16ORK=XXTHENIFFB=K0THENGOSUB1000:R1=K1:GOTO500
340 IFK=4THENIFFC=K0THENGOSUB6000:R1=K1:GOTO500
350 IFK=1THENGOSUB7000:R1=K1:GOTO500
360 IFK=2THENGOSUB8000:GOTO500
380 IFK=8THENGOSUB6700:R1=K1
500 IFFBTHENGOSUB1500
510 IFFCTHENGOSUB6500
600 IFFQTHENGOSUB900
650 IFFQ=K0THENIFFC=K0THENIFINT(MF*RND(TI))=K1THENGOSUB5000
700 IFFQTHENIFML<PXTHENIFML<J1-KNTHENGOSUB5600:FQ=K0
705 IFR1THENGOSUB9000
710 GOTO200:REM * END *
900 REM
905 IFPEEK(ML)<>KZTHENFQ=K0:GOSUB5600:RETURN
910 POKEML,K3:ML=ML-K2:IFML>PX-JGTHENIFML<PX+K1THENEX=EX+K1:FQ=K0:GOSUB5600:GOSU
B5600
920 IFEX>LYTHENB=K1
925 IFML<J7THENFQ=K0:RETURN
930 POKEML,KZ:POKEML+54272,10:RETURN
1000 REM B
1005 W4=W4+K1:FB=K1:YY=K0:PN=XX*RND(TI)+JK:B1=PX+K6
1007 RETURN
1500 POKEB1,K3:B1=B1+K6:B2=PEEK(B1):IFB2=K3THENPOKEB1,J6:POKEB1+54272,7:RETURN
1510 IFB1>1943THENFB=K0:RETURN
1530 IFB2=K9THENFB=K0:RETURN
1540 YY=YY+K1:IFYY>PNTHENFB=K0:RETURN
1550 POKEB1,K3:POKEB1-K2,K3:RETURN
5000 REM M
5110 RM=INT(XX*RND(TI)):ML=MT(RM)
5120 IFPEEK(ML+K2)=K3THENRETURN
5150 FQ=K1:POKEML,KZ:POKEML+54272,10:RETURN
5600 REM MH
5650 FORA=K0TOJK:POKEML-K1+A*K2,K4:POKEML+A*K2,K4:POKEML+K1+A*K2,K4
5652 POKEML-K1+A*K2+54272,15:POKEML+A*K2+54272,15:POKEML+K1+A*K2+54272,15
5655 POKEJ9,A*K9+K2:NEXT
5670 FORA=K0TOJK:POKEML-K1+A*K2,K3:POKEML+A*K2,K3:POKEML+K1+A*K2,K3
5671 FORUU=1TO2
5672 POKE53248+17,156:POKE53248+17,155
5675 NEXT:NEXT:RETURN
6000 REM CB
6010 IFL5=W5THENRETURN
6020 L5=L5+K1:FC=K1:YU=K0
6025 PT=JK*RND(TI)+K1:C1=PX+K6:RETURN
6500 FORA=K0TOJK:C2=PEEK(C1+A):IFC2=K9ORC2=JRTHENFC=K0:RETURN
6510 IFC2<>K3THENYU=YU+J8:POKEC1+A,K4:POKEC1+A+54272,8
6514 NEXT:FORA=K0TOJK:C2=PEEK(C1+A):IFC2=K4THENPOKEC1+A,K3:POKEC1+A+54272,8
6518 NEXT:IFYU>PTTHENFC=K0
6600 C1=C1+K6:RETURN
6700 REM FG
6720 IFL3=W3THENRETURN
6730 L3=L3+K1:FORA=PX+K1TOPX+17STEP3
6750 IFPEEK(A)<>K9THENPOKEA,K7:POKEA+54272,1
6760 NEXT:FORA=PX+1TOPX+17
6770 IFPEEK(A)<>K9THENPOKEA,K3
6780 NEXT:RETURN
7000 A=PEEK(SE)*J3+XX
7010 IFPX>1069THENPRINT"■■■
```

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PROGRAMS

```
8010 IFPX<1863THENPRINT"■■■
```

PROGRAMS

```
61336 DATA0,128,144,248,254,224,0,0,0,0,24,24,126,24,24,0
61352 DATA0,0,0,0,24,8,8,16,0,0,0,126,126,0,0,0
61368 DATA0,0,0,0,0,0,48,48,0,0,24,24,0,126,0,24,24
61384 DATA0,60,98,102,106,114,98,60,0,24,56,24,24,24,24,60
61400 DATA0,60,102,102,12,24,50,126,0,60,98,2,12,2,98,60
61416 DATA0,28,52,100,126,4,4,4,0,126,98,96,124,2,98,60
61432 DATA0,24,48,96,124,98,98,60,0,62,98,4,8,24,24,24
61448 DATA0,60,98,98,60,98,98,60,0,60,98,98,62,2,100,56
61464 DATA0,0,24,24,0,0,24,24,0,0,0,24,24,0,24,8,16
61480 DATA0,8,16,32,64,32,16,8,0,0,0,126,0,126,0,0
61496 DATA0,16,8,4,2,4,8,16,0,60,98,2,28,24,0,24
61512 DATA0,112,112,48,48,0,48,48,0,108,72,72,0,0,0,0

READY.
```

MZ-80K LABEL PRINTER

by Frank Rooney

'Label printer' runs under Sharp Basic SP-5025 or, with minor modifications, under Basic 5060. In common with all MZ-80K programs not involving graphics, it will run on the MZ-80A and 700 using one of the above interpreters.

The program allows the user to design labels which are then printed onto standard computer labels using an Epson MX-80 printer. It can also be used with other Epson-compatible printers, though some of the print options may not be available.

'Label printer' supports condensed, expanded, normal, subscript, condensed subscript and enlarged print styles. Automatic centering is available as an option and the program is menu-driven. The Sharp's screen editor is available when entering the content of the label. Please note that CHR$(124) is used as a demarcation symbol in data statements in place of commas. This is not an 'X', but is the graphics character at the bottom-right of the keyboard. This allows commas to be printed.

For conversion to Basic 5060 (available through the Sharp users club, Yeovil College) the following printer codes should be changed:

Cursor-down: CHR$(15)
Cursor-up: CHR$(14)
Cursor-left: CHR$(27)
To cancel condensed: CLR=CHR$(18)
To cancel enlarged: CLR=CHR$(15)

For conversion to other machines, USR(62) sounds a beep to prompt the user for input (usually BEEP or PRINT CHR$(7); POKE 4466,X prints X lines down the screen (usually achieved by LOCATE x,y, VTAB(x) or PRINT§x,); all other POKES and printer-control characters are explained in remarks within the program.

Lines 1190-1210 allow spaces to be entered at the beginning of inputs (leading spaces would otherwise be ignored). As the program stands, 'Label printer' copes with three types of label: 1 column of 3½ x 1 7/16in, 2 columns of 4 x 1 7/16in and 3 columns of 2¾ x 1 7/16in. To modify the program to handle other types of labels, change the TAB data in lines 1350-1430.

```
10 REM
20 REM | LABEL PRINTER for SHARP MZ-80K |
30 REM | with EPSON MX-80 F/T 3 printer |
40 REM | © Frank R. Rooney     Sept.'83 |
50 REM
60 POKE6347,124:REM Defines CHR$(124) as DATA demarcation symbol
70 POKE10211,127:REM Allows TAB values of greater than 78
80 DIM T(3,7),P(7),E(34),L$(8),K(8),D(8)
90 REM ¤ = ESC printer code
100 NP$="  <1>  Normal print":DP$="      <2>  Double print"
110 EP$="      <3>  Emphasised print":DE$="      <4>  Double Emphasised print"
120 LN$="                                                "
130 PRINT"¤";TAB(12);"LABEL PRINTER":PRINTTAB(12);"--------------"
140 PRINT" [For Sharp MZ-80K & Epson MX80 F/T/3]"
150 PRINT"¤¤  This programme will print standard"
160 PRINT"tractor-feed label sheets."
170 PRINT"¤There are 6 print-sizes, and any ALPHA-"
180 PRINT"NUMERIC symbol, EXCEPT    may be used."
190 POKE53631,98:POKE53632,98:REM Prints "" on the screen
200 PRINT"¤There are 8 lines per label, and the"
210 PRINT"print-size can be slected for each line."
220 PRINT"Press <Y> if the printer is connected.":USR(62)
230 GETA$:IFA$=""THEN230
240 IFA$="Y"THEN260
250 GOTO230
251 REM ¤0 = Initialise printer
252 REM ¤0 = Ignore 'skip over perforations'
253 REM ¤2 = Sets line spacing to 6 lines per inch
260 PRINT/P"¤@¤0¤2"
270 PRINT"¤HOW MANY COLUMNS OF LABELS ? (1, 2 or 3)":USR(62)
280 GETLW:IF(LW<1)+(LW>3)THEN280
290 IFLW=1THEN310
300 FORX=1TO((LW-1)*2)+1)*6:READZ:NEXTX
310 FORI=2TO7:READP(I):NEXTI
320 FORL=1TOLW:FORK=2TO7:READT(L,K):NEXTK:NEXTL
330 PRINT"¤Load the label sheet and allign the"
340 PRINT"printer head to print the top line on":PRINT"the label."
350 PRINT"¤¤    * Press any key to continue *¤":USR(62)
360 GETK$:IFK$=""THEN360
370 PRINT"¤KEY:          <1> Blank line"
380 PRINT"               <2> Condensed subscript"
390 PRINT"               <3> Condensed"
400 PRINT"               <4> Subscript"
410 PRINT"               <5> Normal"
420 PRINT"               <6> 66 Chrs per line"
430 PRINT"               <7> Large"
440 PRINT"-------------------------------------":RETURN
450 PRINT"¤";:B$="labels":IFLW=1THEN550
460 PRINT"Press <1> to print ACROSS the sheet"
470 PRINT"      <2> to print DOWN the sheet"
480 GETAD:IF(AD<1)+(AD>2)THEN490
490 IFAD=1THENB$="rows of labels":GOTO550
500 PRINT"¤¤In which column do you wish to print ?"
510 PRINT"(Press <1> or <2> etc.) ";:USR(62)
520 GETL:IF(L=0)+(L>LW)THEN530
530 PRINTL
540 PRINT"¤¤How many ";B$;" to be printed ";:INPUTN
550 PRINT"¤¤   *  Press <S> to START PRINTING  *"
560 GETA$:IFA$=""THEN570
570 IFA$="S"THEN600
580 GOTO570
590 FORM=1TON
600 FORI=1TO8
610 PRINT"¤Printing";M;" /";N
620 IFAD=1THENFORL=1TOLW:PRINT/P"¤@¤0¤2";SPC(T(L,K(I)));:GOTO650
630 PRINT/P;TAB(T(L,K(I)));
```


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PROGRAMS

```
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642 REM #    = Enlarged characters   - &   Cancel
643 REM #S1 = Subscript characters  - #T  Cancel
644 REM #E   = Emphasised characters - #F  Cancel
645 REM #G    = Double printing      - #H  Cancel
650 ONK(I)GOTO660,670,680,700,710,740,770
660 PRINT/P;:GOTO800
670 PRINT/P"#S1%";:GOTO800
680 PRINT/P"%";:IFD(I)=2THENPRINT/P"#G";
690 GOTO800
700 PRINT/P"#S1";:GOTO800
710 IFD(I)>2THENPRINT/P"#E";
720 IF(D(I)=2)+(D(I)=4)THENPRINT/P"#G";
730 GOTO800
740 PRINT/P"%#";
750 IFD(I)=2THENPRINT/P"#G";
760 GOTO800
770 PRINT/P"#";
780 IFD(I)>2THENPRINT/P"#E";
790 IF((D(I)=2)+(D(I)=4))THENPRINT/P"#G";
800 PRINT/PL$(I);
810 ONK(I)GOTO880,820,830,840,850,860,870
820 PRINT/P"#T%";:GOTO880
830 PRINT/P"%";:GOTO880
840 PRINT/P"#T";:GOTO880
850 PRINT/P"#F";:GOTO880
860 PRINT/P"%";:GOTO880
870 PRINT/P"%#F";
880 PRINT/P"#H";
890 IFAD=1THENNEXTL
900 PRINT/P:NEXTI:PRINT/P:NEXTM
910 PRINT"#Press <R> for MORE of THIS LABEL"
920 PRINT"#       <N> for a NEW LABEL FORMAT"
930 PRINT"#       <E> to EXIT from the program":USR(62)
940 GETA$:IFA$="E"THENPOKE6347,44:PRINT"%":END:REM Redefine , for demarcation
950 IFA$="R"THEN460
960 IFA$="N"THEN980
970 GOTO940
980 FORI=1TOB:D(II)=0:L$(II)="":NEXTII:I=1
990 PRINT"%  Do you require automatic centering ?"
1000 PRINTTAB(15);"#(Y or N)":USR(62)
1010 GETC$:IFC$="Y"THENC=1:GOTO1040
1020 IFC$="N"THENC=0:GOTO1040
1030 GOTO1010
1040 GOSUB380
1050 PRINT"#Line";I;" KEY: ";:USR(62)
1060 GETK(I):IF(K(I)=0)+(K(I)>7)THEN1060
1070 PRINTK(I)
1080 IFK(I)=1THEN1250
1090 PRINT"%";:IF(K(I)=3)+(K(I)>4)THENPRINT"KEY:";
1100 IFK(I)=3THENVC=2:PRINTNP$:PRINTDP$:PRINTLN$:GOTO1150
1110 IFK(I)=5THENVC=4:PRINTNP$:PRINTDP$:PRINTEP$:PRINTDE$:PRINTLN$:GOTO1150
1120 IFK(I)=6THENVC=2:PRINTNP$:PRINTDP$:PRINTLN$:GOTO1150
1130 IFK(I)=7THENVC=4:PRINTNP$:PRINTDP$:PRINTEP$:PRINTDE$:PRINTLN$:GOTO1150
1140 GOTO1160
1150 GETD(I):IF(D(I)=0)+(D(I)>VC)THEN1150
1160 PRINT"#Line";I
1170 POKE4466,13:PRINT"#";:FORA=1TOP(K(I))-1:PRINT"-";:NEXTA:PRINT"-"
1180 POKE4466,11:INPUT" ";L$(I)
1190 FORB=1TOP(K(I))
1200 IFPEEK(53688+B)<>0THEN1220
1210 NEXTB
1220 L$(I)=SPC(B-1)+L$(I)
1230 IFC=0THEN1250
1240 L$(I)=SPC(INT(P(K(I))-LEN(L$(I)))/2)+L$(I)
1250 I=I+1:IFI<9THEN1040
1260 PRINT"#The complete label reads:%%"
1270 PRINT"——"
1280 FORI=1TOB:PRINTL$(I):NEXTI
1290 PRINT"——"
1300 PRINT"%%Does this look O.K. ? (Y or N)"
1310 GETA$:IFA$=""THEN1310
1320 IFA$="N"THEN980
1330 IFA$="Y"THEN460
1340 GOTO1310
1348 REM × = CHR$(124) DATA Demarcation symbol
1349 REM No. of characters of different sizes per line - 1 COLUMN OF LABELS
1350 DATA50·50·29·29·25·15
1359 REM TAB Settings
1360 DATA0·0·0·0·0·0
1369 REM No. of characters of different sizes per line - 2 COLUMNS OF LABELS
1370 DATA53·53·36·36·25·18
1379 REM TAB Settings Column 1
1380 DATA3·3·0·0·3·0
1389 REM TAB Settings Column 2
1390 DATA46·46·44·44·47·44
1399 REM No. of characters of different sizes per line - 3 COLUMNS OF LABELS
1400 DATA33·33·21·21·18·12
1409 REM TAB Settings Column 1
1410 DATA2·2·1·1·1·0
1419 REM TAB Settings Column 2
1420 DATA30·30·29·29·29·28
1429 REM TAB Settings Column 3
1430 DATA57·57·57·57·56·56
```

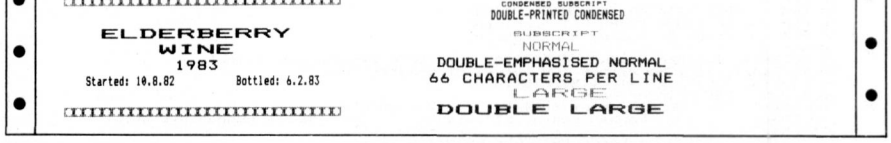

BBC TERMINAL PROGRAMS

by T Harvey & M Orr

BBC 'Terminal programs' enable a program to be rapidly transferred from one BBC Micro to another using the RS432 serial ports, and two BBCs to communicate with each other telex-style.

Listing 1 enables a program to be transferred from one machine to another. The primary use of the program is in schools or sites where there are more machines than disk drives. A program can be loaded from disk to one machine, and then rapidly transferred to others without the need for full networking.

To use the program, use an RS432 lead wired for communications (your local Acorn dealer should be able to supply this). Connect the two machines, and type *FX 2,1 on the machine to which you intend to send the program. This disables the keyboard, with the exception of the BREAK key, and tells the machine to accept input from the RS432 port as if it were being entered from the keyboard.

You should then run the 'Master terminal' program on the transmitting machine and load the program to be transferred, then follow the instructions given in the program. BREAK restores the host machine to normal use and OLD recovers the transmitted program.

The second program comprises two listings. One should be typed into each machine to enable the two to communicate with each other using the RS432

link as above. As it is, the program is rather uninteresting but, as our referee points out, the technique used could form the basis of some very imaginative software involving two machines. An 'Eliza' program, with two machines talking to each other, could be fun! Adventure programs, with two human characters playing simultaneously, are also interesting or — for the more ambitious — an arcade-style game with two spacecraft battling it out, each player controlling one craft and receiving data on the other player's movements. If anyone wants to write something for *PCW* Programs along these lines, let me know.

```
 10 MODE 7
 20 PRINTTAB(10,2);CHR$(129);"MASTER TERMINAL"
 30 PRINTTAB(12,3);CHR$(129);"BY T. HARVEY"
 40 PRINTTAB(14,4);CHR$(129);"14/9/83"
 50 *FX8,7
 60 *FX7,7
 70 PROCADVICE
 80 REPEAT
 90   INPUTLINE'"COMMAND:"A$
100   ST%=INSTR(A$,"LIST")
110   IF ST%<>0 THEN *FX2,1
120   *FX3,3
130   *FX5,2
140   VDU2:PRINT A$:VDU3
150   *FX3,0
160   IF ST%<>0 THEN END
170   UNTIL FALSE
180 DEFPROCADVICE
190 PRINT"ADVICE-"
200 PRINT"ENSURE THAT THE OTHER COMPUTER IS RECEIVING"
210 PRINT"I.E.*FX2,1 HAS BEEN ENTERED."
220 PRINT'"TO GET PROGRAM FROM TERMINAL:"
230 PRINT"*FX5,2:RETURN:*FX6,10:RETURN"
240  PRINT"VDU2:LIST:RETURN:BREAK:OLD"
250 PRINT'"THIS MACHINE RECEIVES WHEN LIST IS":PRINT"ENTERED"
260 ENDPROC
```

```
 10 MODE 7
 20 PRINTTAB(10,2);CHR$(129);"TALKING TERMINALS"
 30 PRINTTAB(8,3);CHR$(129);"BY T.HARVEY AND M.ORR"
 40 PRINTTAB(14,4);CHR$(129);"14/9/83"
 50 PRINTTAB(13,5);CHR$(129);"TERMINAL 1"
 60 H%=FALSE
 70 *FX8,7
 80 *FX7,7
 90 REPEAT
100   IF H%=TRUE THEN *FX2,1
110   IF H%=FALSE THEN 140
120   INPUTLINE"ANSWER:"DUM$
130   *FX2,0
140   INPUTLINE'"QUESTION:"A$
150   *FX3,7
160   PRINT A$
170   *FX3,0
180   H%=TRUE
190   UNTIL FALSE
```

```
 10 MODE 7
 20 PRINTTAB(10,2);CHR$(129);"TALKING TERMINALS"
 30 PRINTTAB(8,3);CHR$(129);"BY T.HARVEY AND M.ORR"
 40 PRINTTAB(14,4);CHR$(129);"14/9/83"
 50 PRINTTAB(13,5);CHR$(129);"TERMINAL 2"
 60 *FX8,7
 70  *FX7,7
 80 REPEAT *FX2,1
 90   INPUTLINE"QUESTION:"DUM$
100   *FX2,0
110   INPUTLINE'"ANSWER:"A$
120   *FX3,7
130   PRINT A$
140   *FX3,0
150   UNTIL FALSE
```

COMMODORE WORDSQUARE

by Antony Gerrish

'Wordsquare' was written on a PET, but should convert easily to both the Commodore 64 and VIC 20. A printer is essential.

The program generates wordsquares of the type found in puzzle books using words entered by the user. The words you enter will be hidden in a grid of letters, and may read in any one of eight directions — up, down, left, right and the four diagonal directions.

The program also offers an optional answer sheet, showing the positions of all the words without the dummy letters used to fill the grid. The program contains no instructions but is easy to use by simply following the prompts.

When typing in the listing, please

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PROGRAMS

note that the author has used two- or three-letter codes to represent Commodore control codes. The meanings should be apparent: CLS to clear the screen; CD for cursor-down; CL for cursor-left; CU for cursor-up; RVS for reverse-video and RVO for reverse-video off. You should, of course, enter the standard Commodore codes rather than these mnemonics — consult your manual if in doubt.

```
5 REM WORDSQUARE BY A.P. GERRISH (21/5/83)
6 REM
10 REM HAS SOUND ON CB2 LINE
20 REM
30 REM PRINTER OUTPUT 78 COLUMNS
40 REM
50 EE$="[CD]ILLEGAL ENTRY[CD]"
60 PRINT"[CLS]":GOSUB1000
70 INPUT"OUTPUT TO [RVS]S[RVO]CREEN OR [RVS]P[RVO]RINTER ";AA$
80 AA$=LEFT$(AA$,1)
90 IF AA$<>"P" AND AA$<>"S" THEN RUN
100 INPUT"[CD]DO YOU WANT THE ANSWER SHEET ";AS$
110 AS$=LEFT$(AS$,1)
120 INPUT"[CD]MAXIMUM NUMBER OF WORDS ";KL
130 IF KL>2000 OR KL<10 THEN PRINT"[CD]OUT OF RANGE":GOTO120
140 DIM A$(KL)
150 PRINT"[CD]PLEASE INPUT WORDS.
160 PRINT"[CD]IF YOU WANT TO STOP                    TYPE 'END'.
170 PRINT"[CD]TYPING ↑ DELETES THE LAST WORD INPUT.
180 A$=""
190 I=1:PRINT"[CD][CD][CD]";
200 GOSUB1000:INPUT"  -[CL][CL][CL]";A$(I):IFLEN(A$(I))>10THENPRINTEE$:GOTO200
210 IFA$(I)="↑"THENI=I-1:A$(I)="":GOTO200
220 IFLEN(A$(I))<3THENPRINTEE$:GOTO200
230 GG=0:FOR MD=1TOLEN(A$(I))
240 MV=ASC(MID$(A$(I),MD,1))
250 IFMV<64ORMV>90THENGG=1
260 NEXT MD:IFGG=1THENPRINTEE$:GOTO200
270 IFA$(I)="END"THEN300
280 I=I+1:IFI>KLTHEN300
290 GOTO200
300 NO=I-1:I=0
310 I=I+1:D=I-1:IFI>=NO THEN380
320 D=D+1:IFD=NO+1THEN310
330 IFD=ITHENPRINT"SORTING WORD ";I;"[CL] [CU]":GOTO320
340 IFLEN(A$(I))<LEN(A$(D))THENB$=A$(I):A$(I)=A$(D):A$(D)=B$
350 IFA$(I)<>A$(D)THEN320
360 GOSUB1000:GOSUB1070
370 D=I-1:GOTO320
380 GG=0:FORI=1TONO-1
390 IFLEN(A$(I))<LEN(A$(I+1))THENB$=A$(I):A$(I)=A$(I+1):A$(I+1)=B$:GG=1
400 NEXTI:IFGG=1THEN380
410 PRINT"[CD]":LK=0:FORI=1TONO:LK=LK+LEN(A$(I)):NEXTI
420 AC=39:IFAA$="P"THENAC=78
430 DO=INT((LK*3)/AC)
440 IFDO<2THENDO=DO+2
450 DIMD$(AC,DO)
460 PRINT"[CLS]"
470 FORI=1TONO:PRINTA$(I):NEXT
480 PRINT"[CD]SIZE:"AC"*"DO
490 FORW=1TO NO:LE=LEN(A$(W))
500 PRINT"COUNT:"(NO+1)-W"[CL] [CU]"
510 Y=INT(RND(1)*DO):X=INT(RND(1)*AC)
520 A1=INT(RND(1)*3+1)-2
530 A2=INT(RND(1)*3+1)-2:A=0:L=1
540 IFA1=0ANDA2=0THEN520
550 A$=MID$(A$(W),L,1)
560 K1=X+(A1*L):K2=Y+(A2*L)
570 IFK1<1ORK2<1THEN510
580 IFK1>ACTHEN510
590 IFK2>DOTHEN510
600 B$=D$(K1,K2)
610 IFB$=A$THENA=A+1:GOTO640
620 IFB$=""THEN640
630 GOTO510
640 L=L+1:IFL<=LE THEN550
650 IFA=LE THEN510
660 FORI=1TOLE:A$=MID$(A$(W),I,1)
670 D$(X+(A1*I),Y+(A2*I))=A$
680 NEXTI:NEXTW:PRINT"[CD]"
690 POKE59467,16:POKE59466,32
700 FORI=1TO10
710 POKE59464,200:FORX=1TO100:NEXT
720 POKE59464,30 :FORX=1TO70 :NEXT
730 NEXTI
740 IFAA$="S"THEN770
750 PRINT"[CD]PRESS 'SPACE' WHEN READY.
760 GETA$:IFA$<>" "THEN760
770 POKE59467,0:POKE59466,0
780 S=7:F=4:IFAA$="S"THENF=3:S=F
790 OPEN3,F
800 GG=0:IFAS$="Y"THENGG=1
810 FORI=1TOAC:PRINT#3,"-";
820 NEXTI:PRINT#3:FORI=1TODO
830 FORD=1TOAC
840 IFD$(D,I)=""ANDGG=0THENPRINT#3,CHR$(64+INT(RND(1)*26+1));:GOTO870
850 IFD$(D,I)=""ANDGG=1THENPRINT#3," ";:GOTO870
860 PRINT#3,D$(D,I);
870 NEXT:PRINT#3:NEXT
880 FORI=1TOAC:PRINT#3,"-";
890 NEXT:PRINT#3:I=0
900 IFGG=1THENGG=0:PRINT#3:GOTO810
910 GOSUB1190
920 FORD=1TOS
930 I=I+1:IFI>NO THENB$="":GOTO950
940 B$=A$(I)
950 IFLEN(B$)<10THENB$=B$+" ":GOTO950
960 PRINT#3,B$;:IFI<NOANDD<>STHENPRINT#3,":";
970 NEXT:PRINT#3:IFI<NO THEN920
980 FORI=1TOAC:PRINT#3,"-";:NEXT
990 PRINT#3:GOTO1140
1000 POKE59467,16:POKE59466,32
1010 POKE59464,10:FORX=1TO10:NEXT
1020 POKE59464,100:FORX=1TO10:NEXT
1030 POKE59464,0
1040 POKE59467,0:POKE59466,0:RETURN
1050 DATACONTENTS,COMPUTER,JUMPING,CROWDED,INDENT,RETURN,SCREEN,ROOM,MOVE
1060 DATAJUST,LIKE,VERY,THE,PIN,BIN,END
1070 IFV=1THEN1120
1080 READA$:IFA$="END"THENV=1
1090 PRINT"                                    [CU]"
1100 PRINTA$(I)," = ";A$
1110 A$(I)=A$:RETURN
1120 A$(D)="":FOR H=D TO NO-1
1130 A$(H)=A$(H+1):NEXT:NO=NO-1:RETURN
1140 D$="A TOTAL OF"+STR$(NO)+" WORDS"
1150 FORI=1TO(AC/2)-(LEN(D$)/2)
1160 PRINT#3," ";:NEXT:PRINT#3,D$
1170 FORI=1TOAC:PRINT#3,"-";:NEXT
1180 PRINT#3:CLOSE3:END
1190 FORJ=1TO NO-1
1200 DD=J+1
1210 IF DD>NO THEN 1260
1220 PRINT"SORTING WORD ";J;"[CU]"
```

PROGRAMS

```
1230 IFLEN(A$(DD))<LEN(A$(J))THEN1260
1240 IFA$(DD)<A$(J)THENB$=A$(DD):A$(DD)=A$(J):A$(J)=B$
1250 DD=DD+1:GOTO1210
1260 NEXTJ
1270 RETURN
```



BBC DISASSEMBLER

by S James & R Nurse

'Disassembler' is a fast machine code disassembler for the BBC models A & B. When run, the program displays a standard disassembly of the contents of RAM beginning at the specified address. 'Disassembler' also displays a hexadecimal and ASCII version of the code, the hex to the left of the disassembly, the ASCII to the right.

The start address should be given in hex, but without the leading '&'. The output has been made extremely easy to follow by highlighting unconditional jumps (JMPs and JSRs) in green, with conditional branches in red.

Two points to note are (a) in the ASCII column, all screen display codes are replaced by asterisks, and (b) the same codes are likely to play havoc with your printer. The program was tested on itself and on parts of the BBC ROM.

```
LIST
  100 PCL=&70:PCH=&71
  200 esctest=&9834
  300 Oswrch=&FFEE
  400 Osnewl=&FFE7
  500 Osrdch=&FFE0
  600 prhex=&8570
  700 sig=&7D:col=&7B:asc=&7A
  800 Opcode=&72:Bytes=&73:Format=&74:Mnemonic=&75
  900 Baselo=&76:Basehi=&77:Temp=&78:Te1=&79
 1000 DIMmnem% 172,form% 78,data% 512,Bytes% 13,mach% 900,opc 100,opname% 200
 1100 READ$mnem%
 1200 FORT=0TO12:READA$
 1300   FORY=0TO5:form%?(T*6+Y)=ASC(MID$(A$,Y+1,1)):NEXT:NEXT
 1400 FORT=1TO13:READBytes%?T:NEXT
 1500 FORT=0TO511
 1600   READdata%?T:NEXT
 1700 strt=opname%:FORT=0TO12
 1800   READname$,loc
 1900   ?(opc+T*4)=loc MOD 256
 2000   ?(opc+T*4+1)=loc DIV 256
 2100   ?(opc+T*4+2)=strt MOD 256
 2200   ?(opc+T*4+3)=strt DIV 256
 2300   $strt=name$:strt=strt+LEN(name$)+1
 2400   NEXT
 2500 FORpass=0TO1
 2600   P%=mach%
 2700   [ OPTpass*2
 2800   .DISS JSRstart
 2900   .DIS1 JSRprpc
 3000   JSRdissbyte
 3100   JSRprcalls
 3200   LDAasc:CMP£128:BEQDIS2:JSRprasci
 3300   .DIS2 LDAOpcode:CMP£&4C:BEQline:CMP£&6C:BEQline
 3400   .back JSRnextbyte:JSROsnewl
 3500   JSResctest
 3600   JSRkeys
 3700   JMPDIS1
 3800   .line JSROsnewl:JMPback
 3900   .prpc LDA PCH:JSRprhex:LDA PCL:JSRprhex:LDA£ASC"_":JSROswrch:RTS
 4000   .dissbyte LDY£0:LDA(PCL),Y:STAOpcode
 4100   CMP£128:BCCsmall
 4200   LDA£(data%+256) DIV 256:STABasehi
 4300   LDA£(data%+256) MOD 256:STABaselo
 4400   LDAOpcode:SEC:SBC£128:JMPgetinfo
 4500   .small LDA£data% DIV 256:STABasehi
 4600   LDA£data% MOD 256:STABaselo:LDAOpcode
 4700   .getinfo ASLA:TAY:LDA(Baselo),Y:STAMnemonic
 4800   INY:LDA(Baselo),Y:STAFormat
 4900   CMP£0:BNEr1:JMPerr:.r1 TAY:LDABytes%,Y:STABytes
 5000   LDYFormat:DEY:TYA:ASLA:STATemp:ASLA:CLC:ADCTemp:STAFormat
 5100   .eret LDY£0
 5200   .prnum LDA(PCL),Y:JSRprhex:LDA£32:JSROswrch:INY:CPYBytes:BNEprnum
 5300   LDA£9:SEC:SBCBytes:SBCBytes:SBCBytes:JSRprblnk
 5400   LDAcol:CMP£128:BEQ nocol:JSRaddincols
 5500   .nocol LDYMnemonic:DEY
 5600   LDAmnem%,Y:JSROswrch:LDAmnem%+1,Y:JSROswrch:LDAmnem%+2,Y:JSROswrch:LDA£2
:JSRprblnk
 5700   LDYFormat:LDX£6:CPY£54:BEQrel:CPY£48:BEQend
 5800   .praddr LDAform%,Y:CMP£ASC"*":BEQaddress:CMP£32:BEQend:JSR&FFEE
 5900   .prnext INY:DEX:BNEpraddr
 6000   .end RTS
 6100   .address TYA:PHA:LDYBytes:DEY
 6200   .addr LDA(PCL),Y:JSRprhex:DEY:BNEaddr:PLA:TAY:JMPprnext
 6300   .prmess TYA:PHA:LDY£0
 6400   .prmes1 LDA(&86),Y:CMP£13:BNEprmes2:PLA:TAY:RTS
 6500   .prmes2 JSR&FFEE:INY:JMPprmes1
 6600   .prblnk CMP£0:BEQprblk2:TAX:LDA£32
 6700   .prblk1 JSROswrch:DEX:BNEprblk1
 6800   .prblk2 RTS
 6900   .rel LDA£ASC"&":JSR&FFEE:LDY£1:LDAPCL:CLC:ADC(PCL),Y:ADC£2:STATe1:LDAPCH
:ADC£0:JSRprhex:LDATe1:JSRprhex:JMPend
 7000   .start LDA£0:STAcol:LDA£128:STAsig:STAasc:RTS
 7100   .keys LDAsig:CMP£128:BEQsigdo:LDA£&81:LDY£0:LDX£0:JSR&FFF4:TXA:JMPtest
 7200   .coloff CLC:LDAcol:ADC£128:STAcol:RTS
 7300   .ascoff CLC:LDAasc:ADC£128:STAasc:RTS
 7400   .sigstp CLC:LDAsig:ADC£128:STAsig:RTS
 7500   .sigdo JSR&FFE0:.test CMP£ASC"A":BEQascoff
 7600   CMP£ASC"S":BEQsigstp
 7700   CMP£ASC"C":BEQcoloff
 7800   CMP£ASC"N":BEQctrln
 7900   CMP£ASC"O":BEQctrlo .
 8000   RTS
 8100   .ctrln LDA£14:JSR&FFEE:RTS
 8200   .ctrlo LDA£15:JSR&FFEE:RTS
 8300   .err LDA£1:STABytes:LDA£169:STAMnemonic:LDA£9:STAFormat:JMPeret
```


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PROGRAMS

```
 8400   .addincols LDAFormat:CMP£54:BEQrelc:LDAOpcode:CMP£&4C:BEQjump:CMP£&6C:BE
Qjump:CMP£&20:BEQjump:RTS
 8500   .relc LDA£8:JSR&FFEE:LDA£129:JSR&FFEE:RTS
 8600   .jump LDA£8:JSR&FFEE:LDA£130:JSR&FFEE:RTS
 8700   .prasci LDA£32:JSRprtab:LDA£135:JSR&FFEE:LDA£ASC">":JSR&FFEE
 8800   LDY£0
 8900   .prasc1 LDA(PCL),Y:CMP£32:BCCprasce:CMP£128:BCSprasce:JSR&FFEE:JMPnxt
 9000   .prasce LDA£ASC"*":JSR&FFEE
 9100   .nxt INY:CPYBytes:BNEprasc1
 9200   LDA£4:SEC:SBCBytes:JSRprblnk:LDA£ASC"<":JSR&FFEE:RTS
 9300   .nextbyte CLC:LDABytes:ADCPCL:STAPCL:LDAPCH:ADC£0:STAPCH:RTS
 9400   .prtab CMP£0:BEQprtend:STA&8F:TXA:PHA:LDA£&86:JSR&FFF4:STXTe1:LDA&8F:SEC
:SBCTe1:JSRprblnk:PLA:TAX:.prtend RTS
 9500   .prcalls LDABytes:CMP£3:BNEencal
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 9700   .prcloop:LDA opc,X:CMP&86:BNEprcnxt:LDA opc+1,X:CMP&87:BNEprcnxt
 9800   LDA£26:JSRprtab:LDAopc+2,X:STA&86:LDAopc+3,X:STA&87:JSRprmess:RTS
 9900   .prcnxt INX:INX:INX:INX:CPX£52:BNEprcloop
10000   .encal RTS
10100   .erere JSRkeys:LDAsig:JSRprhex:JSROsnewl:JMPerere
10200   :]:VDU6:NEXT
10300 MODE7
10400 PRINT"************************************"
10500 PRINT"*                                  *"
10600 PRINT"* Fast Machine Code Dissassembler *"
10700 PRINT"*     By S.D.James & R.T.Nurse     *"
10800 PRINT"*                                  *"
10900 PRINT"************************************"
11000 PRINT'"   This is a 6502 Dissassembler for the  BBC Micro.It takes a machin
e code       program and converts it into the        appropriate 6502 mnemonics
& addresses. It has been written in machine code"
11100 PRINT"so that it runs very quickly indeed."
11200 PRINT"   Apart from the actual dissassembly   this dissassembler generates
 two other  outputs.It prints out a hexadecimal     version of the machine code
and also    an ASCII version.When you dissassemble"
11300 PRINT"the hex is on the left of the           dissassembly while the ASCII
 is on the  right.The ASCII is not totally true     ASCII.As the character codes
 less than  32 are screen codes they are replaced bya '*'."
11400 PRINT"Please press space to continue.";:REPEAT UNTILGET$=" "
11500 CLS
11600 PRINT"   The dissassembler also does one otherthing.If the address of an o
pcode       accesses the operating system routines, the dissassembler prints out
 the name ofthe routine between the ASCII version"
11700 PRINT"and the dissassembly.It also highlights branches,JSR's and JMP's by
putting themin various colours:JSR's and JMP's in   green and branches(condition
al) in red."
11710 PRINT"   During dissasembly,if you press      various keys one or more of
these       functions can be enabled or dissabled.  These are the keys and their
 default    settings."
11720 PRINT"        KEY   CONTROLS         DEFAULT"
11730 PRINT"        ===   ========         ======="
11740 PRINT"         S    Step on/off        On"
11750 PRINT"         A    Ascii printout     On"
11760 PRINT"         C    Colours            On"
11770 PRINT"         N    Page mode          On"
11780 PRINT"         O    Scroll mode        Off"
11790 PRINT'
11800 PRINT
11900 INPUT"Starting address:",S$
12000 CLS
12100 VDU14
12200 S%=EVAL("&"+S$)
12300 ?PCL =S% MOD 256
12400 ?PCH =S% DIV 256
12500 CALLDIS1
12600 DATAADCANDASLBCCBCSBEQBITBMIBNEBPLBRKBVCBVSCLCCLDCLICLVCMPCPXCPYDECDEXDEYE
ORINCINXINYJMPJSRLDALDXLDYLSRNOPORAPHAPHPPLAPLPROLRORRTIRTSSBCSECSEDSEISTASTXSTY
TAXTAYTYATSXTXATXS???
12700 DATA"A      ","£&*    ","&*     ","&*,X  ","&*,Y  ","&*     ","&*,X  ","&*,Y
","","&*     ","(&*,X)","(&*),Y","(&*)   "
12800 DATA1,2,2,2,2,3,3,3,1,2,2,2,3
12900 REM6502-Data 0,0 Means non existant
13000 DATA31,9,103,11,0,0,0,0,0,0,103,3,7,3,0,0,109,9,103,2,7,1,0,0,0,0,103,6,7,
6,0,0
13100 DATA28,10,103,12,0,0,0,0,0,0,103,4,7,4,0,0,40,9,103,8,0,0,0,0,0,0,103,7,7,
7,0,0
13200 DATA85,6,4,11,0,0,0,0,19,3,4,3,121,3,0,0,115,9,4,2,118,1,0,0,19,6,4,6,118,
6,0,0
13300 DATA22,10,4,12,0,0,0,0,0,0,4,4,118,4,0,0,133,9,4,8,0,0,0,0,0,0,4,7,118,7,0
,0
13400 DATA124,9,70,11,0,0,0,0,0,0,70,3,97,3,0,0,106,9,70,2,97,1,0,0,82,6,70,6,97
,6,0,0
13500 DATA34,10,70,12,0,0,0,0,0,0,70,4,97,4,0,0,46,9,70,8,0,0,0,0,0,0,70,7,97,7,
0,0
13600 DATA127,9,1,11,0,0,0,0,0,0,1,3,121,3,0,0,112,9,1,2,121,1,0,0,82,13,1,6,121
,6,0,0
13700 DATA37,10,1,12,0,0,0,0,0,0,1,4,121,4,0,0,139,9,1,8,0,0,0,0,0,0,1,7,121,7,0
,0
13800 DATA0,0,142,11,0,0,0,0,148,3,142,3,145,3,0,0,67,9,0,0,163,9,0,0,148,6,142,
6,145,6,0,0
13900 DATA10,10,142,12,0,0,0,0,148,4,142,4,145,5,0,0,157,9,142,8,166,9,0,0,0,0,1
42,7,0,0,0,0
14000 DATA94,2,88,11,91,2,0,0,94,3,88,3,91,3,0,0,154,9,88,2,151,9,0,0,94,6,88,6,
91,6,0,0
14100 DATA13,10,88,12,0,0,0,0,94,4,88,4,91,4,0,0,49,9,88,8,160,9,0,0,94,7,88,7,9
1,8,0,0
14200 DATA58,2,52,11,0,0,0,0,58,3,52,3,61,3,0,0,79,9,52,2,64,9,0,0,58,6,52,6,61,
6,0,0
14300 DATA25,10,52,12,0,0,0,0,0,0,52,4,61,4,0,0,43,9,52,8,0,0,0,0,0,0,52,7,61,7,
0,0
14400 DATA55,2,130,11,0,0,0,0,55,3,130,3,73,3,0,0,76,9,130,2,100,9,0,0,55,6,130,
6,73,6,0,0
14500 DATA16,10,130,12,0,0,0,0,0,0,130,4,73,4,0,0,136,9,130,8,0,0,0,0,0,0,130,7,
73,7,0,0
14600 REM Data for Operating system call check
14700 DATAOsfind,&FFCE,Osgbpb,&FFD1,Osbput,&FFD4,Osbget,&FFD7,Osargs,&FFDA,Osfil
e,&FFDD,Osrdch,&FFE0,Osasci,&FFE3,Osnewl,&FFE7,Oswrch,&FFEE,Osword,&FFF1,Osbyte,
&FFF4,Oscli,&FFF7
```



BBC PURSUIT SHIP

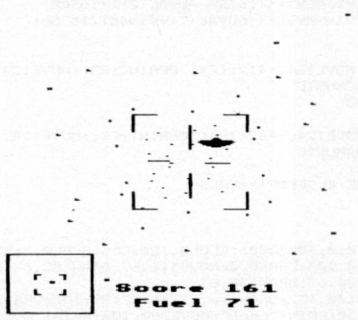
by John Dean

'Pursuit ship' is a compelling arcade-style game for a 32k BBC Micro. The idea is simply (?) to locate the enemy ship in your sights and blast it into tiny pieces.

The 'soundtrack' is maintained by the

PROGRAMS

procedure MUSIC, ADVAL(—8) being used to test whether there is room in the SOUND buffer for another note. The tune itself is held in the DATA statements in lines 2540-2560. A screen-dump of the game in progress is given below, and full instructions are contained within the program.




```
 10 REM ******************************
 20 REM *                            *
 30 REM *  P U R S U I T   S H I P   *
 40 REM *                            *
 50 REM * Author   :  J.A.Dean       *
 60 REM * Date     :  1983           *
 70 REM * Machine  :  BBC Micro 32K  *
 80 REM *                            *
 90 REM ******************************
100
110 ONERRORRUN
120 H%=-1:MODE7
130 PROCINTRO
140 MODE2
150 REPEAT
160   PROCINIT
170   IFH%=-1PROCSTARS(200,1.1):H%=0
180   PROCSTATIC
190   ONERRORPROCAGAIN:RUN
200   REPEAT
210     PROCSHIPMAKE
220     REPEAT
230       PROCSTARMOVE
240       IFADVAL(-8)>3PROCMUSIC
250       PROCSMOVE
260       PROCTESTSHOT
270       PROCUSEFUEL
280       PROCSPEEDUP
290       UNTILHIT OREMPTY
300     UNTILEMPTY
310   PROCAGAIN
320   UNTILFALSE
330
340 DEFPROCSTARMOVE:IFTIME<STARTIME%ENDPROC
350 VDU19,STARCOL%,0,0,0,0:STARCOL%=STARCOL%+1
360 IFSTARCOL%>6STARCOL%=1
370 VDU19,STARCOL%,7,0,0,0:STARTIME%=TIME+STARINT%:ENDPROC
380 ENDPROC
390
400 DEFPROCSMOVE:LOCALTNX%,TNY%:IFTIME<SMOVETIME%ENDPROC
410 IFI$="K"PROCKEYBOARD ELSEPROCJOYSTICK
420 IFRND(5)=1TXA%=RND(MTV%/4)-MTV%/8:IFRND(2)=1TYD%=-TYD%
430 TXV%=TXV%+TXA%:IFTXV%<-MTV%TXV%=-MTV%:TXA%=-TXA%
440 IFTXV%>MTV%TXV%=MTV%:TXA%=-TXA%
450 IFTXV%<0TYV%=MTV%+TXV%ELSE TYV%=MTV%-TXV%
460 IFTYD%<0TYV%=-TYV%
470 TNX%=TX%+TXV%-SXV%:TNY%=TY%+TYV%-SYV%
480 IFTNX%>1875TNX%=1875:TXV%=-TXV%
490 IFTNX%<-1875TNX%=-1875:TYV%=-TYV%
500 IFTNY%>1500TNY%=1500:TYV%=-TYV%:TYD%=-TYD%
510 IFTNY%<-1500TNY%=-1500:TYV%=-TYV%:TYD%=-TYD%
520 PROCSHIPSHOW(TNX%,TNY%):PROCSHIPSHOW(TX%,TY%):TX%=TNX%:TY%=TNY%
530 SMOVETIME%=SMOVETIME%+SMOVEINT%:ENDPROC
540
550 DEFPROCSHIPSHOW(X%,Y%):MOVEX%,Y%:IFX%<575PRINTS$ELSEPRINTCHR$224
560 PLOT69,-490+(X%*150)/1945,-412+(Y%*100)/1560:PLOT65,8,0:PLOT65,0,4
570 PLOT65,-8,0:IFABSX%<300ANDABSY%<300ANDRND(F%/3+15)=1PROCFIRE(X%+64,Y%-16)
580 ENDPROC
590
600 DEFPROCFIRE(X%,Y%):MOVEX%,Y%:DRAW0,-512:SOUND17,1,100,15
610 PROCFUEL(1):MOVEX%,Y%:DRAW0,-512:ENDPROC
620
630 DEFPROCTESTSHOT
640 IFI$="K"ANDINKEY(-99)PROCSHOOT
650 IFI$="J"AND(ADVAL(0)AND3)=1PROCSHOOT
660 ENDPROC
670
680 DEFPROCSHOOT
690 MOVE-32,16:PRINT"*":SOUND16,-15,4,2:SOUND17,1,255,10:PROCWAIT(1)
700 MOVE-32,16:PRINT"*"
710 IFTX%>-128ANDTX%<0ANDTY%>0ANDTY%<32PROCHIT:PROCSTARMOVE
720 PROCFUEL(1):ENDPROC
730
740 DEFPROCHIT:PROCSHIPSHOW(TX%,TY%):FORI%=-15TO0:IFADVAL(-8)>3PROCMUSIC
750 SOUND0,I%,4,2:PROCSTARMOVE:NEXT:PROCSCORE(10):HIT=TRUE
760 IFF%<91PROCFUEL(-10)ELSEIFF%<100PROCFUEL(F%-100)
770 ENDPROC
780
790 DEFPROCUSEFUEL:IFTIME<FUELTIME%ENDPROC
800 IFF%>0PROCFUEL(1):SOUND2,-15,150,1
810 FUELTIME%=TIME+FUELINT%:ENDPROC
820
830 DEFPROCSPEEDUP:IFTIME<SPEEDTIME%ENDPROC
840 IFSMOVEINT%>2SMOVEINT%=SMOVEINT%-1
850 IFFUELINT%>70FUELINT%=FUELINT%-10
860 MTV%=MTV%+1:MSV%=MTV%*1.4+5
870 IFSTARINT%>1STARINT%=STARINT%-1
880 SPEEDTIME%=TIME+SPEEDINT%:ENDPROC
890
900 DEFPROCKEYBOARD
910 SXV%=0:SYV%=0:IFINKEY(-54)SYV%=MSV%
920 IFINKEY(-86)SYV%=-MSV%
```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PROGRAMS

```
930 IFINKEY(-70)SXV%=MSV%
940 IFINKEY(-85)SXV%=-MSV%
950 ENDPROC
960
970 DEFPROCJOYSTICK
980 SXV%=0:SYV%=0:IFADVAL1<16380SXV%=-MSV%*((16380-ADVAL(1))/16380)
990 IFADVAL1>49140SXV%=MSV%*((ADVAL(1)-49140)/16380)
1000 IFADVAL2<16380SYV%=MSV%*((16380-ADVAL(2))/16380)
1010 IFADVAL2>49140SYV%=-MSV%*((ADVAL(2)-49140)/16380)
1020 ENDPROC
1030
1040 DEFPROCSCORE(X):MOVE124,-412:IFX<>0PRINT;S%;:MOVE124,-412:S%=S%*1.2+X
1050 IFADVAL(-8)>3PROCMUSIC
1060 PRINT;S%;:ENDPROC
1070
1080 DEFPROCFUEL(X):MOVE124,-462:IFX<>0PRINT;F%;:MOVE124,-462
1090 IFADVAL(-8)>3PROCMUSIC
1100 F%=F%-X:PRINT;F%;
1110 IFF%<1 EMPTY=TRUE ELSEEMPTY=FALSE
1120 ENDPROC
1130
1140 DEFPROCSTATIC
1150 VDU26,29,0;0;24,0;0;300;200;:GCOL0,128:CLG:GCOL0,7:MOVE0,0:DRAW300,0
1160 DRAW300,200:DRAW0,200:DRAW0,0:MOVE116,67:DRAW184,67:DRAW100,83
1170 MOVE184,67:DRAW200,67:DRAW200,83
1180 MOVE100,116:DRAW100,132:DRAW116,132:MOVE184,132:DRAW200,132:DRAW200,116
1190 VDU26,5:MOVE444,50:PRINT"Fuel":MOVE380,100:PRINT"Score":VDU29,640;512;
1200 MOVE60,0:DRAW140,0:MOVE-60,0:DRAW-140,0:MOVE0,40:DRAW0,120:MOVE0,-40
1210 DRAW0,-120:MOVE120,160:DRAW200,160:DRAW200,100:MOVE120,-160:DRAW200,-160
1220 DRAW200,-100:MOVE-120,160:DRAW-200,160:DRAW-200,100
1230 MOVE-120,-160:DRAW-200,-160:DRAW-200,-100:GCOL3,8:PROCSCORE(0)
1240 PROCFUEL(0):FORI%=1TO6:SOUND1,1,4,5:PROCMUSIC
1250 PROCSTARMOVE:NEXT:SOUND17,0,0,1:ENDPROC
1260
1270 DEFPROCSHIPMAKE:LOCALX%:IFRND(2)=1THENX%=1ELSEX%=-1
1280 TX%=1875*X%:TY%=RND(3051)-1526:TXV%=RND(MTV%)*-X%
1290 TYV%=(MTV%-ABS(TXV%))*X%:TXA%=RND(3)-2:IFRND(2)=1TYD%=1ELSETYD%=-1
1300 PROCSHIPSHOW(TX%,TY%):HIT=FALSE:ENDPROC
1310
1320 DEFPROCSTARS(N,D):LOCALI%:B$=" ** PURSUIT SHIP **":I%=RND(-9):STARINT%=0
1330 PROCSTARMAKE:VDU29,640;512;:VDU5:GCOL3,8:MOVE-640,0:PRINTB$
1340 FORI%=1TON:GCOL1,(I%MOD6)+1:PROCSTARSHOW(SX,SY):PROCSTARSHOW(-SX,-SY)
1350 PROCSTARNEXT(D):PROCSTARMOVE:IFADVAL(-8)>0PROCMUSIC
1360 NEXT:STARINT%=10:GCOL3,8:MOVE-640,0:PRINTB$:I%=RND(-TIME):ENDPROC
1370
1380 DEFPROCSTARMAKE:SX=RND(101)-1:SY=RND(101)-1:IFSX<25ANDSY<25PROCSTARMAKE
1390 IFRND(2)=1SX=-SX
1400 IFRND(2)=1SY=-SY
1410 ENDPROC
1420
1430 DEFPROCSTARSHOW(X,Y):X=X-(X MOD8):Y=Y-(Y MOD8):IFPOINT(X,Y)=0PLOT69,X,Y
1440 IFPOINT(X,Y+4)=0ANDABSX>160ORABSY>128PLOT69,X,Y+4
1450 IFPOINT(X+8,Y)=0ANDABSX>320ORABSY>256PLOT69,X+8,Y
1460 IFPOINT(X+8,Y+4)=0ANDABSX>480ORABSY>384PLOT69,X+8,Y+4
1470 ENDPROC
1480
1490 DEFPROCSTARNEXT(D):SX=SX*D:SY=SY*D:IFABSSX>640ORABSSY>640PROCSTARMAKE
1500 ENDPROC
1510
1520 DEFPROCBLACKOUT(C):FORI%=1TO6:VDU19,I%,0,0,0,0:VDU19,I%+8,C,0,0,0
1530 NEXT:ENDPROC
1540
1550 DEFPROCAGAIN
1560 IFNOTHIT PROCSHIPSHOW(TX%,TY%)
1570 *FX15,0
1580 VDU19,8,7,0,0,0:GCOL1,8
1590 IFS%>HX HX=S%:A$="The highest score!"ELSEA$="High score: "+STR$(H%)
1600 MOVE-640,325:PRINTA$
1610 B$="Another game? (Y/N)":REPEATUNTILINKEY$(50)="":PROCBLACKOUT(2)
1620 MOVE-640,250:PRINTB$:REPEAT:K$=INKEY$(0):UNTILK$="Y"ORK$="N"
1630 IFK$="N":VDU22,7:END:ENDPROC
1640 GCOL3,8:MOVE-640,250:PRINTB$:PROCSCORE(0):PROCFUEL(0)
1650 MOVE-640,325:PRINTA$
1660 ENDPROC
1670
1680 DEFPROCINIT:VDU4:GCOL0,7:GCOL0,128:PROCBLACKOUT(2)
1690 VDU19,8,2,0,0,0,19,15,7,0,0,0:IFH%=-1CLG
1700 VDU23,224,&01&03&7F&FF&7F&3F&0F&03
1710 VDU23,225,&80&C0&FE&FF&FE&FC&F0&C0
1720 S$=CHR$224+CHR$225:MTV%=12:MSV%=24:SX%=0:DD%=6:F%=100:STARTIME%=0
1730 STARCOL%=1:SMOVETIME%=0:SMOVEINT%=25:FUELTIME%=0:FUELINT%=200
1740 SPEEDTIME%=0:SPEEDINT%=1500:SX%=0:SY%=0:EMPTY=FALSE
1750 ENVELOPE1,129,-6,-4,-3,16,32,96,64,-4,-2,-100,126,100:ENDPROC
1760
1770 DEFPROCINTRO
1780 B$=CHR$141+CHR$131+"P U R S U I T   S H I P"
1790 PRINTTAB(6,6)B$
1800 PRINTTAB(6,7)B$
1810 PRINTTAB(8,10)CHR$129"Author : J.A.Dean 1983"
1820 PRINTTAB(3,16)CHR$133"Do you want to use a Joystick or"
1830 PRINTTAB(3,17)CHR$133"the Keyboard for control? (J/K):";
1840 REPEAT I$=GET$:UNTILI$="K"ORI$="J":PRINTI$
1850 PRINTTAB(3,19)CHR$134"Do you want instructions? (Y/N):";
1860 REPEATK$=GET$:UNTILK$="N"ORK$="Y":IFK$="N"ENDPROC
1870 CLS
1880 PRINT''''"You are the pilot of a Pursuit Ship and"
1890 PRINT"it is your task to seek out and destroy"
1900 PRINT"the alien craft which threaten Earth's"
1910 PRINT"safety."
1920 PRINT''"There is a long range radar scan shown"
1930 PRINT"at the bottom left of the screen, this"
1940 PRINT"indicates the position of enemy craft"
1950 PRINT"relative to the view on the ship's main"
1960 PRINT"scanner."
1970 PROCSPACE
1980 PRINT''''"You must centre the enemy ship in your"
1990 PRINT"cross wires before firing to destroy it."
2000 PRINT"When you use the controls, the ship willmove ";
2010 PRINT"in the direction requested, giving"
2020 PRINT"the impression of the target moving in"
2030 PRINT"the opposite direction!"
2040 PRINT''"For each alien craft destroyed you will"
2050 PRINT"be awarded extra fuel. But note that if"
2060 PRINT"the aliens feel threatened they may wellopen ";
2070 PRINT"fire on you, and maintaining your"
2080 PRINT"defensive shield will reduce your fuel."
2090 PROCSPACE
2100 IFI$="K"PROCKEYINST ELSEPROCJOYINST
2110 PROCSPACE
```

PROGRAMS

```
2120 PRINTTAB(0,3)"There will be a short introduction whilethe ";
2130 PRINT"galaxy is drawn. When it is completeBATTLE ";
2140 PRINT"STATIONS will be sounded and the"'"game will commence."
2150 PRINT'''"Remember: firing your laser uses fuel,"
2160 PRINT"being hit by the enemy uses fuel and"
2170 PRINT"fuel is consumed by the normal running"
2180 PRINT"of your ship. The only way to regain"
2190 PRINT"fuel is to destroy the aliens."
2200 PRINT'"The game ends when your fuel supply is"'"exhausted."
2210 PRINT'''"Good Luck! I've a feeling you'll need it"
2220 PROCSPACE
2230 ENDPROC
2240
2250 DEFPROCJOYINST
2260 PRINTTAB(0,7)"You should use the left hand Joystick"
2270 PRINT"Press the 'fire' button when you have"'"found it!"
2280 REPEAT:UNTIL(ADVAL(0)AND3)=1
2290 PRINT'"Fine, now you can use the Joystick to"'"move your ship."
2300 PRINT'"Use the fire button when the target shipis in your sights."
2310 ENDPROC
2320
2330 DEFPROCKEYINST
2340 PRINT'"To move your ship, use the following"
2350 PRINT"keys (one or more at a time):"
2360 PRINT'"                    'U' ---- Up"
2370 PRINT'" Left ---- 'H'    'J' ---- Right"
2380 PRINT'"                'N' ---- Down"
2390 PRINT'"Use the SPACE BAR to fire when you have"
2400 PRINT"the target in your sights."
2410 ENDPROC
2420
2430 DEFPROCSPACE:REPEATUNTILINKEY$(25)=""
2440 PRINTTAB(0,24)CHR$131"Press the"CHR$136"SPACE BAR"CHR$137"to continue..";
2450 REPEATUNTILINKEY$(0)=" ":CLS:ENDPROC
2460
2470 DEFPROCWAIT(X):WAITTIME%=TIME+X:REPEATUNTILTIME>=WAITTIME%:ENDPROC
2480
2490 DEFPROCMUSIC:IFF%/16+1<DD%DD%=F%/16+1
2500 READPP%:IFPP%<0RESTORE:READPP%
2510 SOUND3,-15,PP%,DD%:SOUND3,0,0,1:IFADVAL(-8)>3PROCMUSIC
2520 ENDPROC
2530
2540 DATA0,0,12,12,28,28,12,12,0,0,12,12,28,28,12,12,20,20,32,32,48,48,32,32
2550 DATA20,20,32,32,48,48,32,32,28,28,12,12,0,0,12,12,28,28,12,12,0,0,12,12
2560 DATA48,48,32,32,20,20,32,32,48,48,32,32,20,20,32,32,-1
```



DRAGON TRAKTRAP

by Bob Chappell

Dragon 'Traktrap' is a Snake by another name, running on the Dragon 32/64.

The computer and player each lay a trail, the idea being to trap the computer while avoiding crossing your own or the computer's trail. The computer's trail is red, yours is yellow. The first to win ten rounds is declared the winner.

Use the arrow keys to control your direction. The computer controls the speed of the game.

```
1 REM*TRAKTRAP**BOB CHAPPELL*********15/1/83***
2 CLEAR2000:GOTO39
3 ON A GOTO4,5,6,7
4 M=U:RETURN
5 M=L:RETURN
6 M=R:RETURN
7 M=D:RETURN
8 FORJ=1TO4:A(J)=0:NEXT:A$=INKEY$:IFA$=""THENA=LH:GOTO13
9 A=ASC(A$):IFA=94THENA=1:GOTO13
10 IFA=8THENA=2:GOTO13
11 IFA=9THENA=3:GOTO13
12 IFA=10THENA=4 ELSE A=LH
13 GOSUB3:IFH+M>=L1 THENH=H-L3:IFPEEK(H+M)=0G GOTO16 ELSEGOTO29
14 IFH+M<=L2 THENH=H+L3
15 IFPEEK(H+M)<>0G GOTO29
16 LH=A:H=H+M:GOSUB26:A=LD:IFA=2ORA=3THENFD=A
17 J=RND(24):IFJ<5THENA=J:IF(FD=2ANDA=3)OR(FD=2ANDA=3)THENA=FD
18 GOSUB3:IFDG+M>=L1 THENIFPEEK(DG-L3+M)=0G THENDG=DG-L3:GOTO22 ELSEGOTO21
19 IFDG+M<=L2 THENIFPEEK(DG+L3+M)=0G THENDG=DG+L3:GOTO22 ELSEGOTO21
20 J=DG+M+M:IFJ>L2 ANDJ<L1 ANDPEEK(J)<>0G GOTO23
21 IFPEEK(DG+M)<>0G GOTO23
22 LD=A:DG=DG+M:GOSUB27:GOTO8
23 FORJ=1TO4
24 A=RND(4):IFA(A)=1GOTO24
25 A(A)=1:GOSUB3:IFPEEK(DG+M)=0G GOTO22 ELSE NEXT:GOTO33
26 POKEH,159:SOUND2,1:RETURN
27 POKEDG,191:SOUND1,1:FORJ=1TOY:NEXT:IFY1=1THENY=Y-5
28 RETURN
29 A=H+M:K=159:GOSUB36:DS=DS+1:CLS3:PRINT@231," YOU ";HS;"      ME ";DS;
30 FORJ=1TO5:PRINT@106," YOU CRASHED ";:FORK=50TO250STEP50:SOUNDK,1:NEXT:PRINT@1
06," you crashed ";:FORK=250TO50STEP-50:SOUNDK,1:NEXTK,J
31 IFDS<>10GOTO54
32 FORJ=1TO8:PRINT@427," I WIN ";:FORK=1TO5:SOUNDK*30,1:NEXT:PRINT@427," i win "
;:FORK=5TO1STEP-1:SOUNDK*15,1:NEXTK,J:GOTO66
33 A=DG+M:K=191:GOSUB36:HS=HS+1:CLS4:PRINT@231," YOU ";HS;"      ME ";DS;
34 FORJ=1TO5:PRINT@106," I CRASHED ";:FORK=200TO250STEP10:SOUNDK,1:NEXT:PRINT@10
6," i crashed ";:FORK=250TO200STEP-10:SOUNDK,1:NEXTK,J:IFHS<>10GOTO54
35 FORJ=1TO8:PRINT@427," YOU WIN ";:FORK=20TO60STEP10:SOUNDK*4,1:NEXT:PRINT@427,
" you win ";:FORK=60TO20STEP-10:SOUNDK*4,1:NEXTK,J:GOTO66
36 IFA>L1-1 THENA=A-32
37 IFA<L2+1 THENA=A+32
38 FORJ=1TO15:POKEA,K:SOUNDJ*10,1:POKEA,42:SOUNDJ*10+5,1:NEXT:RETURN
39 L=-1:R=1:U=-32:D=32:A=RND(TIMER):OG=255
40 L1=1536:L2=1023:L3=512:FG=0
41 CLS:PRINT@8,"traktrap"
42 PRINT:PRINT" YOUR TRACK IS"
43 PRINT:PRINT" MY TRACK IS":FORJ=1106TO1115:POKEJ,159:NEXT:FORJ=1170TO1179:POKE
J,191:NEXT
44 PRINT:PRINT" WE BOTH LAY A TRAIL,AVOIDING
45 PRINT" CROSSING OUR OWN OR EACH":PRINT" OTHER'S TRACK.NO BACKTRACKING!
46 PRINT:PRINT" TO ALTER THE COURSE OF YOUR":PRINT" TRACK,HIT ONE OF THE FOUR":P
RINT" ARROW KEYS WHICH POINT IN THE":PRINT" DIRECTION YOU WISH TO GO.":PRINT
47 PRINT" Please Press the space key now";
48 A$=INKEY$:IFA$<>" "GOTO48
```


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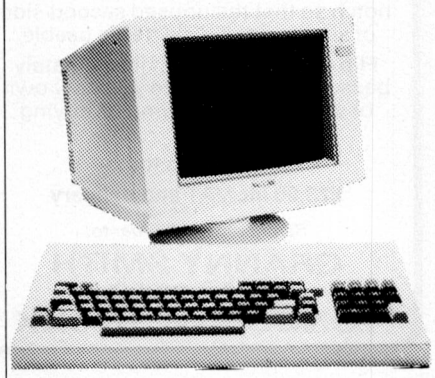

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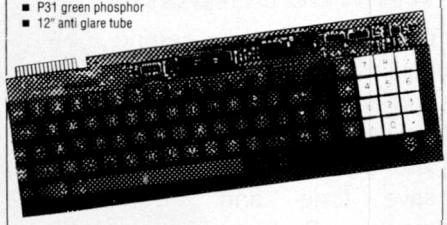

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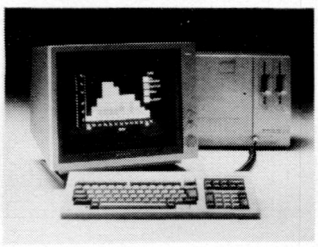

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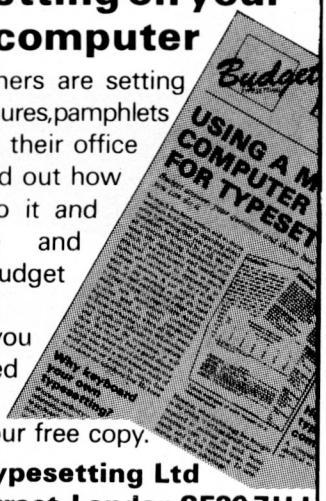

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PROGRAMS

```
49 CLS:PRINT:PRINT" IF YOU RUN OFF THE EDGE OF":PRINT" THE PLAYING AREA,YOU WILL
":PRINT" RE-APPEAR ON THE OTHER SIDE":PRINT" (PROVIDED THERE IS A GAP":PRINT" YO
U CAN GET THROUGH!).
50 PRINT:PRINT" APART FROM THE FIRST ROUND,":PRINT" THE NEXT ROUND STARTS UP AFT
ER":PRINT" 10 SECONDS UNLESS YOU SELECT":PRINT" ANOTHER TYPE OF GAME."
51 PRINT" THE FIRST ONE TO WIN 10 ROUNDS":PRINT" WINS THE GAME. HAPPY TRACKING."
52 PRINT:PRINT" Please Press the sPace key now"
53 A$=INKEY$:IFA$=""GOTO53
54 CLS:PRINT:PRINT" PRESS ONE OF THESE KEYS:-
55 PRINT:PRINT"   F   FAST SPEED.":PRINT:PRINT"   M   MEDIUM SPEED.":PRINT:PRINT
"   S   SLOW SPEED.":PRINT:PRINT"   A   ACCELERATING SPEED."
56 PRINT:PRINT:PRINT"      which letter ?"
57 Y=0:Y1=0:Y3=0:TIMER=0
58 IFTIMER>500ANDFG=1THENA$=L$:GOTO60
59 A$=INKEY$:IFA$=""GOTO58
60 IFA$="F"GOTO65
61 IFA$="M"THENY=100:GOTO65
62 IFA$="S"THENY=150:GOTO65
63 IFA$="A"THENY1=1:Y=150:GOTO65
64 GOTO58
65 L$=A$:FG=1:CLS8:H=1292:DG=1302:GOSUB26:GOSUB27:A=RND(4):GOSUB3:H=H+M:LH=A:FOR
J=1TO50:NEXT:A=RND(4):GOSUB3:DG=DG+M:GOSUB26:GOSUB27:LD=A:GOTO8
66 FORJ=1TO3:FORK=1TO8:CLS K:SOUNDK*30,2,3:NEXTK,J:CLS:PRINT@226,"WANT TO PLAY A
GAIN (Y/N) ?"
67 A$=INKEY$:IFA$="Y"THEN RUN
68 IFA$="N"THEN END
69 GOTO67
```

MICROSOFT BASIC INLAY CARDS

by Ian Masters

'Inlay cards' is a short and simple print program, producing blank cassette inlay cards which have space for up to 21 programs per side. Inlay cards supplied with cassettes often don't have enough room to record details of all the programs on a C-60 or C-90 tape.

Written in completely standard MBasic, the program should run on any machine supporting an LPRINT USING statement.

```
10 'CASSETTE BOX INSERTS by Ian Masters
20 '28 Sept 1983      in Microsoft Basic
30 'For use with MX100 Printer and 128
35 'column paper.
40 'The program will produce 6 cassette
50 'box inserts per sheet of 128 col by
60 '11 inch paper. Don't be tight, use
70 'good paper 80gsm and a good ribbon,
80 'for best results.
90 '140 sets line spacing to 1/6th inch
100 '150 sets the emphasised mode ON.
110 A$=STRING$(40,"_")
120 B$=STRING$(18,"_")
130 C$=STRING$(19,"_")
140 LPRINT CHR$(27);CHR$(50)
150 LPRINT CHR$(27);CHR$(69)
160 FOR Z=1 TO 2
170   LPRINT A$;" ";A$;" ";A$
180   FOR I=1 TO 15
190     LPRINT USING"##";I;
200     LPRINT B$;"¦";C$;" ";
210     LPRINT USING"##";I;
220     LPRINT B$;"¦";C$;" ";
230     LPRINT USING"##";I;
240     LPRINT B$;"¦";C$
250   NEXT I
260   LPRINT:LPRINT
270   LPRINT A$;" ";A$;" ";A$
280   FOR X=16 TO 21
290     LPRINT USING"##";X;
300     LPRINT B$;"¦";C$;" ";
310     LPRINT USING"##";X;
320     LPRINT B$;"¦";C$;" ";
330     LPRINT USING"##";X;
340     LPRINT B$;"¦";C$
350   NEXT X
360   LPRINT:LPRINT
370 NEXT Z
380 END
```

PROGRAMS



BBC Missile defender
by S Roden

'Missile defender' is a 32k version of the classic arcade game.

Your task is to defend four cities against an onslaught of missiles. You score 25 points for each missile you hit but lose a city each time a missile reaches its target. If you score 1000 points, the night falls and you are awarded another four cities. At 2000 points, day breaks and you are given a further four cities (if you survive that long).

Full instructions are contained within the program.

```
    2 REM## MISSILE DEFENDER##
L.  4 REM## (C) S.RODEN 1983 ##
    10DIMB$(11),C(10):FORA%=0TO10:B$(A%)="S.RODEN":C(A%)=500:NEXT:DIMR(3)
    30ON ERRORGOSUB1750
    40MODE7
    50PROCINTRO
    60PROCSETUP
    70FORA%=0TO3:R(A%)=1:NEXT
    80SCORE=0
    90VDU23;10,32,0;0;0;
   100CITIES=4:CLS
   110MISSILES=0
   120SOM=12:SOS=16
   130CLS:PRINTTAB(8,20);"(C)1983 S.RODEN":FORA=1TO5000:NEXT
   140MODE2
   150VDU23;10,32,0;0;0;
   160X=650:Y=X
   170IFMISSILES)0THENPROCMOVEMISS ELSEPROCMISSILES:COLOUR7:PRINTTAB(0,0);"SCORE=
";SCORE
   180IFJ$="Y"THEN PROCJMOVE ELSEPROCMOVE
   190IFCITIES=0THENMODE7:PROCFAME:PROCINTRO:GOTO70
   200IFBSCORE)=1000THENPROCBONUS:MISSILES=0:GOTO140
   210GOTO170
   220DEF PROCSETUP
   230SCREEN=0:BSCORE=0
   240BONUS=0
   250SCORE=0
   260VDU23,224,255,255,255,255,255,255,255,255
   270VDU23,226,129,66,36,0,0,36,66,129
   280VDU23,225,100,101,105,110,100,255,255,255
   290CLS
   300ENDPROC
   310DEF PROCSCREEN
   320CLS:FORW%=1 TO 50:PLOT69,RND(1280),RND(1024):NEXT
   330COLOUR2
   340PRINTTAB(0,31);CHR$224;:FORA%=1TO19:PRINTCHR$224;:NEXT
   350COLOUR3
   360GCOL0,2
   370PLOT69,540,64:PLOT69,640,100:PLOT85,740,64
   380ENDPROC
   390DEF PROCJMOVE
   400VDU5
   410GCOL0,0:MOVEX,Y:PRINTCHR$226:IF(ADVAL(0) AND3)=1THENPROCFIRE
   420XX=ADVAL(1) DIV256
   430YY=ADVAL(2) DIV256
   440X=X+((XX)205)-(XX(55))*SOS
   450Y=Y+((YY(55)-(YY)205))*SOS
   460IFX)1249 X=1
   470IFX(-20 X=1248

   480IFY)1024 Y=1024
   490IFY(150 Y=150
   500GCOL0,7:MOVEX,Y:PRINTCHR$226
   510VDU4
   520ENDPROC
   530DEF PROCFIRE
   540ENVELOPE3,7,2,1,1,1,1,1,121,-10,-5,-2,120,120
   550SOUND100,3,2,255
   560GCOL0,3:MOVE650,100:DRAWX+31,Y-13:GCOL0,0:MOVE650,100:DRAWX+31,Y-13
   570X%=X+31:Y%=Y-13
   580IFMR1=1THENMX=MX1:MY=MY1:MR=MR1:GOSUB630:MR1=MR
   590IFMR2=1THENMX=MX2:MY=MY2:MR=MR2:GOSUB630:MR2=MR
   600IFMR3=1THENMX=MX3:MY=MY3:MR=MR3:GOSUB630:MR3=MR
   610IFMR4=1THENMX=MX4:MY=MY4:MR=MR4:GOSUB630:MR4=MR
   615VDU4:COLOUR7:PRINTTAB(0,0);"SCORE=";SCORE:VDU5
   620ENDPROC
   630IFMX(Y%+13 ANDMX)Y%-13 ANDMY(X%+13 ANDMY)X%-13 THENPROCEXP:SCORE=SCORE+25:M
R=0:BSCORE=BSCORE+25
   640RETURN
   650DEF PROCMISSILES
   660IFBONUS)0THENPROCCOLOURS ELSEVDU20
   670MISSILES=0:MR1=1:MR2=1:MR3=1:MR4=1
   680SOM=SOM+1:SOS=SOS+1:PROCSCREEN:PROCCITIES
   690IFSOM)31THENSOM=31:SOS=35
   700GOSUB750:MX1=MX:MY1=MY:A1=A
   710GOSUB750:MX2=MX:MY2=MY:A2=A
   720GOSUB750:MX3=MX:MY3=MY:A3=A
   730GOSUB750:MX4=MX:MY4=MY:A4=A
   740ENDPROC
   750A=RND(3)-RND(4)
   760MX=1024
   770MY=RND(1280)
   780PLOT69,MY,MX
   790MY=MY-.5
   800MISSILES=MISSILES+1
   810RETURN
   820DEF PROCMOVEMISS
   830IFMR1=1THENMX=MX1:MY=MY1:A=A1:GOSUB880:MX1=MX:MY1=MY:A1=A
   840IFMR2=1THENMX=MX2:MY=MY2:A=A2:GOSUB880:MX2=MX:MY2=MY:A2=A
   850IFMR3=1THENMX=MX3:MY=MY3:A=A3:GOSUB880:MX3=MX:MY3=MY:A3=A
   860IFMR4=1THENMX=MX4:MY=MY4:A=A4:GOSUB880:MX4=MX:MY4=MY:A4=A
   870ENDPROC
   880GCOL0,6:PLOT69,MY,MX
   890MX=MX-SOM
   900MY=MY+A*5
   910DRAWMY,MX
   920IFMY)1249THENMY=0
   930IFMY(0THENMY=1249
   940IFMX)64 ANDMX(110THEN PROCCHECK
   950IFMX(60THENMISSILES=MISSILES-1
   970GCOL0,3
   980RETURN
   990DEF PROCEXP
```


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PROGRAMS

```
 1000MR=0
 1010ENVELOPE1,130,80,-4,0,2,40,50,1,-1,1,0,1,0:ENVELOPE2,2,0,0,0,0,0,0,60,-1,-1
0,0,126,60
 1020GCOL0,1:SOUND&13,0,10,255:SOUND&110,2,7,255:SOUND&111,1,10,255:Q=1:FORB=1TO
20:PLOT69,MY-10+RND(50),MX-10+RND(50):PLOT85,MY-10+RND(50),MX-10+RND(50):GCOL0,Q
 1030IFQ=1THENQ=3ELSEQ=1
 1040NEXT
 1050MISSILES=MISSILES-1
 1060ENDPROC
 1070DEF PROCFAME
 1080CLS


 1090PRINTCHR$141;CHR$129;"  MISSILE DEFENDER HALL OF FAME     "
 1100PRINTCHR$141;CHR$129;"  MISSILE DEFENDER HALL OF FAME     "
 1110FORX=15,1
 1120IFC(1))SCORE THENGOTO1190
 1130PRINTTAB(0,10);"PLEASE ENTER YOUR NAME"
 1140INPUT,A$
 1150A%=11:REPEAT:A%=A%-1:IFSCORE)C(A%)THEN 1170
 1160UNTILA%=0
 1170D=A%:IFD)10THEND=10
 1180FOR F = 2 TO D  :C(F-1)=C(F): B$(F-1)=B$(F):NEXT:B$(D)=A$:C(D)=SCORE
 1190CLS:PRINTCHR$141;CHR$129;"  MISSILE DEFENDER HALL OF FAME     ":PRINTCHR$141
CHR$129;"  MISSILE DEFENDER HALL OF FAME     "'
 1200FORA%=10TO1STEP-1:PRINTC(A%);"....";B$(A%):PRINT:NEXT
 1210VDU23;10,32,0;0;0;
 1220BONUS=0:BSCORE=0
 1230PRINT';CHR$136;" PRESS SPACE-BAR OR FIRE TO CONTINUE";
 1240A$=INKEY$(0):IF ADVAL(0)=10R A$=" " THEN ENDPROC ELSE1240
 1250GOTO1240
 1260SCREEN=0
 1270MISSILES=0
 1280DEF PROCCITIES
 1290IFR(0)=1THENPRINTTAB(3,29);CHR$225
 1300IFR(1)=1THENPRINTTAB(6,29);CHR$225
 1310IFR(2)=1THENPRINTTAB(13,29);CHR$225
 1320IFR(3)=1THENPRINTTAB(16,29);CHR$225
 1330COLOUR3
 1340ENDPROC
 1350DEF PROCCHECK
 1360IFMY)196 ANDMY(266 ANDR(0)=1THENR(0)=0:PROCEXP:CITIES=CITIES-1:MISSILES=MIS
SILES-1
 1370IFMY)388 ANDMY(458 ANDR(1)=1THENR(1)=0:PROCEXP:CITIES=CITIES-1:MISSILES=MIS
SILES-1
 1380IFMY)834 ANDMY(904 ANDR(2)=1THENR(2)=0:PROCEXP:CITIES=CITIES-1:MISSILES=MIS
SILES-1
 1390IFMY)1027 ANDMY(1097 ANDR(3)=1THENR(3)=0:PROCEXP:CITIES=CITIES-1:MISSILES=M
ISSILES-1
 1400MR=0
 1410DEF PROCMOVE
 1420VDU5
 1430GCOL0,0:MOVEX,Y:PRINTCHR$226:IFINKEY(-99)THENPROCFIRE
 1440X=X+(INKEY(-98)-INKEY(-67))*SOS
 1450Y=Y+(INKEY(-105)-INKEY(-73))*SOS
 1460IFX)1280 X=1
 1470IFX(-20 X=1279
 1480IFY)1024 Y=1024
 1490IFY(150 Y=150
 1500GCOL0,7:MOVEX,Y:PRINTCHR$226
 1510VDU4:ENDPROC
 1520DEFPROCINTRO
 1530VDU23;10,32,0;0;0;
 1540CLS
 1550PRINTSPC(9);CHR$141;CHR$129;"MISSILE DEFENDER"
 1560PRINTSPC(9);CHR$141;CHR$129;"MISSILE DEFENDER"
 1570PRINT'';" As the defender of the last laser base on earth, your mission is
to destroy theincoming missiles before they destroy  the four cities which you
are defending."
 1580PRINT" You must destroy the missiles by aimingthe sights at the head of the
missiles  (which arrive in groups of four) and by firing your laser."
 1590PRINT'" If you are not using Joy-sticks, use  the following keys:"
 1600PRINT
 1610PRINTSPC(15);"Z - Left"
 1620PRINTSPC(15);"X - Right"
 1630PRINTSPC(15);"* - Up"
 1640PRINTSPC(15);"? - Down"


 1650PRINTSPC(11);"SPACE - Fire"
 1660PRINT';CHR$136;" PRESS SPACE-BAR OR FIRE TO CONTINUE";
 1710TIME=0:REPEATUNTILTIME)20
 1720A%=(ADVAL(0) AND3):IFA%=1THENJ$="Y":ENDPROC
 1730S$=INKEY$(0):IFS$()" "THEN1720
 1740J$="N":ENDPROC
 1750MODE7:PRINT''''':VDU23;11,32;0;0;0;:PRINTSPC(7);CHR$141;CHR$129;"THERE IS N
O ESCAPE!":PRINTSPC(7);CHR$141;CHR$129;"THERE IS NO ESCAPE!":TIME=0:REPEATUNTILT
IME)250:RETURN
 1760DEF PROCBONUS
 1770*FX21,5
 1780FORA%=0TO200 STEP5:SOUND1,-10,A%,3:VDU19,6,5,0,0,0:VDU19,2,4,0,0,0:VDU19,3,
1,0,0,0:SOUND1,-10,220-A%,3:VDU20:NEXT
 1790IFBONUS)0THENBONUS=0 ELSEBONUS=1
 1800PRINT''''
 1810CLS:PRINT''''':FORA%=1TOCITIES:PRINTCHR$225;" ";:NEXT
 1820PRINT"X 100 =";CITIES*100:SCORE=SCORE+CITIES*100:BSCORE=CITIES*100:CITIES=4
 1830TIME=0:REPEATUNTILTIME=250
 1840FORA%=0TO3:R(A%)=1:NEXT
 1850ENDPROC
 1860DEFPROCCOLOURS
 1870VDU19,6,5,0,0,0
 1880VDU19,2,4,0,0,0
 1890VDU19,3,1,0,0,0
 1900ENDPROC
```



Atari Pseudo-DOS
by Michael Jackson

Atari 'Pseudo-DOS' is an extremely useful utility for Atari programmers.

One of the problems with Atari Basic is that it doesn't support much in the way of operating system commands: it's often necessary to repeatedly exit to DOS when developing a program to perform disk-based functions. 'Pseudo-DOS' gets around the problem by providing a selection of DOS commands which are accessible from Basic.

As well as supporting standard Atari DOS commands in a more-or-less standard format, the author has added three extra commands of his own —

two of them useful, the third one downright dangerous!

To use 'Pseudo-DOS', enter the program and save it to disk as a Basic program. Then, next time you enter Basic to work on a program, load 'Pseudo-DOS' first. It simply sits at line 30000 onwards as a routine on the end of your own program. When you save your program, 'Pseudo-DOS' will be saved too. Obviously, your own program must not overwrite it so you must avoid those line numbers.

The standard DOS features available are:

Disk directory: as Atari DOS.
Warm-start: performs a system reset.
Rename: as Atari DOS.
Delete: simply enter the filename — 'D1:' is not necessary.
Format: a very useful feature if you get yourself into the awkward position of not having a formatted disk to save a program in memory while in Basic! A silly position to be in, but it happens to be the best!
Lock: simply enter the filename to lock.
Unlock: as lock.

In addition, there are three extra commands: create autorun programs, rename select and inhibit/enable verify.

Create autorun programs allows you to set a program to automatically run when loaded, which is useful for creating user-friendly packages. To implement it, you must save the file using the SAVE "D:" format. In order to save space, you are restricted to a five-letter filename without an extension, but this can be changed if you can spare the extra memory.

Rename select is another command designed to get you out of trouble. Hands up everyone who has ever overwritten a file by renaming another file to a filename which already exists? The old file is not actually overwritten, you just can't get it back without being an expert on Atari DOS. With rename select activated, one of the identically-named files can be renamed without affecting the other. The ordinary Atari DOS rename, of course, renames both.

Finally, we come to inhibit/enable verify. I'm only mentioning this to warn you against using it! It allows the automatic verify-save routine to be switched off. While this does, as the author points out, halve the time taken to save a file, you then have no way of telling whether the save was correctly executed! When you come back to load the file, it may very well not be there. Please, don't use it — and definitely don't come complaining to me if you do!

The program uses approximately 2.5k but can be reduced by omitting the create autorun option. To call the 'Pseudo-DOS', GOTO 30000 in direct mode.

```
30000 GRAPHICS 0:CLR :DIM DU$(20),DOS
$(20)
30004 REM ********** PRINT OPTIONS
30005 ? "A":? "PSEUDO DOS - BY MICHAEL
 JACKSON 1983":?
30010 ? "A.DISK DIRECTORY     G.UNLOCK
FILE":? "B.WARMSTART RESET    H.CREATE
AUTORUN"
30020 ? "C.RENAME FILE        I.INHIBIT
 VERIFY":? "D.DELETE FILE      J.ENAB
LE VERIFY":? "E.FORMAT DISK";
30025 ? "              K.RENAME SELECT":? "F.
LOCK FILE"
30030 TRAP 30030:CLOSE #4:? :? "SELECT
 ITEM OR RETURN FOR MENU":DU$="D:"
30040 ? :INPUT DOS$:IF DOS$="" THEN 30
005
30049 REM ********** SCAN CHOICE
30050 FOR I=65 TO 75:X=I-35:IF I=69 TH
EN X=I+185
30060 IF ASC(DOS$)=I THEN GOTO (30000+
(I*2))
30070 NEXT I
30075 ? "NO SUCH ITEM":GOTO 30030

30130 OPEN #4,6,0,"D:*.*"
30131 INPUT #4,DOS$:? DOS$:GOTO 30131
30132 POKE 580,0:Z=USR(0484)
30134 ? "OLD NAME,NEW NAME":GOTO 30200

30136 ? "DELETE FILESPEC ";:GOTO 30200

30138 ? "SURE YOU WANT TO FORMAT(Y/N)"
;:INPUT DOS$:IF DOS$="N" THEN 30030
30139 GOTO 30300
30140 ? "LOCK FILESPEC ";:GOTO 30200
30142 ? "UNLOCK FILESPEC ";:GOTO 30200

30144 GOTO 30400
30146 ? "VERIFY PROCESS INHIBITED":POK
E 1913,80:GOTO 30030
30148 ? "VERIFY PROCESS ENABLED":POKE
1913,82:GOTO 30030
30150 ? "RENAME SELECT (Y/N)";:INPUT D
OS$:IF DOS$="N" THEN POKE 3118,184:? "
RENAME SELECT DISABLED":GOTO 30030
30151 POKE 3118,0:? "RENAME SELECT ENA
BLED":DU$="D:":X=32:GOTO 30134
30199 REM ********** INPUT FILESPEC

30200 INPUT DOS$:DU$(LEN(DU$)+1)=DOS
$:XIO X,#1,0,0,DU$:GOTO 30030
30299 REM ********** I/O ROUTINE
30300 XIO X,#1,0,0,"D:":GOTO 30030
30399 REM ********** AUTORUN.SYS ROUTINE

30400 CLR :DIM NAME$(12),CHOICE$(1),SY
S$(159)
30420 ? "AUTORUN FILESPEC ";:INPUT NAM
E$:IF LEN(NAME$)>5 THEN ? "LESS THAN 6
 CHARACTERS PLEASE":GOTO 30420
30450 NAME$(LEN(NAME$)+1)=CHR$(34)
30460 ? "COLD START RESET(Y/N)";:INPUT
 CHOICE$:IF CHOICE$="N" THEN RESET=48
30480 IF CHOICE$="Y" THEN RESET=49
30490 ? :? "PLEASE WAIT ...."
30500 FOR I=1 TO 159:READ A:SYS$(LEN(S
YS$)+1)=CHR$(A):NEXT I
30510 FOR I=LEN(NAME$) TO 1 STEP -1
30520 SYS$(136-I,136-I)=NAME$(I,I)
30530 NEXT I
30540 SYS$(143,143)=CHR$(RESET)
30550 ? "Insert disk and hit any key."
:POKE 764,255

30560 IF PEEK(764)=255 THEN 30560
30570 POKE 764,255
30580 OPEN #2,8,0,"D:AUTORUN.SYS"
30590 FOR I=1 TO LEN(SYS$):A=ASC(SYS$(
I,I)):PUT #2,A:NEXT I
30600 CLOSE #2
30610 ? "YOUR AUTORUN.SYS FOR ";NAME$;
" IS CREATED":CLR :POKE 764,255:GOTO 3
0000
30640 DATA 255,255,0,6,144,6,162,0,189
,26,3,201,69,240,5,232,232,232,208
30650 DATA 244,232,142,105,6,189,26,3,
133,205,169,107,157,26,3,232,189,26,3
30660 DATA 133,206,169,6,157,26,3,160,
0,162,16,177,205,153,107,6,200,202,208

30670 DATA 247,169,67,141,111,6,169,6,
141,112,6,169,21,141,106,6,96,172,106
30680 DATA 6,240,9,185,123,6,206,106,6
,160,1,96,138,72,174,105,6,165,205
30690 DATA 157,26,3,232,165,206,157,26
,3,104,170,169,155,160,1,96,0,0,0
30700 DATA 0,0,0,0,0,0,0,0,0,0,0,76,0,
0,0,32,32,32

30710 DATA 32,32,58,68,34,78,85,82,58,
49,44,48,56,53,69,75,79,80,255
30720 DATA 255,226,2,227,2,0,6
```


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MATRIX TRANSFORMATION

by T Scott

'Matrix transformation' is an educational program for the BBC model B running OS 1.2.

The program illustrates the way in which matrix multiplications are performed. The user enters a matrix and the coordinates of an object, and the computer calculates the resultant image. The object and/or image can then be plotted on the screen.

The scale can be changed to allow for different-sized images and the program is menu-driven. As an educational tool, it works alongside traditional teaching methods: the program helping the user to understand the way in which the theory applies in practice.

```
 10 *KEY 10 OLD▒RUN▒M
 20 REM ***************************
 30 REM * MATRIX TRANSFORMATIONS *
 40 REM *           BY            *
 50 REM *         T.SCOTT         *
 60 REM ***************************
 70 CLEAR:GOSUB 1810
 80 MODE 1
 90 REM **Define Characters**
100 VDU 23,250,4,8,8,16,16,32,32,32
110 VDU 23,251,32,32,16,16,8,8,4,0
120 VDU 23,252,32,16,16,8,8,4,4,4
130 VDU 23,253,4,4,8,8,16,16,32,0
140 VDU 23,254,0,0,0,0,0,0,255,0
150 VDU 23,255,255,0,0,0,0,0,0,0
160 VDU 23;8202;0;0;0;
170 REM **Setup Variables**
180 DIM A(2,2),B(2,5),C(2,5)
190 A(1,1)=1:A(2,2)=1
200 B(1,2)=1:B(1,3)=1:B(2,3)=1:B(2,4)=1
210 N=4:S=40:E=0
220 PROCinitscale
230 MOVE 0,127:DRAW 1279,127
240 MOVE 896,127:DRAW 896,1023
250 PROCaxis
260 PROCcommands
270 PROCbrackets
280 GCOL 0,3
290 COLOUR 3
300 IF E=41 THEN E=DD:GOTO 330
310 PROCcalculate
320 PROCquestion("Command?")
330 IF E=1 THEN PROCinput(1,2)
340 IF E=2 THEN GOSUB 420
350 IF E=3 THEN PROCplot(1)
360 IF E=4 THEN PROCplot(2)
370 IF E=5 THEN PROCplot(1):PROCplot(2)
380 IF E=6 THEN PROCscale:PROCaxis
390 IF E=7 THEN RUN
400 IF E=8 THEN VDU 26:END
410 GOTO 280
420 PROCquestion("Columns?")
430 IF E>5 THEN GOTO 420
440 N=E:E=0
450 PRINTTAB(8,29);SPC(32);
460 PRINTTAB(8,30);SPC(32);
470 PRINTTAB(8,31);SPC(30);
480 PRINTTAB(7+N*3,29);CHR$(252);CHR$(254);CHR$(250);SPC(N*3-1);CHR$(252);
490 PRINTTAB(7+N*3,30);CHR$(253);CHR$(255);CHR$(251);SPC(N*3-1);CHR$(253);
500 PRINTTAB((7+N*1.5),31);"B";TAB(7+N*3,31);" = ";TAB(10+N*4.5,31);"C";
510 PROCinput(8,N)
520 RETURN
530 REM **Plot Axis**
540 DEFPROCaxis
550 COLOUR 2
560 PRINT TAB(3,0);"Matrix Transformations"
570 VDU 24,0;132;892;1023;
580 GCOL 0,1
590 FOR D=0 TO 800 STEP 40
600 IF D=400 THEN F=5 ELSE F=21
610 MOVE D+48,176:PLOT F,D+48,976
620 MOVE 48,D+176:PLOT F,848,D+176
630 NEXT D
640 VDU 29,448;576;
650 ENDPROC
660 REM **Print Commands**
670 DEFPROCcommands
680 COLOUR 2
690 PRINTTAB(31,1);"COMMANDS"
700 PRINTTAB(31,2);"________"
710 PRINTTAB(29,5);"1. INPUT A"
720 PRINTTAB(29,7);"2. INPUT B"
730 PRINTTAB(29,9);"3. PLOT B"
740 PRINTTAB(29,11);"4. PLOT C"
750 PRINTTAB(29,13);"5. PLOT B&C"
760 PRINTTAB(29,15);"6. SCALE"
770 PRINTTAB(29,17);"7. RESTART"
780 PRINTTAB(29,19);"8. END"
790 COLOUR 3
800 ENDPROC
810 REM **Print Initial Brackets**
```

PROGRAMS

```
  820 DEFPROCbrackets
  830 PRINTTAB(0,29);CHR$(250);"+1 +0";CHR$(251);CHR$(250);"+0 +1 +1 +0";CHR$(25
1);CHR$(254);CHR$(250);"            ";CHR$(251);
  840 PRINTTAB(0,30);CHR$(252);"+0 +1";CHR$(253);CHR$(252);"+0 +0 +1 +1";CHR$(25
3);CHR$(255);CHR$(252);"            ";CHR$(253);
  850 PRINTTAB(0,31);"   A   *     B      =      C";
  860 ENDPROC
  870 REM **Ask Questions**
  880 DEFPROCquestion(H$)
  890 PRINTTAB(29,22);H$
  900 E=GET-48
  910 PRINTTAB(29,22);SPC(11);
  920 ENDPROC
  930 REM **Input Matrices**
  940 DEFPROCinput(Z,L)
  950 X=0
  960 FOR W=0 TO L-1
  970 FOR Y=1 TO 2
  980 A$=""
  990 COLOUR 2
 1000 PRINTTAB(Z+W*3,28+Y);"??";
 1010 COLOUR 3
 1020 A=GET
 1030 IF A=45 THEN A$="-"
 1040 IF A=43 OR A$="" THEN A$="+"
 1050 IF A>47 AND A<58 THEN A$=A$+CHR$(A)
 1060 PRINTTAB(Z+W*3,28+Y);A$
 1070 IF LEN(A$)<2 THEN GOTO 1020
 1080 IF Z=1 THEN A(Y,W+1)=VAL(A$) ELSE B(Y,W+1)=VAL(A$)
 1090 NEXT Y,W
 1100 ENDPROC
 1110 REM **Calculate Matrix C**
 1120 DEFPROCcalculate
 1130 FOR V=1 TO N*3-1
 1140 PRINTTAB(9+N*3+V,29);" ";
 1150 PRINTTAB(9+N*3+V,30);" ";
 1160 NEXT V
 1170 FOR X=1 TO N
 1180 C(1,X)=A(1,1)*B(1,X)+A(1,2)*B(2,X)
 1190 C(2,X)=A(2,1)*B(1,X)+A(2,2)*B(2,X)
 1200 L=LEN(STR$(C(1,X)))
 1210 M=LEN(STR$(C(2,X)))
 1220 PRINTTAB(9+3*(N+X)-L,29);C(1,X);
 1230 PRINTTAB(9+3*(N+X)-M,30);C(2,X);
 1240 NEXT X
 1250 ENDPROC
 1260 REM **Plot Matrices**
 1270 DEFPROCplot(P)
 1280 W=1:H=0
 1290 GCOL 0,(4-P)
 1300 IF P=1 THEN MOVE B(1,1)*S,B(2,1)*S ELSE MOVE C(1,1)*S,C(2,1)*S
 1310 PROCtest
 1320 FOR W=2 TO N
 1330 IF P=1 THEN DRAW B(1,W)*S,B(2,W)*S ELSE DRAW C(1,W)*S,C(2,W)*S
 1340 PROCtest
 1350 NEXT W
 1360 IF P=1 THEN DRAW B(1,1)*S,B(2,1)*S ELSE DRAW C(1,1)*S,C(2,1)*S
 1370 IF H>400/S THEN PROCrescale
 1380 ENDPROC
 1390 REM **Change Scale**
 1400 DEFPROCscale
 1410 PRINTTAB(29,24);"Input scale"
 1420 PRINTTAB(29,25);"from 1to100"
 1430 PRINTTAB(29,26);"e.g.SCALE=6"
 1440 PRINTTAB(29,27);"AXES=-6to6."
 1450 INPUT TAB(29,22)"Scale",S
 1460 S=INT(S)
 1470 PRINTTAB(29,22);SPC(11);
 1480 IF S<1 OR S>100 THEN GOTO 1450 ELSE S=400/S
 1490 DEFPROCinitscale
 1500 PRINTTAB(29,24);SPC(11);
 1510 PRINTTAB(29,25);SPC(11);
 1520 PRINTTAB(29,26);SPC(11);
 1530 PRINTTAB(29,27);SPC(11);
 1540 CLG
 1550 PRINTTAB(5,27);"Scale: ";-400/S;" to ";400/S
 1560 VDU 29,0;0;
 1570 IF E=41 THEN PROCaxis
 1580 ENDPROC
 1590 REM **Warning For Point Off Axis**
 1600 DEFPROCrescale
 1610 PRINTTAB(29,24);"WARNING:-"
 1620 PRINTTAB(29,26);"Points off";
 1630 PRINTTAB(29,27);"scale.";
 1640 DD=E
 1650 PROCquestion("Rescale?")
 1660 IF E=41 THEN GOTO 1720
 1670 IF E<>30 THEN GOTO 1650
 1680 PRINTTAB(29,24);SPC(11);
 1690 PRINTTAB(29,26);SPC(11);
 1700 PRINTTAB(29,27);SPC(11);
 1710 ENDPROC
 1720 S=400/(INT(H/10+1)*10)
 1730 GOTO 1500
 1740 REM **Test For Highest Point**
 1750 DEFPROCtest
 1760 IF P=1 AND ABS(B(1,W))>H THEN H=ABS(B(1,W))
 1770 IF P=2 AND ABS(C(1,W))>H THEN H=ABS(C(1,W))
 1780 IF P=1 AND ABS(B(2,W))>H THEN H=ABS(B(2,W))
 1790 IF P=2 AND ABS(C(2,W))>H THEN H=ABS(C(2,W))
 1800 ENDPROC
 1810 REM **Information**
 1820 ON ERROR GOTO 70
 1830 MODE 7
 1840 PRINTTAB(7,0);CHR$(141);CHR$(131);"MATRIX TRANSFORMATIONS"
 1850 PRINTTAB(7,1);CHR$(141);CHR$(131);"MATRIX TRANSFORMATIONS"
 1860 PRINTTAB(0,2);"This program is designed to demonstrate the use of simple m
atrix tranformations.The commands are fairly simple but it isuseful to have some
 understanding of    matices."
 1870 PRINTTAB(0,8);"INPUT     This allows the user to type in          a tranform
ation matrix (A) or           an object matrix (B). If the             object mat
rix is selected to be         entered then the computer asks           for the";
 1880 PRINT" number of columns or            points contained in the matrix.
      The maximum number of columns          allowed is five."
 1890 PRINTTAB(0,18);"PLOT      This is used to plot either one          of or bot
h the object matrix           (B) and the image matrix (C).            If any po
ints fall outside the         screen the computer will ask if";
 1900 PRINT"          rescaling is required."
 1910 PRINTTAB(11,24);CHR$(134);"<Press any key>";
 1920 Q=GET
 1930 CLS
 1940 PRINTTAB(0,0);"SCALE     The scale used can be changed            to suit th
e size of matrices            which need to be plotted."
 1950 PRINTTAB(0,4);"RESTART   This resets the program and              runs it fr
om the beginning."
 1960 PRINTTAB(0,7);"END       This exits from the program."
 1970 PRINTTAB(11,10);CHR$(134);"<Press any key>"
 1980 Q=GET
 1990 RETURN
```


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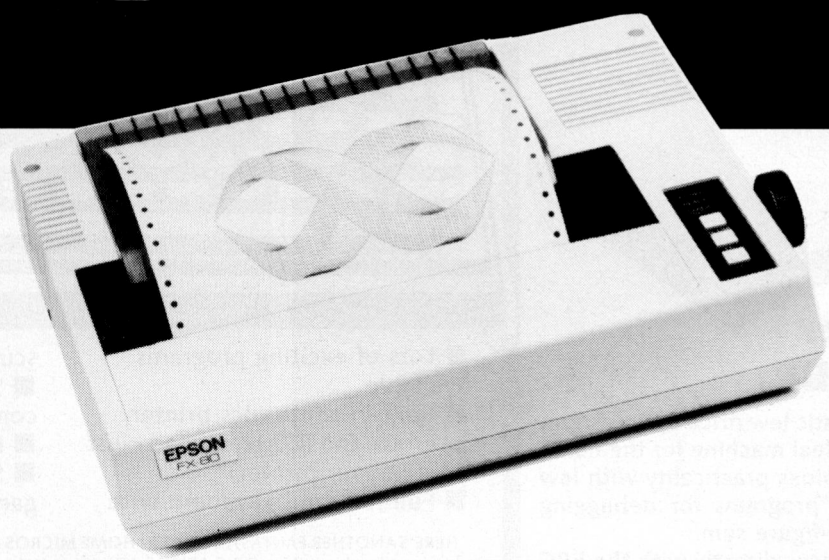

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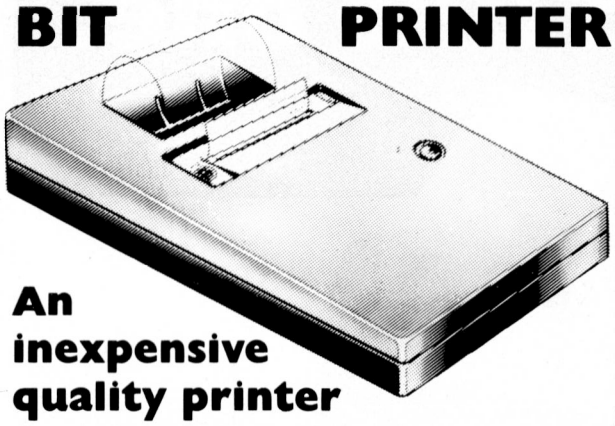

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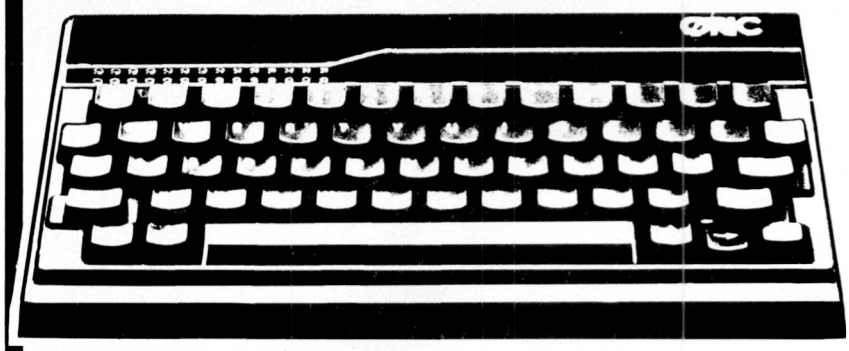

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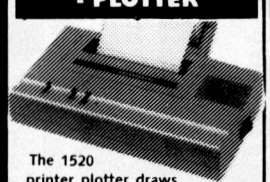

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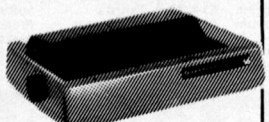

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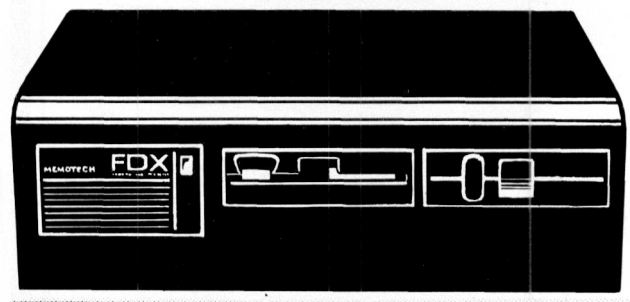

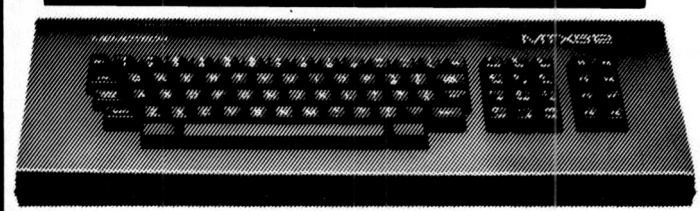

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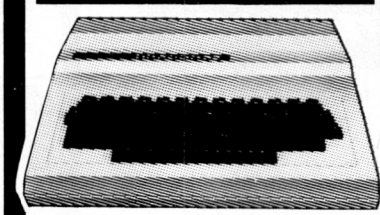

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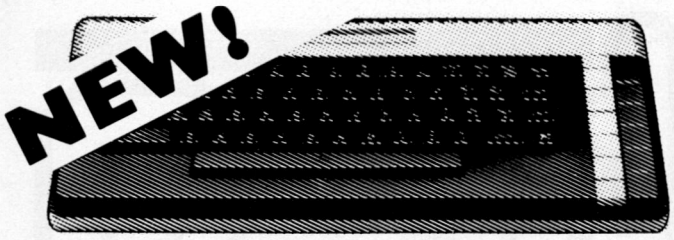

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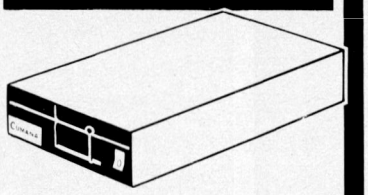

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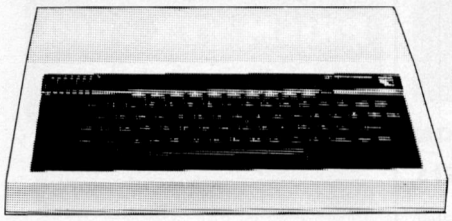

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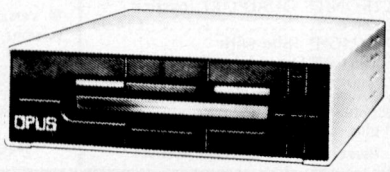

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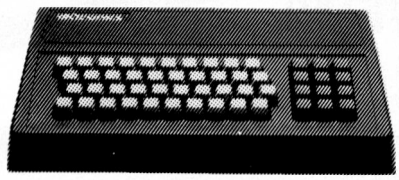

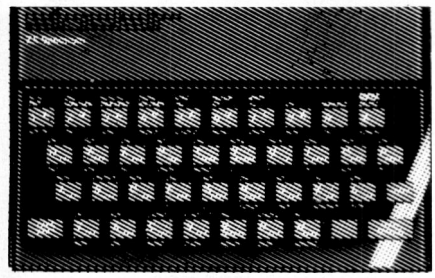

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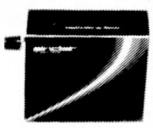
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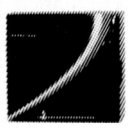
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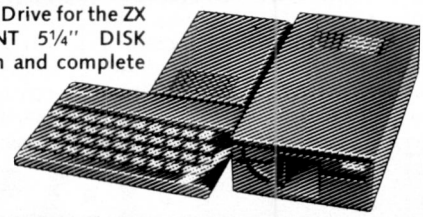

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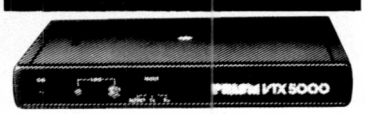

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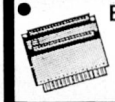

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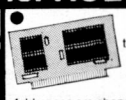

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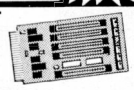

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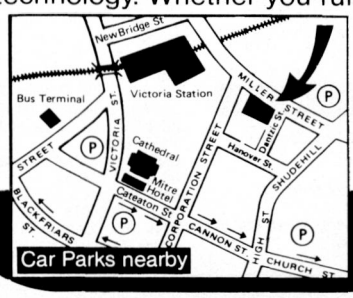

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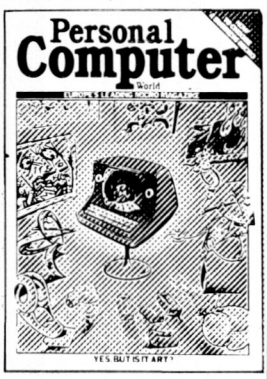

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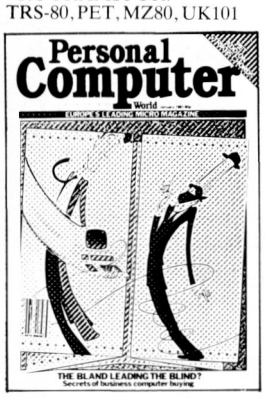

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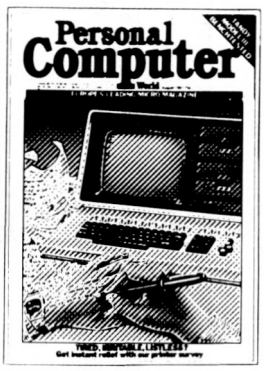

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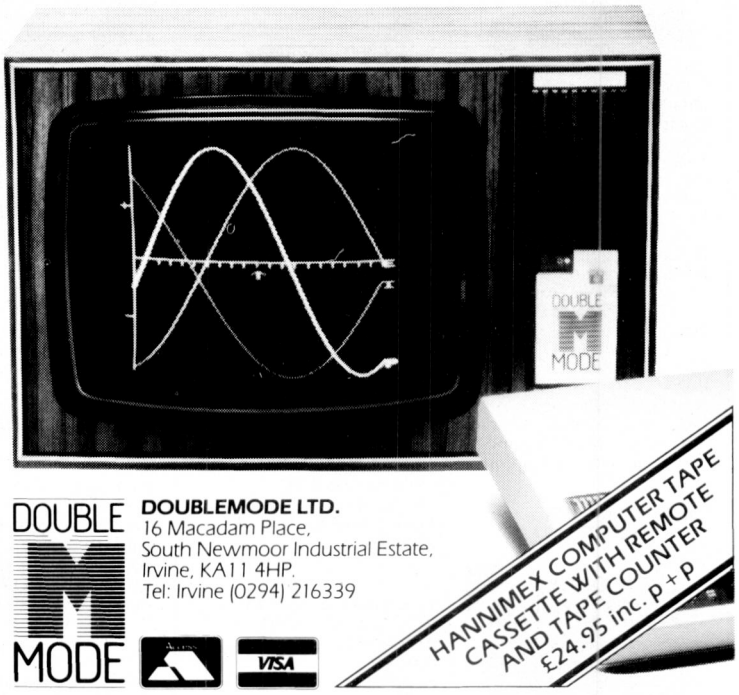

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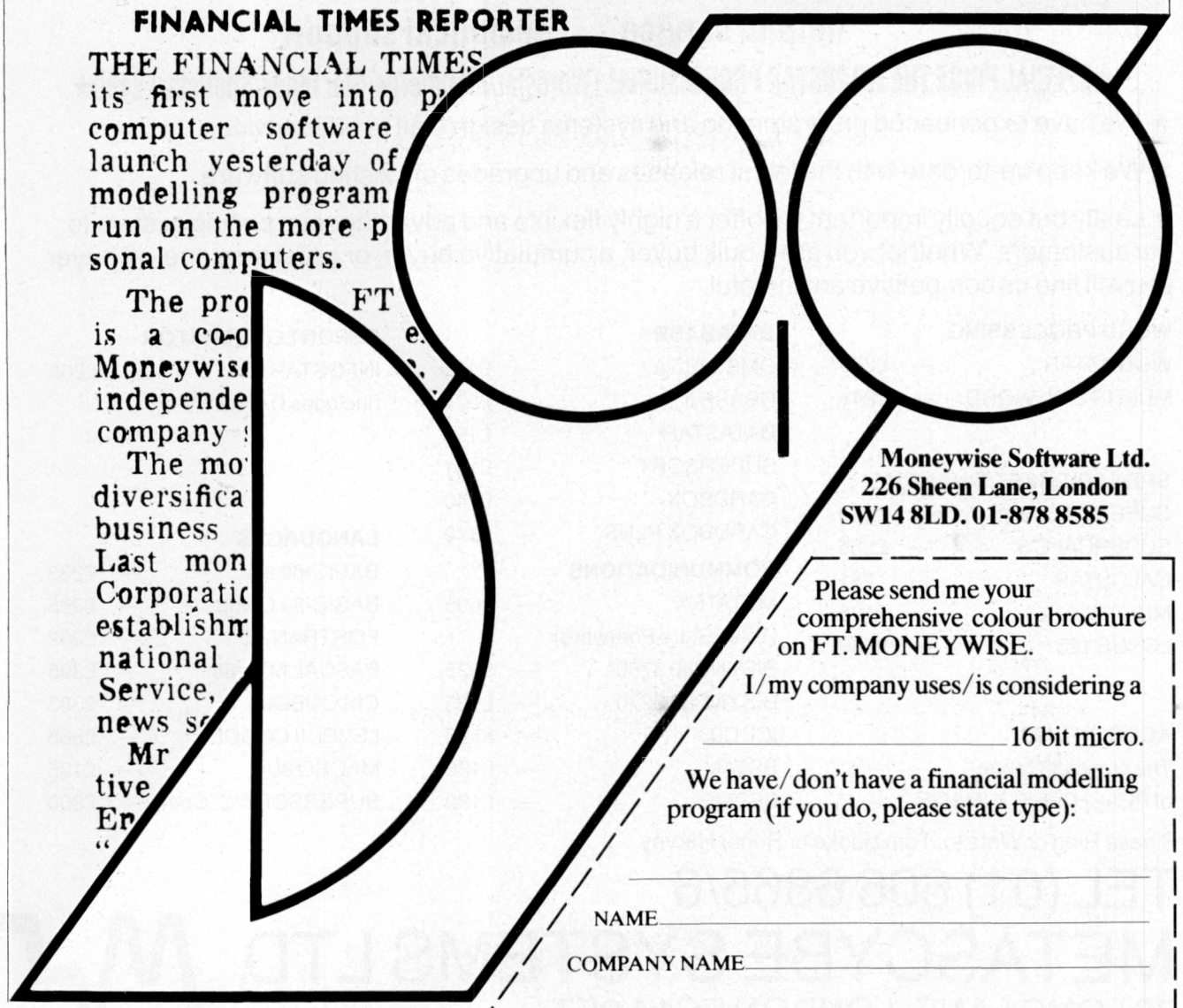

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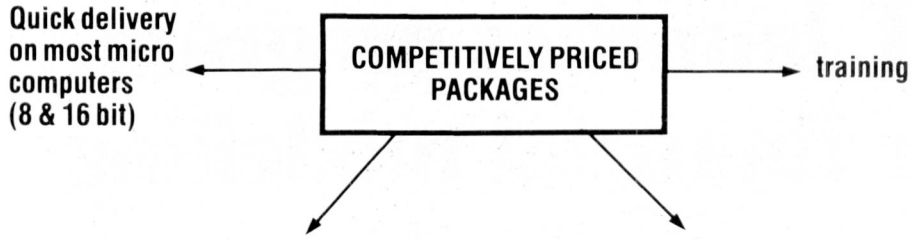

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We can make any cable to your specifications. Our "Cables Unlimited" staff will cut and solder to sort out your cable problem - fast!

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Pete & Pam distribute a wide range of computer software to discerning computer dealers throughout the world.

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As part of a Pan-European incentive scheme, Apple are offering very substantial discounts to educational users of all Apple equipment except Apple IIe bundles, Lisa, and Apple 32. The offer starts in January and ends 31st March, 1984.

PLEASE CONTACT US NOW FOR DETAILS – DISCOUNTS UP TO 40% ARE AVAILABLE! – MAKING THE APPLE IIe EVEN GREATER VALUE FOR MONEY!



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The crosstalk 16 XVI communications package can emulate many other terminals. It can capture data and transfer data files with error checking.

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Pete & Pam distribute EPSON, OKI, and other fine printers to computer dealers throughout the country. If you're a computer dealer and haven't yet discovered the advantages in buying from Pete & Pam, give our sales staff a call NOW. We pride ourselves on excellent prices, fast delivery, top class technical support and service facilities. You've nothing to lose and a lot to gain.

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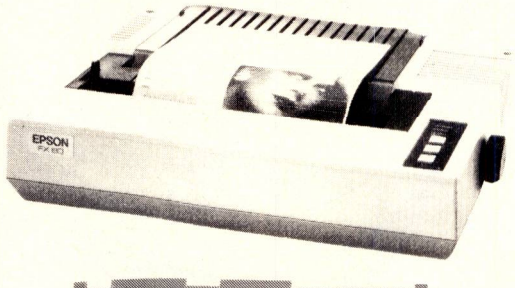
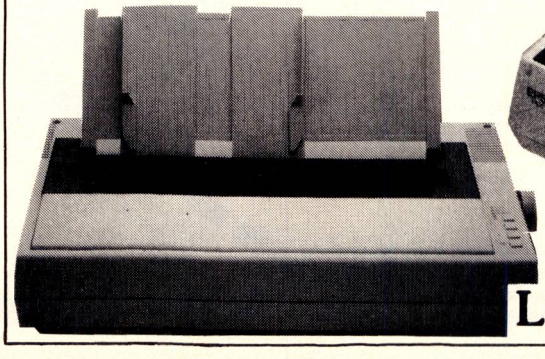


RX-80





LQ-1500

ɔmputers

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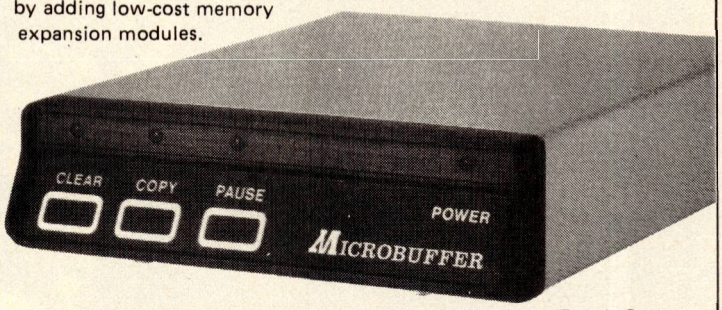
FOR ALL OTHER COMPUTER/PRINTER OR COMPUTER/MODEM COMBINATIONS

The Microbuffer In-line is a stand-alone printer buffer with a minimum of 32K. It is easily upgraded to 64K with four user-installed RAM chips. It can be further user-upgraded, 64K at a time, to up to 256K by adding low-cost memory expansion modules.



Microbuffer In-line features a front panel with three Touch Sensor controls; one to clear the buffer, one to perform complete self-test, and a copy botton to reproduce the last document up to 256 times without any computer intervention. (When a document takes several hours to prepare and a copy machine isn't available, this feature can save a great deal of time.)

Both the parallel and the serial versions can be used with virtually any computer (including TRS-80, Atari, IBM, Apple, Osborne, NEC, etc.) and any printer (including Epson, Centronics, NEC, C.Itoh, IDS, Anadex, Qume, Diablo, TI-810, etc.).

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32K Parallel In-line £199 + VAT **32K Serial In-line £199 + VAT**
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64K additional add-on (max 256K in total £116 + VAT
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8K Wizard Parallel (upgradable to 64K) £109 + VAT

APPLE INTERNAL BUFFERS

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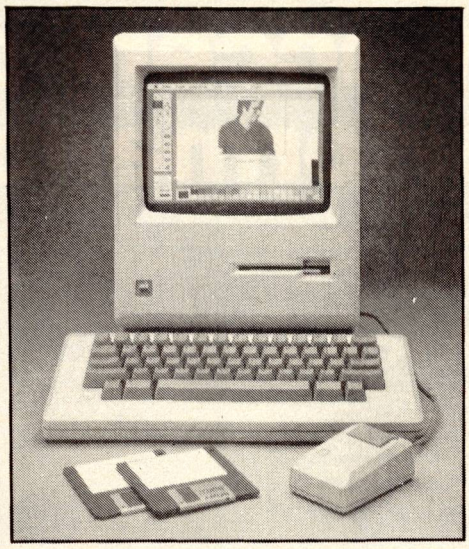
16K Microbuffer II Serial £139 + VAT
16K Gram Serial/Parallel £129.95 + VAT
64K Gram Serial/Parallel £218 + VAT

The Apple Macintosh



Peter Fisher of Pete & Pam says "I've been using a Macintosh for a couple of weeks now. The machine is excellent. It's fast, using a 32/16 bit 68000 processor, and has many superb features, employing software techniques that are years ahead of competitors. The mouse pointer and "pull-down" menus make the machine one of the easiest to learn I have come across. I recommend that every potential purchaser of a micro computer for personal/business/office use see the MACINTOSH before making a decision. Ask for a copy of a 10 page review now.



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Now you can print all the columns of your spreadsheet, all at one time, all on one continuous page. Sideways, the ingeniously simple software program, causes your hard copy to print out – you guessed it – sideways. So your spreadsheet columns need never fall off the edge of your printer paper again.

System requirements:
IBM Personal Computer. – Parallel/Serial printer interface. – One of these graphics printers: –Epson MX-80/100, FX-80/100. – IBM Graphics Printer. Okidata Microline series. – C.Itoh Prowriter. – IDS Prism, 460 or 560.

Compatibility:
SIDEWAYS is compatible with spreadsheet programs such as Lotus 1-2-3, VisiCalc, Multiplan, and Supercalc, as well as most word processors.

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A new accent on PC performance

These instantly installed plug-in expansion boards offer major functionality enhancement for the IBM PC and other micros. They come with full software support on floppy disk.

FORTE MODEL PC 78

Gives your PC direct access to your mainframe (IBM 43xx through 30xx). A single plug-in board connects to your IBM 3274/3276 Cluster Controller via existing coaxial cable. No extra phone lines, modems or peripherals.

- ☐ Entire functionality on floppy disk, no PROM changes.
- ☐ Parity check memory on display RAM.
- ☐ Complete configuration from keyboard.
- ☐ Re-configures colour attributes to taste.
- ☐ Choice of Basic or C, with broad sub-routine library.
- ☐ Serial interface.
- ☐ User-friendly, high-speed file transfer.

PARADISE MULTI-DISPLAY BOARD

Saves a slot in the PC. Colour display controller, monochrome display controller and printer interface all on one plug-in board.

- ☐ Compatible with PC/XT and all the best productivity software.
- ☐ High-resolution colour graphics, fully IBM compatible.
- ☐ 2 pages of high-resolution graphics, facilitating animation or high demand graphics operation.
- ☐ Flicker-free scrolling, even in colour.
- ☐ External switch or software control for monochrome or colour mode.
- ☐ IBM character sets and test modes.
- ☐ Compatible with widest range of RGB and composite video monitors.
- ☐ IBM type printer port.
- ☐ IBM-compatible light pen and RF modulator ports.

VLSI 1553-NET

The ultimate in user-friendly Local Area Networks (LAN's) – very low cost, very high speed, plus reliability that approaches a $1.0E^{-17}$ bit error rate.

- ☐ Connects IBM PC, Apple II/IIE and any S100 bus micro.
- ☐ 3 megabit/sec transmission rate, operating at around 15% utilization and giving a throughput which approximates to that of current 10 megabit bandwidth LAN's.
- ☐ Superior error checking, collision detection and collision avoidance.
- ☐ Lives entirely within constraints of host operating system, preserving upward compatibility; e.g. the interface to the IBM PC is at the ROM BIOS level.
- ☐ Simple coax connection.
- ☐ Up to 4000 feet, without the use of repeaters.
- ☐ Protocol entirely contained in software, permitting various implementations of LAN protocols.
- ☐ Variable blocks sizes supported, from 20 bits to over 64K bytes.

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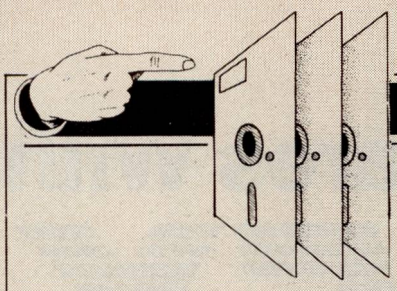

PACKAGES

PCW's 'Packages' section is produced bi-monthly, alternating with our 'In Store' hardware guide. We have confined coverage to business packages which are available and supported at national level and which have been in use for at least six months in a minimum of five sites. Producers of packages which fall within these constraints should send for details or updates to: ***Tracy Dear, PCW, 62 Oxford Street, London W1.***

The layout has been designed to allow you to discover which packages are available for the application you have in mind and to show you which packages are available for your computer if you already have a machine. In either case the code enables you to look up the supplier's name and telephone number in the table below.
All details published are the latest made available — some may have changed since this issue went to press.

Code	Company	Telephone
A1	ACT	021-454 8585
A2	Arbel Ltd	0603 39381
A3	ADP Network services	01 388 1912
A4	Alamo Comp. Serv.	0642-310381
A5	Anthony Ashpitel	0379 852807
A6	Attar Computers	0942 608844
A7	Aurora Software	0532 589980
A8	**Abtex Computer Systems**	**0224 647074**
B1	Bromley Computer Consultancy	01 697 8933
B2	Bonsai Ltd	01 580 0902
B3	Benchmark Computer Systems	0272 735022
B4	Bristol Software Factory	0272 735022
B5	Byte Soft Systems Ltd	0480 215005
B6	Business and Administration Systems	01 953 7303
C1	CAP-CPP Products Ltd.	01-404 0911
C2	Commodore	0753 79292
C3	Comp Prog & Systems Serv	0942-38831
C4	Comput-a-crop	0507-604271
C5	Computastore Ltd.	061-832-4761
C6	Computech	01-794 0202
C7	Compass	Standish 426252
C8	CWP Computers	01-828 3127
C9	Criterion	0493 53956
C10	Caxton Software	01-379 6502
C11	Claremont Controls Ltd	06699 21081
D1	Dataview Ltd	0206 869414
E1	ESDU International Ltd	01 437 4894
G1	Graffcom Systems Ltd.	01-727 5561
G2	Grama (Winter) Ltd.	01-636 8210
G3	Great Northern	0532 589980
G4	Gecas Micros	01-629 3758
G5	Grade One	Glossop 63819
G6	Graham Dolan Software Ltd	0734 664343
H1	Holland Automation	06286 63695
H2	Hevacomp Ltd	0742 661003
H3	H.B. Computers	0536 83922
H4	Wordcraft Systems	0332 683892
H5	HotelMicrosystems Ltd	01-328 8737
I1	Intereurope Software Design	0734 786644
I2	Intex Datalog Ltd	0642 781193
I3	Ismail Computing Services	01-802 0019
I4	IBIS Business Information Systems	0244 317527
J1	T.V. Johnson	0276 20446
K1	Keen Computers	0602 412777
L1	Lifeboat Associates	01-836 9028
L2	EMG	01-688 0088
L3	Ludhouse (Computing) Ltd.	01-749 3834
L4	Logic Comp Systems	01-222-1122
L5	Logic Plus	0582 594539
M1	Micro Computer Applications Ltd.	0258 55100
M2	Microteck.	01-300 3075
M3	Microsys Ltd	051 426 7271
M4	Micropro International	01-499 5777
M5	M.A.P. Comp Systems	061-624-5662
M6	Mercator	0272 731079
M7	Micros For The Movement	01-387 6192
M8	MMG Consultants	06845 63555
M9	Mediatech	01-903 4372
M10	ME-TEC Computer Services	0603 070620
M11	Molimerx Ltd	0424 220391
M12	Mountain Software Services	0276 72772
M13	Micro Planning Services	0272 684530
O1	Omicron Design	0784 31809
O2	Open Computer Services	0273 671666
P1	Padmede Computer Services	02514 21892
P2	Personal Computers Ltd.	01-377 1200
P3	Professional Computer Services	061 624 4065
P4	Prestige Computers	021 561 2001
P5	Precision Software	01-330 7166
R1	Rockliff	051-521 5830
S1	SMG Micro Computers	0474 55813
S2	The Softwarehouse	01-637 2108
S3	Sosoft Ltd	0202 735656
S4	Systematics International	0440 61121
S5	Sumlock Bondain	01-250 0505
S6	Stemmos	01 602 6242
S7	Software Aids Int	01-904 8139
S8	SD Micros	01 836 9520
S9	Southdata Ltd	01-994 6477
S11	Saphire Systems Ltd	01-554 0582
T1	Tridata Micros Ltd.	021 622 6085
T2	Templeman Software	0789 66237
T3	The Micro Solution	0608 3256
T4	Tip Data Ltd	0375 33910
T5	TABS Ltd	0264 64166
U1	Unique Computer Application Ltd	05827 66551
V1	Vlasak Electronics Ltd.	0494-448633
V2	Vauntberry Ltd	0329 235846
W1	Wisbech Computer Services	0945 64146
W2	Westfarthing Comp Services	03265-4098
W4	Walton Microcomputer Ltd	Camberly 28366
X1	Xetal	061 678 0234
X2	Xitan Systems Ltd	0703 334711

Application/Machine	Price	Code
Analysis ledger		
Philips P2000	£100	P4
Appointments planner		
Act Sirius 1	£115	C7
Apple II	£300	A6
Challenger	£25	C7
CP/M	POR	G4
Arable recording & costing		
CP/M	£1500	C4
Architects package		
CP/M	£750	M6
Assembler dev		
PET/CBM	£50	L2
Auction package		
CP/M	£700	M6
BBC Basic		
CP/M	£95	M10
Grundy 8200	£95	M10
Bill of materials		
Apple II	£199	T5
CP/M	£850	B5
CP/M	£199	T5
CP/M	£400	G4
CP/M	£850	V2
CP/M	£390	H1
Cromemco	£850	B5
IBM	£390	H1
PET/CBM	£199	T5
Superbrain	£450	T3
8080/280	£390	H1
Bookmakers package		
CP/M	POR	B7
Bookshop stock control		
Sorcerer	£1450	L2
Budgeting package		
Apple II	£125	P2
Apple II	£125	T2
CP/M	£95	B5
Cromemco	£95	B5
North Star Horizon	£95	B5
Building estimating		
Apple II	£570	S8
CP/M	£325	C9
IBM	£325	C9
Sirius	£325	C9
Building services		
Apple	POR	H2
Apple	POR	I3
IBM	POR	H2
North Star	POR	I3
Sirius	POR	H2
Bureau de change		
PET/CBM	£8	H3

Application/Machine	Price	Code
Bursar package		
CP/M	POR	M8
Cash flow		
Apple II	£125	P2
Apple II	£80	V1
Apple II	£100	C8
CP/M	£250	L3
CP/M	£95	B5
Cromemco	£95	B5
North Star Horizon	£95	B5
PET/CBM	£195	D1
Car showroom sales		
Sorcerer	£1900	L2
Cash register		
CP/M	£300	G6
Cheque writer		
CBM/8032	£90	P3
PET/CBM	£90	P3
Company secretary		
CP/M	£650	C4
Construction cashflow		
Apple II	£75	S8
Construction expenditure		
Apple II	£250	S8
Construction financial control		
Apple II	£750	S8
Construction valuations		
Apple II	£500	S8
Container accounting Contract costing		
CP/M	£750	M5
CP/M	£2000	L3
CP/M & utilities		
Tandy Model II	£165	M1
Credit control		
Apple II	£98	P2
CP/M	POR	G4
PET/CBM	£650	B4
Customer file		
CP/M	£900	G4
Famos	£1000	M2
Dairy mangement		
CP/M	£1500+	C4
Database management retrieval		
ACT800	£225	H4
Apple II	£150	K2
Apple II	£60-140	S2
Apple II	£150	S5
Apple II	£75	P2
Apple II	£100	S4
Apple II	£100	C8

Application/Machine	Price	Code
Apple II	£125	T2
CP/M	£450	C4
CP/M	£100	G3
CP/M	£250	B3
CP/M	£295	G5
CP/M	£225-485	S9
CP/M	£155	X2
CP/M	£295	M4
Famos	£1500	M2
IBM	£295	M4
North Star Horizon	£250	B3
PET/CBM	£225	H4
PET/CBM	£50/150	C2
PET/CBM	£150	J1
PET/CBM	£150	G2
Superbrain	£300	S6
Tandy Model 1	£25-90	M1
Tandy Model 1	£60	S2
Tandy Model 1	£150	J1
Tandy Model 1	£32.50	M11
Tandy Model 111	£270	A4
8000 Series	POR	C2
Debt collection		
CP/M	£150	G4
CP/M	£450	V2
Dental laboratory		
Apple II	£280	A6
Dental records		
Apple II	£1700	A6
CP/M	£500	G6
Department store order program		
Sorcerer	£2500	L2
Double glazing costing		
North Star Horizon	£750	W1
CP/M	£1500	V2
Earth parameter collection & Qualification		
CP/M	£95	M10
Grundy 8200	£95	M10
Eire payroll system		
CP/M	£650	M5
Estate agent		
Apple II	£850	S5
Apple II	£850	K1
Apple II	£175	P2
Apple II	£130	C8
Apple II	£750	S4
PET/CBM	£30	H3
CP/M	£700	B5
CP/M	£850	S9
Simpled Triton 3	£350	B3
MZ-80K	£195	W1
Superbrain	£600	S6
Superbrain	£600	C3
Equipment lease/rent/HP		
CP/M	£400	G1

Application/Machine	Price	Code
Expense analysis		
Philips P2000	£150	P4
Farm accounts		
CP/M	£750	C4
Financial & arable management		
CP/M	£2200	C4
File handling		
PET/CBM	£225	H4
PET/CBM	£645	D1
Financial modelling		
Act Sirius 1	£595	A1
Apple II	£450	P2
Apple II	£360	C8
CP/M	£400	G1
CP/M	£95	B5
CP/M	£425-535	A1
CP/M	£400	S11
CP/M	£400	V2
Cromemco	£95	B5
North Star Horizon	£95	B5
PET/CBM	£425-535	A1
PET/CBM	£250	D1
RAIR Black Box	POR	A3
Financial planning		
Act Sirius 1	£150	A1
Apple II	£250	S4
CP/M	£245	G4
CP/M	£90	X2
UCSD-P	£350	S4
General ledger/NL		
Apple II	£300	S5
Apple II	£300	K2
Apple II	£455	P2
Apple II	£225	V1
Apple II	£295	C6
Apple II	£250P	S4
Apple II	£600	T2
Apple II	£490	L4
Apple II	£199	T5
CBN/8032	£350	W3
CP/M	£500	L3
CP/M	£375	L1
CP/M	£400	G1
CP/M	£400	M3
CP/M	£400	B5
CP/M	£275	S6
CP/M	£390	S7
CP/M	£250	B3
CP/M	£300	W1
CP/M	£425	S11
CP/M	£500	G6
CP/M	£400	M5
CP/M	£1000	B1
CP/M	£199	T5
CP/M	£950/1250	V2
CP/M	£400	M9
Cromemco	£400	B5
North Star Horizon	£250	B3

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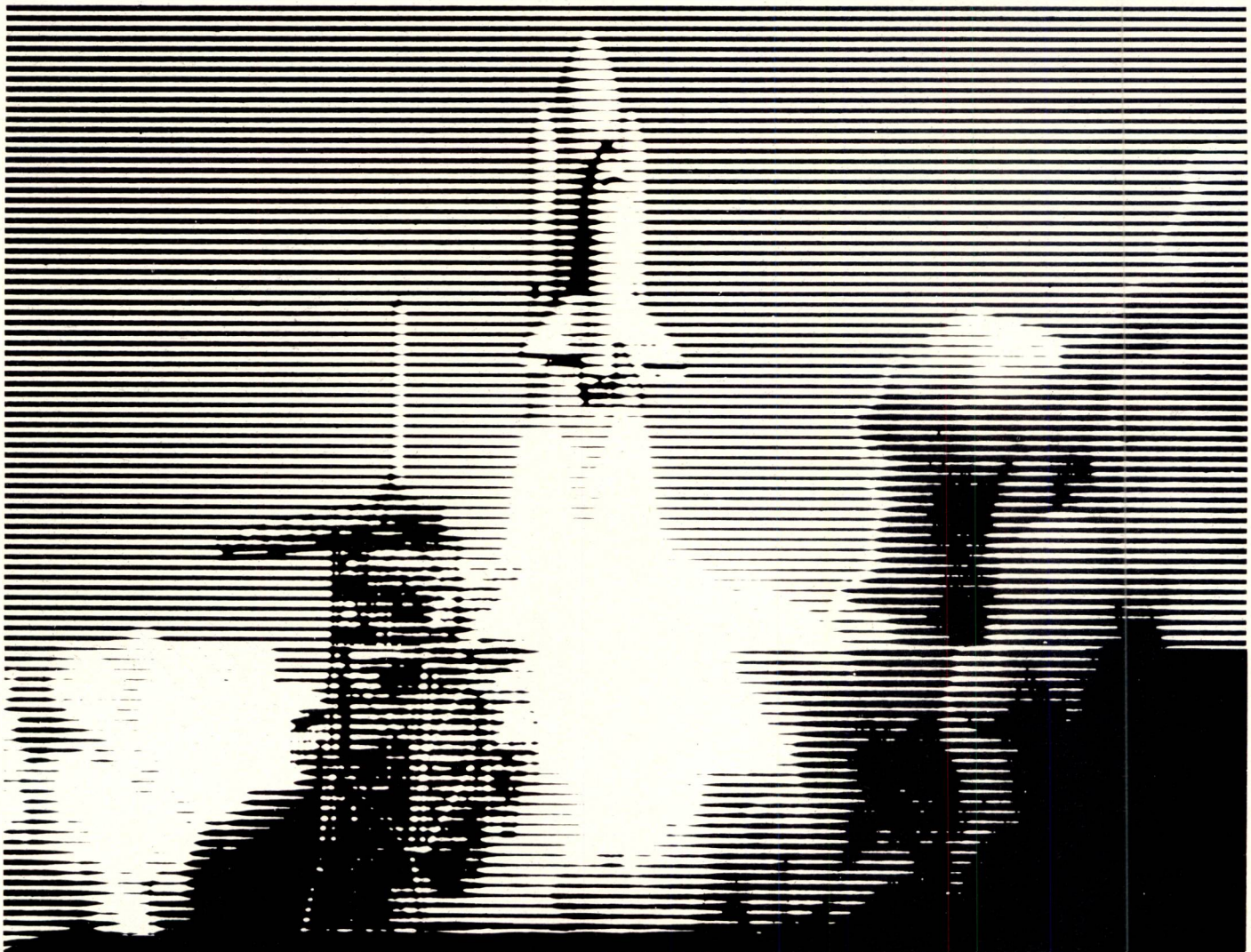

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PACKAGES

Application/Machine	Price	Code
North Star Horizon	£400	M3
PCC 2000 North Star Horion	£400	B5
PET/CBM	£200	C2
PET/CBM	£200	H3
PET/CBM	£199	T5
Philips P2000	£100	P4
Sharp PC3201	£450	P2
Superbrain	£400	M3
Superbrain	£400	S6
Tandy Model I	£90	M1
Tandy Model II	£200	M1
Tandy Model 1	£225	M11
Tandy Model 1	£225/325	T1
Tandy Model 11	£425	T1
UCSD-P	£350	S4
Vector	£400	C5
8080/Z80	£357	L1
8080/Z80	£275	G3
General purchase transaction proc.		
CBM/8032	£495	S3
Greyhound race program		
Apple II	£750	M6
Health authority PPM		
Sorcerer	£2500	L2
Housing association package		
PET/CBM	POR	M7
Hotel billing		
Philips P2000	£500	P4
Hotel management		
CP/M	£750	H5
North Star Horizon	750	H5
RAIR Black Box	POR	A3
Incomplete records		
Act Sirius 1	£1200	S1
Apple II	£250	S2
Apple II	POR	K1
Apple II	£425	P2
Apple II	£490	L4
CP/M	£750	M3
CP/M	£250	B5
CP/M	£975	B3
CP/M	£750	W1
CP/M	£915	M5
CP/M	£155	C10
CP/M	£400	G4
Cromemco	£250	B5
North Star Horizon	£750	M3
North Star Horizon	£250	B5
North Star Horizon	£975	B3
Philips P2000	£150	P4
Superbrain	£750	M3
Superbrain	£1200	S1
Tandy Model 1	£25-50	M1
Tandy Model 1	£40	M11
Industrial cleaning package		
CP/M	£1000	B1
Industry Factory loading		
CP/M	£1000	X1
Industry work study		
DM5	£1000	X1
Inn Management		
Act Sirius 1	£185	C7
Instrument logging		
Sorcerer	£500	L2
Insurance broker		
Act Sirius 1	£450	C7
CP/M	POR	G4
Insurance renewals		
CBM/8032	£1200	S3
Integrated accts		
Act Sirius 1	£795	O1
Apple II	£300	P2
Apple II	£855	V1
Apple II	£1500	T2
Apple II	£1470	L4
Apple II	£300	W2
Apple II	£199	T5
CBM/8032	£1500	P3
CP/M	£950	L1
CP/M	£750	C4
CP/M	£1100	G1
CP/M	£990	M3
CP/M	£690	B5
CP/M	£900	B5
CP/M	£950	B3
CP/M	£1200	S11
CP/M	£199	T5
CP/M	£3400	M9
Cromemco	£690	B5
Cromemco	£900	B5
Famos	£2000	M2
MZ-80K	£150	P2
North Star Horizon	£950	B3
North Star Horizon	£690	B5

Application/Machine	Price	Code
North Star Horizon	£900	B5
PET/CBM	£800	S3
PET/CBM	£199	T5
North Star Horizon	£990	M3
PET/CBM	(£50)	C2
PET/CBM	£650	J1
PET/CBM	£650	G2
Philips P2000	£650	P4
Sirius	£1250	I4
Superbrain	£990	M3
Superbrain	£1200	S6
Superbrain	£1000	T3
Superbrain	£1200	S1
Tandy Model I	£300	M1
Tandy Model II	£600	M1
Tandy Model I	£75	J1
Tandy Model II	£795	O1
Tandy Model III	£550	A4
Vector	£1000	C5
Vector	£1250	I4
8000 Series	POR	C2
8080/Z80	£950	L1
8080/Z80	£995	G3
Investment portfolio		
Tandy Model I	£20	S2
Invoicing		
Act Sirius 1	£95	C7
Act Sirius I	£265	O1
Act Sirius I	£195	A1
Apple II	£295	S2
Apple II	£300	P2
Apple II	£140	V1
Apple II	£1000	T2
Apple II	£199	T5
Challenger	£25	C7
CP/M	£325	L1
CP/M	£250	M3
CP/M	£250	S7
CP/M	£100	B5
CP/M	£100	B3
CP/M	£300	W1
CP/M	£300	B1
CP/M	£199	T5
CP/M	£400	G4
CP/M	POR	W4
CP/M	£400	M9
CP/M	£249	P1
CP/M	£280	U1
CP/M	£390	H1
Cromemco	£100	B5
IBM	£390	H1
North Star Horizon	£100	B3
North Star Horizon	£250	M3
North Star Horizon	£100	B5
PET/CBM	£350	A1
PET/CBM	POR	J1
PET/CBM	£199	T5
Philips P2000	£150	P4
Sorcerer	£290	L2
Superbrain	£250	M3
Superbrain	£150	S6
Tandy Model I	£90	M1
Tandy Model II	£200	M1
Tandy Model I	£25	M11
Tandy Model I	£75	T1
Tandy Model II	£125	T1
Tandy Model II	£265	O1
Tandy Model III	£280	A4
UCSD-p	£350	S4
8080/Z80	£325	L1
8080/Z80	£390	H1
Jewellers System		
CP/M	£1000	S7
CP/M	POR	G4
Job costing		
Act Sirius 1	£350	C7
Act Sirius I	£265	O1
Apple II	£990	X1
Apple II	£199	T5
CP/M	£350	M3
CP/M	£990	X1
CP/M	£395	G6
CP/M	£450	M5
CP/M	£300	B1
CP/M	£199	T5
BOS	£1500	T4
CP/M	£1500	V2
CP/M	£1000	X1
CP/M	£600	A2
CP/M	£495	C9
IBM	£495	C9
North Star Horizon	£350	M3
PET/CBM	£199	T5
Philips P2000	£400	P4
Sirius	£495	C9
Superbrain	£350	M3
Tandy Model II	£265	O1
UCSD-p	£350	S4
Job order control		
8080/Z80	£275	G3
Legal precedents		
CP/M	£1150	C4
Leisure		
Apple II	£550	W5

Application/Machine	Price	Code
Letter writer		
Apple II	£80	V1
Apple II	£99	T5
CP/M	£150	M3
CP/M	£99	T5
CP/M	POR	G4
North Star Horizon	£150	M3
Superbrain	£150	M3
Local government housing maint		
RAIR Black Box		
POR	A3	
Magazine subscriber		
CP/M	£950	S9
Mailing List		
Apple II	£50-150	S2
Apple II	£300	S5
Apple II	£300	K1
Apple II	£40	P2
Apple II	£100	S4
CP/M	£450	C4
CP/M	£250	G1
CP/M	£75	S9
CP/M	POR	G4
CP/M	£250	U1
CP/M	£149	M4
IBM	£149	M4
North Star Horizon	£195	W1
PET/CBM	£15	A1
PET/CBM	£35	H3
Sorcerer	£290	L2
Tandy Model 1	£40	M1
Tandy Model II	£62-50	M1
Tandy Model I	£50-150	S2
Tandy Model I	£25/38/55	H1
Mail shot		
Act Sirius I	£95	A1
Apple II	£14	S2
Apple II	£40	P2
Apple II	£25	T2
Apple II	£99	T5
CP/M	£450	C4
CP/M	£90	M3
CP/M	£100	S7
CP/M	£50/150	G5
CP/M	£99	T5
MCZ Zilog	£250	I1
North Star Horizon	£90	M3
Superbrain	£90	M3
Tandy Model I	£75+	G4
Tandy Model II	£75+	G4
Tandy Model III	£160	A4
Membership accting		
Apple II	£75	P2
CP/M	POR	G4
MCZ Zilog	£250	I1
Motor Dealer		
Act Sirius I	£345	C7
CBM/8032	£950+	P3
CP/M	POR	G4
Famos	£5000	M2
NEDO price adjustment		
Apple II	£200	S8
Nominal ledger Order entry/invoicing		
CP/M-86	£500	O2
Apple II	£99	T5
CBM/8023	£750	P3
CP/M	£350	G1
CP/M	£395	G6
CP/M	£300	M5
CP/M	£550	L1
CP/M	POR	B1
CP/M	£99	T5
CP/M	£400	M9
CP/M	£249	P1
IBM	£395	B2
8080/Z80	£550	L1
Order Processing		
AppleII	£99	T5
CP/M	£99	T5
CP/M	£500	G4
CP/M	£400	M9
Philips P2000	£200	P4
Sirius	£400	I4
Vector	£400	I4
Office admin		
Apple II	£100	S4
Pad to plotter systems		
Apple II	£250	P2
Apple II	£180	C8
Payroll		
Act Sirius I	£300+	O1
Act Sirius I	£195	A1
Apple II	£200	S2
Apple II	POR	S5
Apple II	POR	K1
Apple II	£200	P2
Apple II	£375	V1
Apple II	£375	C6
Apple II	£250P	S4
Apple II	£490	L4
Apple II	£199	T5
CBM/8032	£375	P3

Application/Machine	Price	Code
Challenger	£24	C7
CP/M	£450	L3
CP/M	£475	L1
CP/M	£450	C4
CP/M	£500	G1
CP/M	£390	M3
CP/M	£500	B5
CP/M	£350	B3
CP/M	£425	G11
CP/M	Lease	W1
CP/M	£495	G6
CP/M	£450	M5
CP/M	£300	B1
CP/M	£199	T5
CP/M	£395	G4
CP/M	POR	W4
CP/M	£600	M9
CP/M	£325	M12
CP/M-86	£500	O2
Famos	£1500	M2
North Star Horizon	£350	B3
North Star Horizon	£390	M3
North Star Horizon	Lease	W1
PET/CBM	£200/350	C5
PET/CBM	£400	I2
PET/CBM	£150	G2
PET/CBM	£150	J1
PET/CBM	£150	C2
PET/CBM	£10	H3
PET/CBM	£199	T5
Philips P2000	£300	P4
Scorcerer	£250	L2
Sirius	£600	I4
Superbrain	£390	M3
Superbrain	£400	S6
Superbrain	£250+	T3
Tandy Model I	£200	M11
Tandy Model I	£218	T1
Tandy Model II	£375	T1
Tandy Model II	£300+	O1
UCSD-p	£350	S4
8000 Series	£250	C2
8080/Z80	£475	L1
8080/Z80	£275	G3
PET/CBM	£150	G2
PET/CBM	£150	J1
PET/CBM	£150	C2
Sorcerer	£250	L2
Tandy Model I	£249	M1
TRS-80	£200	M11
TRS-80I	£218	K1
TRS-80I	£218	T1
TRS-80II	£375	T1
8000 Series	£250	C2
8080/Z80	£475	L1
8080/Z80	£275	G3
Victor	£600	I4
Perpetual Inventory		
CP/M	£150	B5
Cromemco	£150	B5
Personnel records		
Apple II	£98	P2
CP/M	£450	C4
MCZ Zilog	£400	I1
Petaid report generator		
PET/CBM	£250	S3
Petsoft programs		
PET/CBM	£160	J1
Pig management		
CP/M	£1250	C4
Pipeline pressure drops		
Apple II		S10
Pipeline sizing		
Apple II		S10
Point of sale		
CP/M	£400	M9
Postal advertising response packages		
Apple II	£350	S2
Price lister		
PET/CBM	£12	H3
Product Management		
Act Sirius I	£245	C7
Production analysis		
Apple II	£75	P2
Production control		
CBM/8032	£650+	P3
CP/M	£2400	V2
PET/CBM	£650+	P3
Prof appts groups		
8080/Z80	£275	G3
Prof appts individ		
8080/Z80	£220	G3
Prof client billing		
8080/Z80	£330	G3
Programming aids		
Apple II	£40	P2

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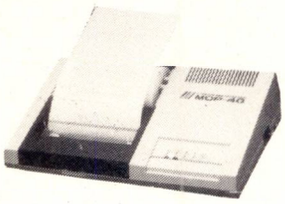

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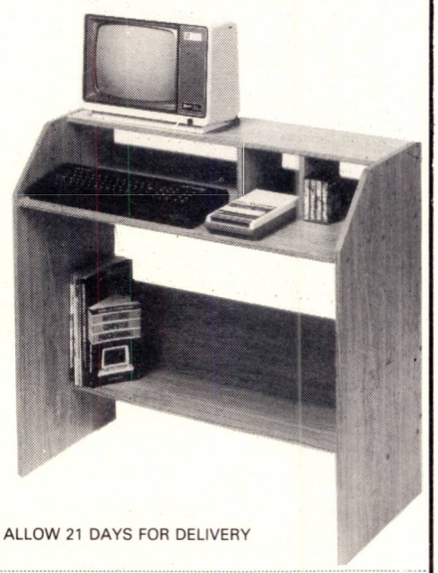

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PACKAGES

Application/Machine	Price	Code
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Apple	£695	M13
CBM/8032	990	C11
IBM	1100	M13
IBM	1600	C11
Sirius	990	M13
Sirius	1600	C11
Victor	£990	M13
Property management		
CP/M	£750--15000	C4
CP/M	£400	M3
CP/M	£1000	B1
North Star Horizon	£400	M3
Superbrain	£400	M3
UCSD-p	£175	S4
Publishers System		
CP/M	£1850	S7
Purchase ledger		
Act Sirius I	£395	A1
Apple II	£300	S5
Apple II	£300	K1
Apple II	£295	C6
Apple II	£300	P2
Apple II	£315	V1
Apple II	£250P	S4
Apple II	£300	T2
Apple II	£490	L4
Apple II	£199	T5
Challenger	£25	C7
CP/M	£450	G1
CP/M	£500	L3
CP/M	£425	L1
CP/M	£400	M3
CP/M	£400	B5
CP/M	£395	S7
CP/M	250	B3
CP/M	£300	W1
CP/M	£425	S11
CP/M	£495	G6
CP/M	£200	M5
CP/M	£300	B1
CP/M	£199	T5
CP/M	£950--1250	V2
CP/M	POR	W4
CP/M	£400	M9
CP/M	£400	G4
CP/M	£450	U1
CP/M	£495	X2
CP/M-86	£500	O2
Cromemco	£400	B5
North Star Horizon	£250	B3
North Star Horizon	£400	M3
North Star Horizon	£400	B5
Sorcerer	£490	L2
Sirius	£325	I4
Superbrain	£400	M3
Superbrain	£300	S6
PET/CBM	£300	B4
PET/CBM	£200	C2
PET/CBM	POR	J1
PET/CBM	£350	H3
PET/CBM	£199	T5
Philips P2000	£200	P4
Sharp PC3201	£300	P2
Tandy Model I	£90	M1
Tandy Model II	£200	M1
Tandy Model I	£225	M11
Tandy Model I	£225	T1
Tandy Model II	£375	T1
UCSD-p	£350	S4
Vector	£400	C5
Victor	£325	I4
8000 Series	£250	C2
8080/Z80	£275	G3
8080/Z80	£425	L1
Quotation estimating		
Act Sirius I	£125	C7
CP/M	POR	G4
Philips P2000	£400	P4
Recruitment Agency		
Act Sirius I	£345	C7
Reinforcement bar schedule		
Apple II	£150	S8
Renewals ledger		
Philip P2000	£200	P4
Report generator		
CP/M	POR	G4
Requirements planning		
CP/M	£700	V2
Resource optimiser		
Apple II	£295	C10
Sales ledger		
Act Sirius I	£395	A1
Apple II	£300	S5
Apple II	£300	K1
Apple II	£295	C6
Apple II	£300	P2
Apple II	£315	V1
Apple II	£250P	S4
Apple II	£600	T2
Apple II	£490	L4
Apple II	£199	T5
Challenger	£25	C7
CP/M	£450	G1
CP/M	£500	L3
CP/M	£425	L1
CP/M	£400	M3
CP/M	£400	B5
CP/M	£365	S7
CP/M	£350	B3
CP/M	£300	W1
CP/M	£425	S11
CP/M	£495	T4
CP/M	£200	M5
CP/M	£300	B1
CP/M	£199	T5
CP/M	£400	G4
CP/M	£950--1250	V2
CP/M	POR	W4
CP/M	£400	M9
CP/M	£249	P1
CP/M	£390	H1
CP/M-86	£500	O2
Cromemco	£400	B5
IBM	£390	H1
North Star Horizon	£250	B3
North Star Horizon	£400	M3
North Star Horizon	£400	B5
PET/CBM	£300	B4
PET/CBM	£800	C1
PET/CBM	POR	J1
PET/CBM	£200	C2
PET/CBM	£350	C7
PET/CBM	£199	T5
Philips P2000	£200	P4
Sharp PC 3201	£300	P2
Sorcerer	£490	L2
Superbrain	£400	M3
Superbrain	£300	S6
Superbrain	£199	T5
Tandy Model I	£90	M1
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Tandy Model I	£225	M11
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8080/Z80	£275	G3
8080/Z80	£425	L1
8080/Z80	£390	H1
S/L, P/L & stock control		
Apple II	£900	P2
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CP/M	£1000	L3
CP/M	£900	B5
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CP/M	£1200	M9
Cromemco	£900	B5
North Star Horizon	£900	B5
Philips P2000	£950	P4
Solicitor's complete record accounting		
Apple II	£3000	S2
PET/CBM	£1785	D1
Solicitor's package		
Act Sirius I	£1400	S1
CBM/8032	£1400	S1
Compucorp	£2000	Q1
CP/M	£1250	M5
CP/M	£750	M6
CP/M	£2000	M12
Sorcerer	£3500	L2
Superbrain	£1400	S1
Statistics		
Apple II	£150	G3
Apple II	£100-195	P2
Apple II	£140	C8
Tandy Model I	£45	S2
Stock control/recording		
Act Sirius I	£265	O1
Act Sirius I	£195	A1
Apple II	POR	K1
Apple II	POR	S5
Apple II	£150	G3
Apple II	£80	S2
Apple II	£75/300	P2
Apple II	£285	V1
Apple II	£500	S4
Apple II	£490	L4
Apple II	£199	T5
CBM/8032	£175	P3
CBM/8032	£199	T5
Challenger	£25	C7
CP/M	£325	L1
CP/M	£750-1500	C4
CP/M	£350	G1
CP/M	£900	M3
CP/M	£700	B5
CP/M	£550	B5
CP/M	£250	B3
CP/M	£300	W1
CP/M	£395	G6
CP/M	£450	M5
CP/M	£300	B1
CP/M	£199	T5
CP/M	£500	G4
CP/M	£400	M9
CP/M	£249	P1
CP/M	£350	U1
CP/M	£495	C9
Cromemco	£700	B5
Famos	£1500	M2
IBM	£395	B2
IBM	£495	C13
MZ-80K	£150	P2
North Star Horizon	£250	B3
North Star Horizon	£900	M3
PET/CBM	£195	I2
PET/CBM	£300	B4
PET/CBM	£150	C2
PET/CBM	£150	J1
PET/CBM	£150	G2
PET/CBM	£250	R1
PET/CBM	£35/25	H3
PET/CBM	£199	T5
Philips P2000	£300	P4
Sirius	£495	C9
Sorcerer	£390	L2
Superbrain	£900	M3
Superbrain	£300	S6
Superbrain	£450	T3
Tandy Model I	£30-50	M1
Tandy Model II	£300	M1
Tandy Model I	£48	S2
Tandy Model I	£200	H1
Tandy Model I	£115	J1
Tandy Model I	£200	T1
Tandy Model I	£375	T1
Tandy Model II	£265	O1
8080/Z80	£275	G3
8080/Z80	£325	L1
Survey analysis		
CP/M	£645	M6
Surveying		
CP/M	£500	G6
Text file librarian		
Apple II	£125	S4
Time/cost recording		
Act Sirius 1	£800	S1
Apple II	£450	S2
CBM/8032	£800	S1
CP/M	£400	G1
CP/M	£200	M3
CP/M	£250	B3
CP/M	POR	G4
CP/M	£750	M6
CP/M	POR	W4
North Star Horizon	£250	B3
North Star Horizon	£200	M3
North Star Horizon	£450	W1
Philips P2000	£300	P4
Superbrain	£200	M3
Superbrain	£800	S1
Tandy Model I	POR	M1
Tandy Model II	£575	M1
Tour operators package		
Sorcerer	£2900	L2
Travel agency accts		
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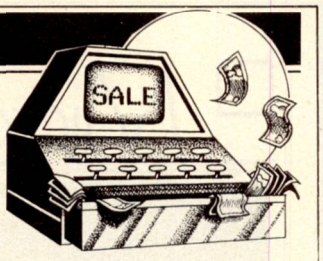

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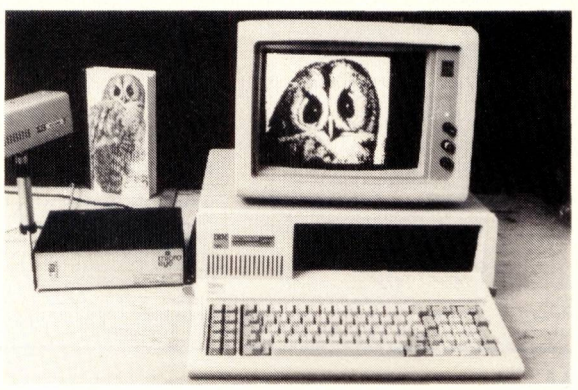

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●ATARI Writer, new word processor £50. Interface module mint cond, £110 ono. Visicorps Visicalc for Atari, unused, cost £160—accept £120. Also various games, half price. Tel: 0582 28209 (Luton).
●DBASE II £185 ono. For Osborne I, Cardbox, £70 ono. Sanyo green monitor, £85 ono. All as new. Tel: Marriott on 01-736 5898.
●OSBORNE 01. Double density + CP/M CBasic, MBasic, Wordstar, Supercalc, Mailmerge. Little used. £950. Tel: Watlington (049161) 2155.
●NASCOM 2. 32k RAM, NASYS 3, Zeap, Debug, Naspen, sound board + many games including Logichess. All hardware housed in Vero 19in rack. £300 or offers. Tel: Newcastle (0632) 634197.
●MZ-80K. 48k RAM, includes screen, taperes, perfect condition, dust cover, manuals, software worth over £500. Asking £200 for computer and £100 for software. Nearest offers. Tel: Ascot 21071, 8pm to 10pm.
●NASCOM 2. 48k, cased with Zeap assembler, Nasdis, Debug, Naspen text editor, Sargon Chess, all manuals, some games and magazines, £150. Tel: Colchester 841293.
●SHARP MZ80K. 48k RAM. Dust cover, Zen assembler, monitor listing, manuals etc. Very good condition, £220 ono. Tel: Deepcut (0252) 836747 eves.
●ZENITH H89, MTR84. Zenith CPM 2.2 must go in exchange for Apple software (business) or hardware. Tel: 01-624 6080 (Ian, office hours).
●TRS-80 Model I. Expansion interface 48k, £300. Green VDU, £50. 2 disk drives, £300. MX80 printer, £290, word processing and mailist programs included. Tel: Richards on (0482) 843303 (Hull) after 8pm.
●NEC PC8001. With hi-res colour monitor and cassette. Excellent condition, games software and technical manual included. Mr A Pettit, 2 Caburn View, Firle, Nr Lewes, Sussex BN8 6LX. Tel: (079) 159492.
●MICROLINE 80 printer. Friction tractor, rollpaper, pound sign, recently overhauled, ribbons, manual, parallel interface, £150 ono. Brandes, 46 Field Way, Chalfont St Peter, Bucks. Tel: (0753) 882982.
●TRS-80. 32k, interface, monitor, 3 double density disk drives and software including Visicalc, Profile and Editor Assembler. Excellent condition, £750 ono. Tel: Dave Milburn on 01-928 1777 X4110 days.
●ATARI 400. 48k, joystick, Jumbo Jet Pilot, Basic Defenders + manuals. 18 months old, £200. Tel: Robert or David Fisher on 01-977 7689 after 5pm weekdays only.
●TRS-80 or GENIE software. Microsoft Basic-80 compiler. Ryan Macfarland Cobol compiler. Moimerx Pascal compiler. Forth language. Some books, original manuals and master disks. All half original price. Tel: 0482 867349.
●APPLE software. Arcade/adventure games, business, utilities + over 150 software manuals. SAE list, J Davey, 44, Hazelmere Road, Stevenage, Herts.
●NEWBRAIN Model AD with books and software, immaculate condition, hardly used. Bargain price of £120. M Othman, 27 Jermyn St, Liverpool L8 2XA. Please write.
●ITT 2020. 48k. Disk drive with paddles, Jailbreak, 16k RAM card and software. Little used. Tel: Biggin Hill 73958, £550 ono.
●VIDEO GENIE, EG 3003. sound included, built in cassette. Machine language programs, flight simulation, arcade Scramble + many others. Books + mags. Only £150 all in. Tel: Barnsley 41155.
●EPSON HX 20. 32k with expansion unit and micro cassette drive, travelling case transformer, games, software. Cost new, £680, 4 months old—first £350. Tel: Sheffield 369000.
●BYTEWRITER daisy wheel typewriter/printer for sale. Less than 1 year old. Centronics compatible interface with TRS-80 Model 1 cable, £300 ono. Mark Burgin, West London. Tel: 01-567 2024.

●NASCOM. NAS-SYS 3, graphics ROMS, assemblers, disassemblers, NAS-debuger, Basic, Cottis/Blandford interface, motherboard, buffer (NASCOM) and micropower 64k RAM (both faulty but diagnosed). Many other goodies, PSU, £130. Tel: Canterbury 710720 eves.
●SHARP MZ80K. 48k with Basic, manual, user mags 1-7 + 3 others, Basic and Forth tapes, dust cover, original packaging, £280 inc postage. Trevor Day, 19 Drayton Road, Cambridge CB1 4EU

●VIDEO GENIE I. Mint condition, original box, manuals etc. Some games, £120. Tel: Mr Cole on 01-921 8128 day or (0732) 848132 after 6pm.
●ZX81, 16k RAM. DKTronics keyboard. In full working order as new. 10 games including Multifile. Complete with leads etc, £80 ono. Tel: Steve on 01-486 4488 ext 318, 9.30-6pm.
●APPLE II Europlus. 2 Apple drives, DOS 3.3, Kaga monitor, Draxis daisywheel printer, 16k language card + 80 col card + Mountain clock card, Versawriter graphics tablet, Applewriter II + Visifile + bookeeper + other software, £1,450. Tel: 01-455 3608.
●SPECTRUM 48k. Software cover. Excellent condition, £100. Tel: Redhill (0737) 66650.
●ATARI 400. 48k, cassette, and Basic, also over £1,000 of professional programs including Donkey Kong, Dig-Dug, Pengo, Joust, Popeye, Pole-Position. Joysticks, books, manuals, all for only £200. Tel: 0903 42013.
●TRS-80 Model I. 48k. 2 40TR drives, NewDos-80, LDOS manuals + software games and business programs. Value £500—total cost £750 ono. Tel: (0702) 587210 eves.
●HITECH (LS100 Bus), high resolution colour graphics board and software. Half price £145. Lots of North Star format software, cheap, eg CP/M, C/Basic, utilities. Must clear now. Tel: (0293) 515201.
●SHARP PC-1500. CE-150 printer, CE-159, RAM/ROM, CE-151 RAM, CE-152 recorder, CE-153 software board, CE-15A applications software, £275 ono. Tel: Aldershot 24461, ext 2668, office hours.
●WANTED M6800. Only multi-board computer with disc, Eprom burning and experimental board facilities. Tel: Beaconsfield, Bucks 3868 eves/weekends.
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●BBC Model B. Version 1.2 operating system and all Acornsoft games + VU-FILE database package, £375 (genuine buyers only). Tel: 01-263 8730 after 8pm.
●BARGAIN SEIKOSHA GP80A printer with paper £80 or with Genie interface £100. 21 Wheatcroft Close, Danesmoor, Chesterfield, Derbyshire. Tel: Chesterfield 862461 (work); Sheffield 696832 (home).
●PET 2001. 8k RAM, small keyboard, cover and green screen + several books including PET Revealed. Over 70 programs including assembler, disassembler, Tim, Backgammon, Chess, Tuition, £200. Tel: Horsham 58609.
●CORTEX. 64k, colour sprites, powerful, £300. Tangerine, Basic XBug fully expanded, 2 hi-res boards, offers. Apple software, Visicalc, Applewriter, business graphics, Omnis, Pascal, games galore, hardware. Lots more. Tel: (0483) 68116.
●BARGAIN, TRS-80, Model I, Level II. 16k, including manuals, perfect condition, in original packaging. Only £95 cash—no offers—first come first served. Tel: 01-599 1611 (day).
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●SIRIUS Act I. I am a new user and looking for people in NW London to exchange information, hints and ideas. Tel: 01-328 5625 (eves/weekends).
●COLOUR GENIE Series I computer, 16k, 16 colours, 3 sound channels and software, Basic, manuals and typewriter keyboard, £125. Quick sale imminent. Tel: Adam on 047663415 eves.
●WANTED for VIC 20, monitor, printer, disk drive, 64k RAM. Bennett Hill Farm, Salmonby, Horncastle, Lincs. Tel: 06584 739.
●EXIDY SORCEROR II. 48k with BMC 12in monitor. Word processor, development packs, software, manuals & extras, only £550 ono. Tel: 01-504 0010.
●PET 3016. 16k, green screen, large keyboard, new ROM, cassette deck, books, manuals, some software £225 ono. Tel: Marlow (06284) 74623.
●ZX-81. 16k RAM, printer, over 30 games + other software, books. All in original packing. All leads etc. Cost over £200—sell for £85. Tel: Jason on 01-553 5617 after 6pm.
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●Commodore PET 4016. 12in screen, including tape deck, programs, Eprom programmer, IEEE to centronics interface, books. Excellent condition. Offers around £350. Tel: Aylesbury (0296) 25984 (eve).
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●Genie/TRS-80. Pascal compiler V5.3 £50. VIDEO GENIE & 32k expansion interface £350. Tandon TM100-3, 80TRK drive £95. Write for details and full list: Mike Tubby, P.O. Box 119, Leicester LE2 7EP.
●Sharp MX80K. 48k, hires, Xtal Basic, Basic extensions, integer Basic compiler, Sharp and Hisoft Pascal, Knight's Fortran, £250 ono. Seikosha GP80D printer £100 ono. Tel: Medway 377755.
●Sharp MZ-80K. 48k, dust cover, Knight's Basic, user manual, several games, Lesil tape, £300. Tel: Norwich (0603) 20890 after 6pm. J. Bond, 8 Dell Crescent, Dereham Road, Norwich, Norfolk NR5 8QB.
●PET, 32k RAM, professional keyboard, high resolution graphics, and 3022 printer. Must collect £400. Tel: (0283) 32415.
●48k Spectrum, Microdrives, printer, paper, lightpen, programmable joystick, RS232 interface and software for sale, cost £507 new, will sell for £375 ono. Tel: Mike, 01-959 7382.
●TRS80 Model I, accessories 26-1181 voice recognition unit £24. 26-1180 speech synthesiser £42. Video monitor (black screen) £26. Light pen £13. Carry case £12. Tel: 061-440 8569.
●Olivetti M10, portable, 8k, tape, printer and bar code reader ports, 8×40 adjustable LCD display. Similar TANDY 100, built-in Basic, text, telecomms, calendar software £425 ono. Tel: 01-539 1697 after 7pm.
●Sharp MZ80K, 48k. Plus £100+ software and books inc Sharp assembler £350 ono. Tel: Sheffield 321953.
●V. GENIE. Expansion box, 32k (EG3014) in first class condition £100. Tel: (0454) 778336 (Bristol).
●VIDEO GENIE EG3003. Sound and all accessories including about £40 of Kansas programmes in VGC £75. Tel: (0454) 778336 (Bristol).
●Nascom-2. Cased, 48k RAM, Gemini I/O board, Castle interface, NAS-SYS III, Zeap (ROM), Dis/Debug, Pascal, hullforth, Dcs-Mos, Dcs-Dash, plus much more software (cassette). All documentation £350. Tel: (0827) 892183.
●Sharp MZ80-A. Built-in monitor + tape, perfect condition, boxed, extended Basic and Defender tapes. Manuals. £299 ono. Tel: (0383) 720549 after 5pm.
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●VIC-20, 16k RAM pack, and software worth £150, + C2N taperecorder 5 months old, under guarantee. Books and joysticks and printer optional. Worth £300 sell £200 only with accessories £400. Tel: John Tucker, (0622) 843385 6.30-9pm weekdays only.
●ATARI 400, 48k, cassette recorder, joysticks, manuals, Basic, music composer, Pacman, Ricochet, Pacific Coast Highway. Cost £455, accept £250. Tel: 021-705 1839 (Solihull).
●Microsoft Basic 80 manual and disc (interpreter) for Torch/BBC. Pristine condition. MP1 list price £232, accept £95. Tel: Hastings (0424) 435 289.
●APPLE II Europlus. 48k, and language card, 2 Apple drives, Dos 3.3, Kaga monitor, Praxis daisywheel printer, Visifile, Applewriter II, bookkeeper, 80 column card, Clock card, graphics tablet, one year old, hardly used (private) £1,600 ono. Tel: 01-455 3608 (eve).
●Printer, Texas Instruments silent 700 dot matrix printer and keyboard £150. Including manual, 5MByte cartridge disc drive, unused, (DRI 4000). Manual available, only £125. Tel: Newbury (0635) 43855.
●Tandy TRS-80 Model I, LII, 16k with monitor etc and much software etc £150 ono. Tel: 01-994 1963.
●Tuscan S100, 24k RAM, dual 380k each, SS/DD 5in drives, CP/M and disc Basic. Only £490. Hyder. Tel: 01-427 7742 (eve and weekends only).
●APPLE III Europlus, Disk drive and controller and professional monitor. Loads of software and disks, manuals and extra books and lessons if you want, excellent condition £750. Tel: (0244) 677712 (eve) (Chester).
●Sharp MZ80K, 48k, twin drives, interface, P3 printer, sales purchase, nominal ledgers on disk + other software. Excellent condition £850 ono. Chris Clinch. Tel: Eastbourne (0323) 23880 (day), 640950 (eve).
●Microprocessor board. Including timer, I/O, and Basic chips. Fully documented £67. Acorn ATOM, good working order, including colour board (needs software). Ideal for wordprocessor, bargain at £68. Tel: Burscough 894948.
●DRAGON 32. Joysticks + software including Donkey King, Cyrus Chess, Dragon Forth. Price new over £300. My price £130 ono. Tel: Nick Goodwin, Horley (029-34) 4405 (Surrey).
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●Chess computer, Morphy Encore. As new, little used, cost £178, sell £100 ono. Features 9 levels of play Enpassant, Castling, Queening with under promotions, Take back, Hint etc. Tel: 01-866 6195.
●NEC-PC 8001 BE. 5 vol self tutor, rave reviews, as new boxed complete with cables and manuals. New £600, sacrifice £300. 18 months old, friends gone BBC hence sale. Tel: 01-866 6195.
●Sharp MZ-80K. 48k, dust cover, many utilities, games, magazines, books, including Zen, Forth, Centipede. Excellent condition £280 ono. May split. Also Quantum, Hi-res board £75. Tel: 01-771 5531 after 6pm.
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●PET 32k, new ROM, toolkit, cassette/soundbox, manuals, many progs and mags £300. 2031 disk + Diskopro chip £300 ono. Tel: Maidenhead 73667.
●HP2100S mini mainframe £150, TTY33 £120, High speed tape recorder £50, HST punch £50, X-Y plotter £50 or complete system £350. Tel: Wroxham (06053) 3154.
●NEWBRAIN AD, almost new £170. Also Sanyo 12in hi-res monitor, green phosphor screen with anti-glare cover, model DM8112CX, almost new £75. Tel: Bristol (0272) 690345.
●Unused APPLE IIe, boxed, £620 + VAT. Tel: 01-743 8751.
●APPLE IIe system. As new, disc drive, 80 column card, TV modulator, paddles, software selection £895 + VAT. Tel: 01-743 8751.
●IBM 320k. Diskette drive new! Boxed, unopened. Best offer secures. Myerscough, Eldon Court, Eldon Grove, London NW3 5PN. Tel: 01-794 6879.
●Sharp MZ80K, 48k. K Basic, A Basic, M/C, Pascal, Forth, Fortran, Sargon, Chess, Monopoly + lots of programs. VGC £300 ono. Tel: Cumbernauld (02367) 24501, Jimmie.
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●NEWBRAIN AD. Almost unused, still in original packing, complete with manual power supply, all leads. All yours for only £160. Tel: Graeme Park on Kilbarchan 4142 or Lochwinnoch 842972 now!
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●TRS 80, 48k 22 Monitor, CTR80 recorder, lowercase numeric keypad, programmes Scripsit mailing list and games Aculab and Waifers, dot matrix printer. All leads £500. Tel: (09274) 27733 (Northwood, Middx). Ivor.
●EPSON HX-20 + microcassette drive with 4 tapes. Carrying case and charger included. As new £450 ono. Exchange for alternate system considered. Tel: 01-435 0431 (8-5pm) or 01-960 6483 (after 6pm).
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●SORCERER 52k, CP/M system, twin 8in drives (1.2m), monitor and lots of software including Wordstar, Microsoft disc, Basic and Fortran, pascal MT+. Tel: Keith, Southampton 789230 after 6pm, offers invited.
●Sharp MZ-80K 48k RAM, Basic, Forth, Pascal, Fortran. Complete with manuals, dust cover and many programs, £220 ono. Can deliver Devon and Cornwall area. Tel: (08403) 409 (eve only).
●Sharp MZ-80K 48k, 2-4Mhz. Reset switch, hi-res graphics board, external volume control, + £££ software, books, magazines, user group notes, etc. £325 ono. Tel: Southend (0702) 48109.
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●MZ80A 48K, + MZ80A Basic + mZ80K Basic (runs both MZ80A and MZ80K Basic programs). 40 games + Sharp software pack (5 tapes). Year old, new condition, boxed, incredible bargain £360 ono. Tel: 01-560 6023 eves.
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● BBC 'B'. Disc interface, control data ZL141B drive, new cassette. Zenith green screen monitor. £200 best games, 12 discs including utility, many extras, all cables, £700. Tel: 01-764 7402 around 7pm.

● PROFESSIONAL wordprocessor, Burroughs Offiswriter 400. Full communications facility, 12in screen, twin disk drives, separate keyboard, new condition, cost over £4,000—only £900 for quick sale. Tel: 0435 830680.

● Commodore VIC 1540 disk drive, + disks, leads, manual, + Vicfile £160 ono. VIC 1515 printer + manual + leads + paper. Needs new ribbon £130 ono. Tel: 01-301 3930 after 6.30pm.

● GENIE I 16k, 32k expander with RS232 and double density, 2 single Teac drives, Epson MX-100III printer, 50 disks, software, manuals etx. Cost over £2,000, may separate. Realistic offers. Tel: Hull 867349.

● PET 4032, 4040, 3022 system wanted for youth club. Good working condition. Tel: 061-6820554 (9-5pm).

● Sharp MZ80-K, 48k RAM, integral monitor and cassette, dust cover, user notes, lots software including Speed Basic, Forth and Machine Code, games, £260. Tel: Kings Langley 65549.

● TRS-80 Model I, Level II, 16k, green screen, cassette, manuals, + approx £100 of books and software, £195 ono. Tel: Otley 467426 (Nr Leeds).

● Seikosha GP100A. Good as new, for sale £150. Including manual and lead. Tel: 01-920 7350 (day), 01-947 6579 (eve).

● Sharp MZ-80A, 48k, Basic, manual, 9 months old, with over £100 of software including Pacman, Defender, Invaders, all boxed, cost over £700, accept £350 ono. Tel: Simon, Tunbridge Wells (0892) 33549.

● *PCW*, All issues from Vol 1 No 1 (1978) to Vol 6 No 3 (1983). Make me an offer for the set. Gerry Purdue, Walton-on-Thames 223676 or 29 Laleham Road, Shepperton, Middx.

● VIC-20. Cassette recorder, 16k RAM cartridge, super expander graphics cartridge, games software worth £230+, books worth £50. Total system worth £400. For sale at £200 ono. Tel: Mike on 01-485 0556.

● TRS-80/1, 48k, vdu, Genie expansion box, cassette, lowercase, amplifier, £250+ software, books £350 or offer. Tel: Colin details. Demo Erith 38298 after 6pm, 01-854 8888 ext 2183 office hours.

● Sharp MZ80A. One month old, boxed with all software + dust cover + Zen editor, assembler. Poverty forces quick sale. Tel: 01-761 5921.

● VIDEO GENIE, + Eg3014 expansion interface (48k) and software £220 ono. Tel: Tarvin (0829) 40569.

● BBC model B. With Star DP510 printer and cassette recorder. Extras include joysticks and software. Will include all issues of Beebug and Acorn User magazines. Must sell, £600. Tel: Ingrebourne 40451.

● TRS80 Mod III, 48k, integral disk drives, monitor with 20 disks and much software £850 ono. Cost £1,700+ Nov/82, includes manuals, leads, cassette drive and all original packing. Tel: Bill on 01-572 2917.

● APPLE II+, 48k £399. Disk drive/controller £249. 2nd disk drive £199. Language card (64k upgrade) £65. CTV modulator £55. Epson FX80FT3 £395, + card £45. Coolstack fan £59. Applewriter II £29. All manuals and disks. Tel: 01-505 4470.

● HP-41CV. Extended functions module, lowercase with manuals. Includes synthetic programming book, £210 ono. Ask for Rabin Ezra on 01-591 1478 (eve).

● PET 4008, 32k with cassette, manuals, and Machine Code books. Also Football Manager program, and Petchess (normally £25) + Cracks Of Doom (£16 worth), + others £300. Tel: 01-868 5117.

● NEC APC, twin disks, colour, CP/M86, with business software value £1,000. All new and unused. Total cost £3,700, sensible offers, buyer collects. Tel: 01-992 6044 after 6.30pm weekdays.

● PET 3032 with C2N cassette and £150 worth of games, all in very good condition, £300 ono. Tel: Camberley 64059 (eve).

● For The Experimenter, Digital Equipment Corporation, DEC PDP8/L. Not a toy. Minicomputer, ideal for control and real time processing. Access to professionally written software through Decus, £650. Exchange W. H. Y. tel: (0294) 822180.

● TRS80 Model 1, 48k, expansion interface, Scripsit + I/c, Microchess, many games + lots of books. Hardly used, only £175. Tel: 01-578 0036 or 01-388 8190 (work).

● Nascom II, 32k RAM, 12k ROM, Kenilworth case, "Hobit" digital tape drive (6000 bps), Naspen, Hitachi monitor, graphics chip. Will separate or the lot for £400 ovno. Tel: Oxted (08833) 6200.

● Sharp MZ-80K, 48k RAM, built-in monitor and tape deck. Extras, Pascal language, tapes, dust cover and Knight's Commander. Games include Asteroids adn Electron 22622, excellent condition £295. Tel: Broxton 450.

● ATARI 400 with Basic, manuals, recorder, joysticks, 4 brilliant games cartridges. All hardly used, in excellent condition. The whole lot yours for only £250. Cost me £400. Tel: Nick on 01-603 7905.

● PET 2001, 8k, new ROM, large keyboard, assembler in ROM, worth £50. Cassette deck, soundbox, very good condition. All books included £195. Tel: 01-427 2831 (eve).

● BBC model B. As new OS1.2, (boxed), £350 + postage or buyer collects. Tel: 041-812 6065 (anytime). (Glasgow area).

● HP41C. With 3 memory modules and card reader. All manuals very good condition. Little used, would cost £360, sell half price £180. Tel: 01-370 3830.

● Sharp MZ-80K, 48k, integral monitor and cassette recorder, excellent condition with many programs. Bought for £450 will sell for only £250. Tel: 021-771 1203 after 5pm. Bargain.

● BBC model B. Monochrome monitor, cassette recorder, manuals, books, leads, some software. 2 years Beebug, £390 ono. Tel: 01-272 5896.

● Sharp MZ80B, MZ80P5 printer still boxed, genuine reason for sale, excellent bargain at £1,195 ono. Hurry must sell. Tel: Heckmondwike 401921/2 or after 5pm Huddersfield (0484) 515946, ask for M. Sarwar.

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● TRS-80 Model 1, Level 2. 48k, lower case mod, with monitor. Boxed with manuals and + 50 cassettes, most containing software + CTR80A cassette recorder, £250. Tel: Bexhill 220272 (STD 0424).

● Sharp PC1251. Pocket computer with printer and cassette recorder. New Dec '83, unused, cost £180, sell for £100 ono. V. Bryant, Wrington, Avon. Tel: 862451.

● Sharp MZ80K + MZ80P3 + MZ80 I/O. Reset switch + some software, £800 ono. Buyer to collect. Contact: Mr A. G. Ashford, Little Berwick, Enfield Road, Evercreech, Shepton Mallet, Somerset BA4 6LJ. Tel: (0749) 830659 after 6.30pm.

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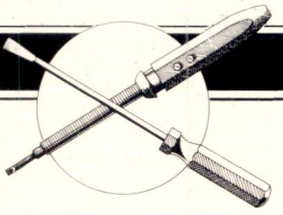
ACC NEWS



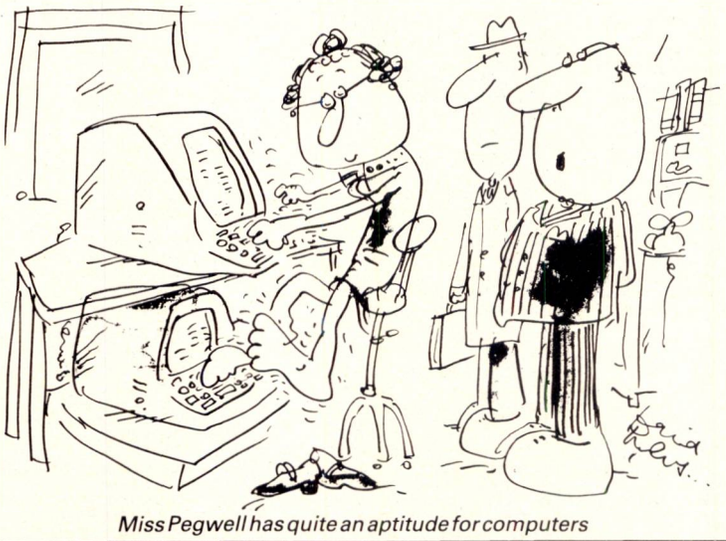
This month Rupert Steele gives an explanation of the significance of computer clubs.

What are computer clubs?

Spring is in the air, and it's just about the time when the novelty of the Christmas present is working off. You've played the three games programs in the manual of your QWERTY-987, apart from the one which gives you a 'SYNTAX ERROR AT 1234' message. You've bought some video games on tapes, but when you zap the starblaster within a second of the throng firing at you the screen goes blank, and if you type LIST it says 'PROTECTED PROGRAM'. You've run the cheque book balancing program, which displays your overdraft in graphic detail, but doesn't have provision for the credit-card interest.

Sounds like you need some new ideas, if the computer is not going to find its way into that heap in the corner where the cuddly donkey given to you by Aunt Mabel has made its home. Or perhaps you wanted to know what the inside of a Z80 looked like. Why don't you take the plunge and *join a computer club*?

'What computer club? Where? What does it do?' Computer clubs come in roughly three varieties: closed, local and user groups. **Closed computer clubs** are those formed around a place of work, a school or another club/society, and are not necessarily restricted to group members. Such groups



Miss Pegwell has quite an aptitude for computers

have a number of advantages. At a place of work, a computer club has easy access to premises (and possibly equipment); the people are familiar and (if the meetings are lunchtimes or early evenings) an almost captive audience.

By their nature, closed clubs do not generally advertise their existence to the world at large, but I have nevertheless heard of many; I'm sure it's an effective way to run a computer club in the right surroundings. Nevertheless, such groups tend to be under the eye of the Boss and are hardly practicable in small firms where there won't be enough interested people. Also, spending more time at work may not be everybody's cup of tea.

While easy to set up, closed clubs can be a second best compared to a good local club. A **local computer club** is an entirely independent body, at which computer hobbyists meet from the local area. Some local clubs cover a small area (there are a large number within London, for example) while others tend to cover a larger area, such as some of the Scottish clubs which cover 500-1000 square miles each.

Some local clubs specialise in a particular type of computer, such as the BBC Micro. At such clubs, everybody will be a Beeb person, and Beeb ideas will be almost exclusively discussed. One of the problems with such an arrangement is that as technology develops, machine specific local groups run a risk of being left behind; this has happened to some TRS-80 groups. Also, a machine specific group is less likely to become involved in new ideas, which can be important to preserving the vitality of the club.

One difficulty always faced by local clubs is somewhere to meet. Ideally, a meeting point should be free (or extremely cheap) and conveniently situated, with a decent number of mains points, and it should be available in the evenings. A telephone line (even if restricted to local calls by PABX circuits) is also very useful. Most local clubs have to manage with rather less than this, but if you know of a venue for your local club that is possibly better than its present one, for goodness sake tell the club about it.

Local clubs publicise themselves in a number of ways such as notices in libraries, articles in the local paper, interviews on local radio and through technical colleges. They also gain publicity through national media, such as computer magazines. The ACC (the Association of Computer Clubs) maintains an up to date list of clubs around the country, which is published from time to time in *PCW*. Various old pirated versions of the ACC list are published in some magazines (including clubs that have folded and/or moved), so be warned—if it doesn't say ACC, the list is likely to be out of date.

Of course, the ACC club list only remains up to date if people tell us when a club is formed (or, sadly, ceases). Write to me at the address below and I'll make sure the list is updated. At the major computer shows, the ACC runs a database program containing the clubs list, and visitors can find out their local computer club. It could be *your* club—if it's on the list. We also answer enquiries by post—write to me for the address of a nearby computer club. Commercial users: when we mail out to our clubs, we provide a *free* set of labels in exchange for your mailing our material out with your mailshot. Write for details.

The third category of computer club is the **National User Group.** This type of club is machine specific or sometimes manufacturer specific (for example, the BBC Micro, or Commodore). Unlike the other categories, the national groups do not hold meetings although they occasionally hold conferences. They work essentially by newsletter, exchanging information between members. Some have arrangements for obtaining discounts on software or hardware, and some market their own. Others have libraries of programs contributed by the members. National user groups are involved in other activities such as Club Spot 800 on Prestel (some local clubs are here as well), and most appear at the major shows and exhibitions in a 'Club Avenue', consisting of groups such as BASUG, BEEBUG, ICPUG, LASERBUG, NATGUG and so on.

The ACC clubs list includes the National User Groups for the rarer machines as well as the more popular micros. Write to me for details of the national group for your machine. My advice is that if you're looking for more from your personal computer, you should join both the National User Group appropriate to your machine and a local club. It's probably worth looking around for a local club before starting your own, as many clubs are short of active members, and one good club is better than two so-so ones. Of course, if there is a closed group appropriate to your situation, then you should consider joining that instead of, or as well as, the local club.

Club news

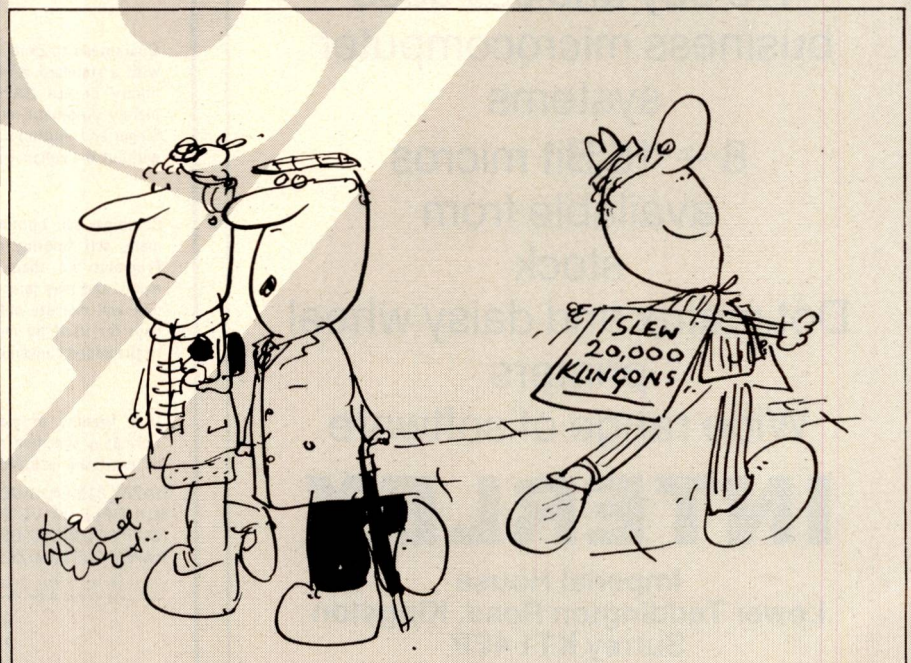
After the information about types of club, here are some reports from clubs around the country.

Mr P A Golder of 6 North Avenue, Swanton Morley, Dereham, Norfolk NR20 4LG writes to tell me of NOGA-TUG (Norfolk Genie and TRS-80 User Group). His phone number is Swanton Morley 491, and he'd be delighted to welcome new members to his group.

On a different note, Mr Ken Robson of Traquair, Innerliethen, Tweedale EH44 6PJ writes to tell me of the Peebles Amateur Radio and Computer Club. The club was formed nine months ago and has 20 members, but they're likely to expand. So, if computers talking to each other over the air (or computer transmission/reception of morse) is your thing, this computer club will be of special interest to you.

Dr J A Lack writes from The River House, Coombe Bissett, Salisbury, Wiltshire SP5 4LX to tell me that he has started a Salisbury BBC user group. Write to him or mailbox him on Prestel/Micronet number 072277303.

And finally for this month, the Nottingham Microcomputer Club has formed a BBC Micro User Group (other user groups within the Nottingham



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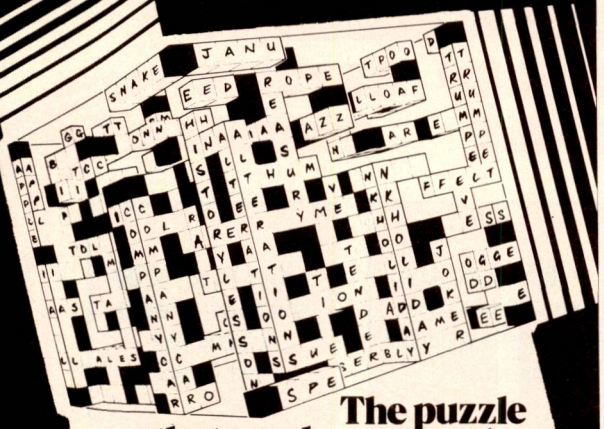

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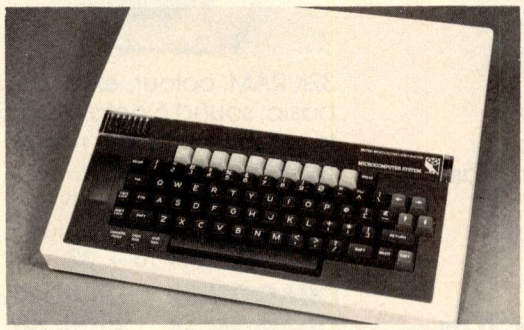

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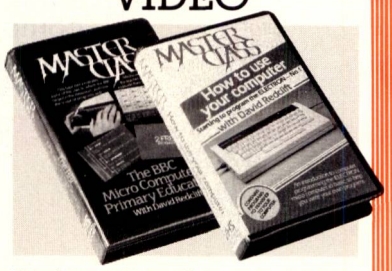

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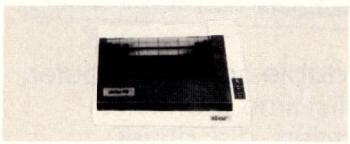

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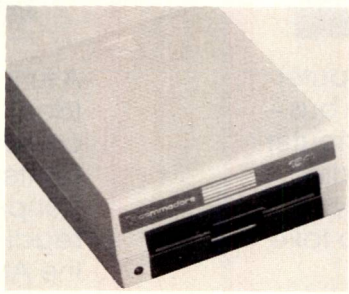

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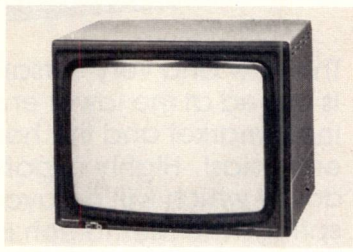

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0332 365280

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Dover International
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18/19 The Charlton Arcade
High Street
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0304 212433

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Evesham Micro Centre
Crown Courtyard 1
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Evesham, Worcs.
0386 49641

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Town Computer Store
30 Town Road
Hanley, Stoke On Trent
0782 287540

Haverford West
Computer Centre
18 Riverside Market
Haverford West
Dysed
0437 2776/28228

Heckmondwike
Thoughts and Crosses
37 Market Street
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0924 402 337

Hemel Hempstead
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Hemel Hempstead
Herts.
0442 55044

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123 Oxford Road
High Wycombe, Bucks.
0494 442311

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Hornchurch, Essex
04024 46741

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0403 52297

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0403 68461

Ipswich
Brainwave
24 Crown Street
Ipswich, Suffolk
Ipswich 50965

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Blackpool Computer Stores
179 Church Street
Blackpool
Lancashire
0253 27091

Lerwick
Tomorrow's World
20 Commercial Road
Lerwick
Shetland Isles
0595 2145

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87 Wigmore Street
London
01-486 0373

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Earls Court
London
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45 Nicholsons Walk
Maidenhead
0628 31765

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2/4 Eton Place
Marlow
Bucks
06284 75244

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Newton-Le-Willows
Merseywide
092 524394

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Norwich
Norfolk
0603 614441

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8 Whitworth Road
South West Ind. Estate
Peterlee
Durham
0783 860314

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Format Computing
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Preston
Lancs.
0772 561952

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The Berkshire Camera Centre
154 Friar Street
Reading
Berkshire
0734 599345

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Rye
E. Sussex
Rye 223106

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Ashby Computer Centre
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Scunthorpe
S. Humberside
0724 871756

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Southend
Essex
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Truro
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Uxbridge
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Belgium
03-238 9284

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club exist for Atari, Commodore, Sinclair and Dragon). The liaison man is John Day, 8 Warkwell Close, Chilwell, Nottingham NG9 5FR, tel: (0602) 225660. It intends to form Interest Sections to bring like-minded users together, such as educationalists, radio hams, games players, businessmen, and so on.

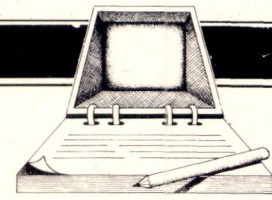
For further information about the ACC, or to contact your local club or National User Group, write to:
Rupert Steele
17 Lawrie Park Crescent
London SE26 6HH Tel: 01-778 6824

BENCHMARKS

A listing of the Benchmarks used when evaluating micros is given below. An explanation can be found in the December '83 issue.

```
100 REM Benchmark 1
110 PRINT "S"
120 FOR K=1 TO 1000
130 NEXT K
140 PRINT "E"
150 END

100 REM Benchmark 2
110 PRINT "S"
120 K=0
130 K=K+1
140 IF K<1000 THEN 130
150 PRINT "E"
160 END

100 REM Benchmark 3
110 PRINT "S"
120 K=0
130 K=K+1
140 A=K/K*K+K-K
150 IF K<1000 THEN 130
160 PRINT "E"
170 END

100 REM Benchmark 4
110 PRINT "S"
120 K=0
130 K=K+1
140 A=K/2*3+4-5
150 K<1000 THEN 130
160 PRINT "E"
170 END

100 REM Benchmark 5
110 PRINT "S"
120 K=0
130 K=K+1
140 A=K/2*3+4-5
150 GOSUB 190
160 IF K<1000 THEN 130
170 PRINT "E"
180 END
190 RETURN

100 REM Benchmark 6
110 PRINT "S"
120 K=0
130 DIM M(5)
140 K=K+1
150 A=K/2*3+4-5
160 GOSUB 220
170 FOR L=1 TO 5
180 NEXT L
190 IF K<1000 THEN 140
200 PRINT "E"
210 END
220 RETURN

100 REM Benchmark 7
110 PRINT "S"
120 K=0
130 DIM M(5)
140 K=K+1
150 A=K/2*3+4-5
160 GOSUB 230
170 FOR L=1 TO 5
180 M(L)=A
190 NEXT L
200 IF K<1000 THEN 140
210 PRINT "E"
220 END
230 RETURN

100 REM Benchmark 8
110 PRINT "S"
120 K=0
130 K=K+1
140 A=K^2
150 B=LOG(K)
160 C=SIN(K)
170 IF K<1000 THEN 130
180 PRINT "E"
190 END
```

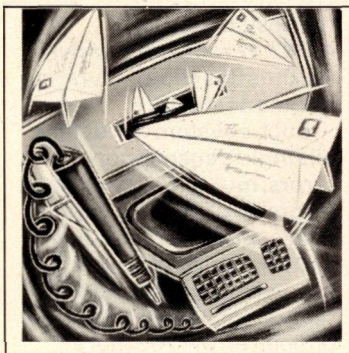
DIARY DATA



Readers are strongly advised to check details with exhibition organisers before making arrangements to avoid wasted journeys due to cancellations, printer's errors, etc.

London	(Wembley Conf Centre), Computer Trade Fair. Contact: Reed Exhibitions, (01) 643 8040.	13-15 March
Chester	(Northgate Arena), Computer & Business Equipment Show. Contact: Glendale Exhibitions, (0244) 45031.	13-15 March
Glasgow	(Albany Hotel, Holiday Inn & Anderston Centre), Scottish Computer Show. Contact: Clapp & Poliak, (061) 832 4242.	13-15 March
Brighton	(Met Exhibition Hall), Computer Aided Design Conf & Exbn. Contact: Reed Exhibitions, (01) 643 8040.	3-5 April
Peterborough	(Saxon Inn), Information Technology Road Show. Contact: David Eccles Enterprises Ltd, (07072) 66322	3-5 April
London	(Wembley Conf Centre), Audio Visual '84. Contact: Nigel Thomas, (01) 688 7788 ext 550.	9-12 April
London	(Cavendish Conf Centre), Computers For Builders Exbn. Contact: A4 Publications Ltd, (088385) 2051.	12 April
London	(Central Hall, Westminster), London Computer Fair (ACC Micro Robotics Conf held in conjunction on 21st). Contact: Tim Collins, (01) 930 1612.	19, 21 & 23 April
Wales	(Elephant & Castle Hotel, Newton, Powys), Mid Wales Computer Exbn. Contact: JO Dale, (0686) 28715.	24 April

C·O·M·M·U·N·I·C·A·T·I·O·N·S



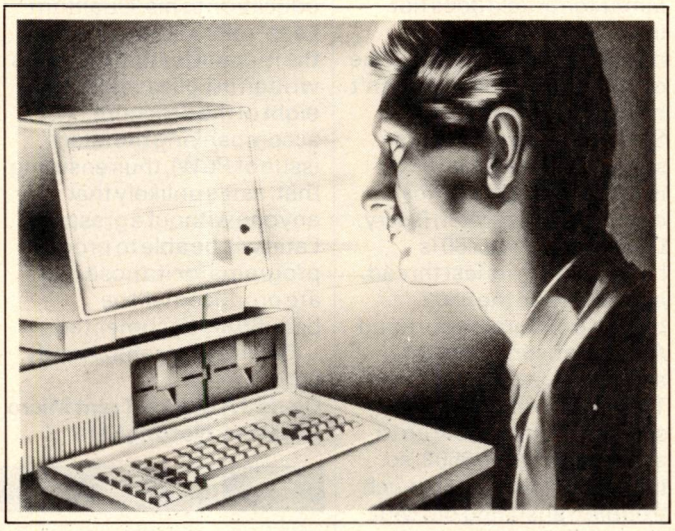
PCW welcomes correspondence from its readers but we must warn that it tends to be one way! Please be as brief as possible and add 'not for publication' if your letter is to be kept private. Please note that we are unable to give advice about the purchase of computers or other hardware/software—these questions must be addressed to Peter Bright (see 'Computer Answers' page). Address letters to 'Communications,' Personal Computer World, 62 Oxford Street, London W1A 2HG.

Hypnosis

I would like to appeal through your pages for help in a rather delicate matter. I refer to Computer Aided Hypnosis (CAH), with which I and a few friends have been experimenting recently. Our work has unfortunately led us into a rather embarrassing situation, and we need some expert advice as soon as possible. The facts are as follows.

We started playing around with computers a couple of years ago, using a Commodore Pet. We played games and taught ourselves to program, but after a year or so we became bored and began to look around for more interesting things to do with our computer. One of our number had recently visited a summer entertainment at Blackpool which involved a stage hypnotist, and had been made to do some rather strange things by this man. We decided to experiment with CAH.

At first, progress was slow. We made no real progress at all until we acquired a more modern computer with a colour monitor, since it had become obvious that both colour and good graphics were essential in establishing the initial trance. It took three months to crack this part of the problem, and we realised we had made the necessary breakthrough when young Len Boot, who was at the keyboard testing our latest idea, suddenly went all glassy-eyed and fell off his chair. It took us three hours and much alcoholic beverage to get him back to normal.



We had great difficulty de-bugging at this stage, because anyone who sat down to put the system through its paces soon found themselves in the same difficulty as young Len—they tended to fall to the ground and require a certain amount of rehabilitation afterwards. We eventually got round the problem by having Mrs. Goodbody (she does odd jobs for us) stand next to the screen with instructions to count backwards from five and snap her fingers loudly whenever the operator began to sway.

It dawned on us at about this time that the system we had devised was open to misuse, and almost immediately our fears were realised. One of our number came in one afternoon following a long, liquid lunch and began to modify the communications routines in a fairly relaxed way. The results were unfortunate, particularly since it was the vicar who had volunteered to be our guinea pig that evening. In response to the computer, our dear reverend suddenly stood up, climbed on to the coffee table and began to sing an extremely vulgar song. Further embarrassment was avoided only by the presence of mind of Mrs. Goodbody, who snapped her fingers just as he began to remove his trousers.

We—that is to say, the more responsible members of our group—were naturally scandalised at such behaviour on the part of a colleague, and we immediately asked him to gather up his floppies and find another group elsewhere. Unfortunately, since he laid claim to a quarter share in the colour monitor, we could not get rid of him until we had had a whip round to pay him off. This was our biggest mistake of all.

Of course, you can guess what happened. Before he finally departed he found time to modify the system quite extensively without our knowledge, so that when the rest of us eventually got back to working on it we found that a number of post-hypnotic-suggestion (PHS) routines had been incorporated where they were least expected, and we all, at one time or another, fell foul of them.

But there's more. There are several prosecutions outstanding as a result of our recent behaviour. One of us has been apprehended three times for directing traffic outside the town hall, and another is on probation for attempting to hijack the 16.22 Victoria to Dover train.

It is vital that we reverse the effects of our CAH software, but we are unable to modify it for fear of what it might make us do while debugging it! We need to contact an experienced CAH man immediately—perhaps someone working in the field at a university—who can show us how to solve this problem. If such a person would be kind enough to contact me via these pages we would all appreciate it very much. I regret having to do it this way, but my colleagues feel they have enough on their minds at the moment without the publicity that might follow the publication of our address.

W F Harrison, Chatham, Kent

Political asides

Is it really necessary to indulge in smug political asides in a computing publication of *PCW*'s calibre?

C·O·M·M·U·N·I·C·A·T·I·O·N·S

I refer to the reference to Automata UK and the Atari defence contract in February's Chip Chat. Implying that those who fight wars are childish is a callow attitude in a world already burdened with tyranny and arrogance, not least that of the cravenly anonymous Guy Kewney responsible for this section. One might as well suggest that Ms Bird lay down arms in her single-minded war on sexism, thus saving the English language from further mutilation.
N Vincent, London WC1

(Guy Kewney is not responsible for Chip Chat—Ed)

Upstart

I find that the very handy 'BBC Word'—December *PCW*'s Program of the Month—also works a treat on the upstart Electron.

Pernickety programmers might want to amend lines 350, 500 and 580 to read Mode6, and Electronspeak prefers # to £ in lines 3020, 3050, 3160, 3190 and 3210.

In practice, mind you, it doesn't make a scrap of difference.

If only Acorn weren't quoting 'about a year' for the necessary hook-up to a printer!
David Taylor, West Clandon, Guildford

Magazine criticisms

I am writing to tell you that I think the new layout and lettering of your magazine is awful.

Most articles' titles have dots everywhere and the letters are too far apart. What happened to the old 'Benchtest' triangle? I though it looked very eye-catching: now we have stripes with clashing colours. Is there a chance that you will revert to the old style? When you changed it in December 1981 it was quite adequate, and I'm sure many of your readers will agree with me.

I just hope the quality of the articles doesn't deteriorate as has the image.

I was also annoyed to see that in the February issue, Paul Overaa's assembly language article does not include the 6809 microprocessor, as this is the only 8-bit processor that isn't hopelessly out of date. Surely his course is more suited to a February 1980 issue? The 8080 is almost completely forgotten (sorry, DAI owners), the Z80 is hanging from its last thread, and CP/M and the 6502 because of Commodore and Acorn's obstinacy in not accepting new technology. The 6809 is virtually software-compatible up to and including the 6502, so there shouldn't be too much trouble translating old 6502 programs/languages.

Does Mr. Overaa realise how many 6809 users there are, how many Dragon 32s have been sold?

Could *PCW* give more attention to today's technology rather than outdated microprocessors?
Paul Hills, Cornwall

(Editorial now has more colour which, together with the new logos, is designed to help you find editorial pages immediately. We left out the 6809 because so few machines use it, but Teach Yourself Assembler should still be useful to Tandy and Dragon owners—Ed)

Latin Quantum Leap

As if computer user manuals weren't unintelligible enough.

No sooner do you publish a cartoon commenting on the lamentable standard of English language used in many instruction manuals supplied with microcomputer software, than Clive Sinclair comes up with the solution (possibly as a result of some of his dealings with MENSA!).

In order to attract only those with a classical education to his 'Quantum Leap' micro, it appears that the manual for this system is written in Latin (see page eight of the brochure accompanying the latest issue of *PCW*), thus ensuring that, as it's unlikely that anyone without a grasp of Latin will be able to produce programs for it, those that are produced will be beautifully documented.

Or isn't the manual ready yet?
David J A Clarke, Trent Micro Systems, Nottingham

Check digits

I read with interest Michael Grose's article on check digits in your December 1983 issue. However, I think there's a danger that readers might assume that, because of its pedigree, the specific system discussed (the International Standard Book Number system) is one to be recommended. In fact, it has certain weaknesses.

It will not detect all multiple transcription errors involving two or more consecutive, identical, digits. For example, the transmission of 11122111 as 11166111 will go undetected.

Similarly, the system is weak in connection with shift errors in codes in which adjacent digits add up to 11. For example, the transmission of 380000 as 3800000 will go undetected.

If a reader is just starting to design a coding system and wishes to include check digits, then he should consider using the remainder from dividing a code by 97. For example, for the basic code 45703, 45703/97 = 471 remainder 16; thus this code is always quoted as 4570316.

Such a system will detect all single transcription errors, multiple transcription errors involving two or more consecutive identical digits and transposition errors, has no obvious weaknesses with regard to shift errors (this is a difficult error to be more specific about) and will detect 99.0% of all errors.
W G Wild, Fareham, Hants

Software piracy

I cannot say how deeply I, and I am sure many others, regret the article on page 13 of February's *PCW*. Far from helping 'the fight against software piracy', you have weakly and cravenly caved in to what amounts to a denial of the reasonable rights of purchasers—and incidentally, since the matter was settled out of court, it does not create a legal precedent.

I am completely opposed to software piracy, as to any other method of defrauding an author of the fruits of his labour. However, anti-copying devices are a totally unreasonable answer and should be banned. If I buy a painting, I am entitled to reframe it, to photograph it for insurance purposes or private study, and even to modify it: what I cannot do is to make and sell prints of it.

If I buy software, I should have an absolute right to copy it for backup purposes, to modify or configure it to my particular needs, and to make it more convenient or faster to load and use.

I am not interested in games personally, but I am outraged at the suggestion that, having paid out money for cassettes, I cannot resave a selection onto disk. This nonsense will hardly, for example, help the sale of Sinclair Microdrives when

the most obvious use is to re-save a selection of games cassettes for easy selection and fast loading.

You have a duty to your readers (who are the customers of your advertisers and the only reason the latter are in business), to ensure that purchasers receive value for money, which includes being able to make use of the software they buy in any way that does not infringe the reasonable intellectual property rights of authors.

In a business application, an uncopyable program could well be in breach of the Sale of Goods Act as 'unfit for purpose' if good user practice required the ability to make copies. Either software protection should be made illegal, or software houses should be required by law to exchange protected copies for unprotected on the purchaser signing a licence agreement, the fee for which, to avoid oppression of customers, should be set by law at not more than 50% of the purchase price of the original program. In addition, you should refuse software advertisements unless they state whether or not the programs are protected and, if they are, the terms on which copyable versions for proper uses are available.

I therefore hope you will rethink your position, which is retrograde and harmful to the reasonable rights of those who have paid for software and have a right to make full proper use of it.

William Lyons, London NW3

Acorn replies

We fully support Mr Lyons' assertion that those who have paid for software have a right to make full proper use of it. However, his use of a painting as an analogy is not really a good comparison since the possibility for 'piracy' is small; few people would accept a photograph of a painting as a reasonable substitute for the original, and to set up and make high quality prints of a painting would be an expensive undertaking. The reason why software piracy is such a problem is that unless a cassette is protected, a user can obtain a perfect copy, indistinguishable from the original, at no more than the cost of a blank cassette. We therefore feel it is essential to protect our software with locking devices; however, these are only designed to inhibit the unlawful user, and it is a definite policy that these should not hamper the honest user.

Without these locking devices we are certain that illegal copying of our programs would be far more widespread and it is not only the software companies like ourselves who suffer — many authors rely on royalties from sales of our programs to reward their work and every illegal copy is depriving authors of their rightful royalty.

Also, the cost of developing certain types of software, particularly the more serious software applications, is generally very high and the only way that we can charge a low price for such applications is if we are fairly sure that the original investment in developing this software will be recouped over a large number of sales. If copying is not discouraged, software companies may find it uneconomic to develop these types of programs or to publish specialist titles where the envisaged number of sales is fairly small.

Unfortunately, we do not know of any way of preventing unlawful copying while allowing the rightful owner of the program to make backup copies, or to transfer a cassette copy to disk. However, we do offer a free of charge replacement service for any faulty cassette or disc returned at any time during its use, and we have organised a cassette replacement scheme whereby customers can return their cassettes and receive brand new disc copies at half price.

We feel that these policies provide the only feasible compromise to giving a free rein to piracy on the one hand, and unnecessarily restricting software publishing on the other.

David Johnson-Davies
Managing Director
Acornsoft
Cambridge

No government approval

Now that portable large-memory micros are available (Husky Hunter, for example) that can run CP/M programs such as WordStar and Supercalc, a whole new dimension has opened up to the software piracy industry. How can anyone stop people downloading programs to a portable and re-loading them elsewhere?

Also, although the British Government (via the MoD) is a major user of portable micros, the Central Computer & Telecommunications Agency, which evaluates micros and recommends machines to prospective users in government departments, apparently has no category for portable micros, and cannot actually approve them.

Odd?

Peter Bush, Saffron Walden, Essex

Useful utility?

```
10 REM useful utility for PCW
readers
20 REM A NOBLE
50 REM Burton on Trent
60 REM Staffs DE12 7AL
70
80 total = 0 : last
page = 400 : page = 1
90 REPEAT
100 IF page = ADVERTS
THEN SOUND FART ELSE
SOUND TRUMPETS
110 IF page = ADVERTS
total = total + 1
120 page = page + 1
130 UNTIL page = last page
140 IF (100*total)/last
page > 30% THEN REJOICE
ELSE CANCEL SUBS AT
NEWSAGENT
150 goto30000
160
170
180
190
200
30000 PRINT "Go on . . .
Publish and be damned!!"
30010 END
```

Anon

Pet Wave conversion

PCW Programs are excellent. Keep up the good work. Does anyone have a conversion of the Pet Wave Simulation, *PCW*, October 1983, pages 280-82, for the BBC model B?

William Cooper, Swansea

Dear PCW subscriptions

Well, you just lost one subscriber to *PCW*. Don't get the wrong idea — I'll still read *PCW*, I just refuse to pay £3.33 for the privilege of having the magazine sent direct from you to me when for 85 pence (plus p&p) I can get the same magazine a few days later.

Unless you can justify £2.45 as postage and packing this is one reader who will (grudgingly) wait a few days.

D Harker, Ipswich

(We're very sorry about the increase in subscription cost — the postage is very expensive. Why not reserve an issue each month at your newsagent? See the newsagent card in this issue — Ed)

Program listings problem

I can see the need for small print for long program listings.

I can see how a coloured background discourages photocopying.

16 BIT

COPAM INTELLIGET PC-301

PERSONAL COMPUTER

PC301 SPECIFICATIONS:

Microprocessor: Intel 16 bit CPU 8088
Operation System: MS DOS 2.0
User Memory: 128K Expandable to 512K
Disk Drives: Dual DSDD 720 Kbyte
Interface: 2 Serial RS-232 Port
1 Parallel Centronics Port
8 Expansion Slots
Power Supply: 100W Enough to Support Hard Disk
Keyboard: Capacitor Type 50 Million Strikes
Resolution: 640 x 400 Dots with 16 Colours
Calendar Clock



SOFTWARE

COPAM INTELLIGENT PC-301 uses the MS-DOS 2.0 as operating system.
COPAM INTELLIGENT PC-301 can be used to run countless package those are designed under MS-DOS such as 1·2·3, Multiplan, Wordstar, VisiCalc, DBASE II, Copy II PC . . . etc. IBM PC compatible package can be used on CPAM INTELLIGENT PC-301, this compatibility will assure you the ever increasing supply of more powerful package in the future.
The CP/M-86 will run the COPAM INTELLIGENT PC-301, the meaning of this compatibility is the software which developed under CP/M-86 can be used on theCOPAM INTELLIGENT PC-301.

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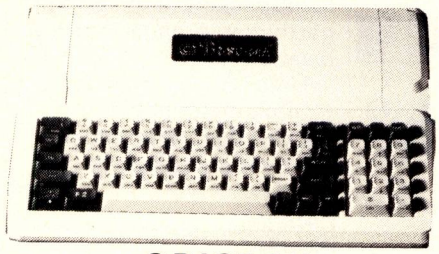

G BASE-64A

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Self-test to check Rom, sound, pattern, color and Ram. **£320**
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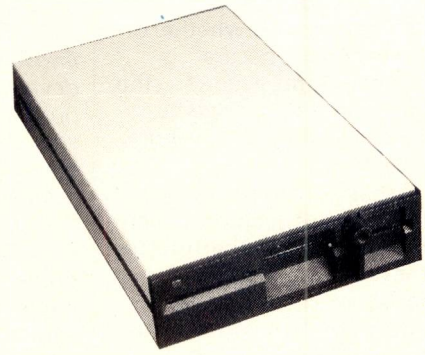

Multitech slimmer half-height 5.25-inch minifloppy disk drive, 100% high quality, Apple™ II compatibility. This slim, stylishly designed drive provides 143 Kbytes of storage with 35 track compatibility. The slimmer provides a 34 pin standard format interface for use with the IBM™ PC. **£175**

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C·O·M·M·U·N·I·C·A·T·I·O·N·S

But my eyes are dim, I cannot see.

Us grandparents, who have the time and patience to type in these programs have a problem!

Brian Gill Oldham

(I do sympathise. Sorry things have been coming out small sometimes—watch out for an improvement, or you can also download our programs Micronet—Ed)

No NewBrain information

I was very interested in G McMullon's letter in the January issue of *PCW*, as I have a NewBrain with twin disk system and expansion unit but cannot get hold of any detailed information to enable me to make proper use of it. The Technical Notes to which Mr McMullon refers seem to be just what I want.

I have written to Tradecom International, Brainwave Software Ltd and AJ Electronics quoting the substance of Mr McMullon's letter and asking for information.

Perhaps through your columns I might ask all users of NewBrain disk systems to add their support by writing to Tradecom and Brainwave, thus adding weight to my request to them.

Robert W McCall, Maidstone, Kent

The party's just beginning

Martin Banks may enjoy reminiscing about the good old days of the DIY computer market but this is no excuse for accepting defeat in front of the IBM onslaught. As he more accurately says at the end of his article 'On the other hand...', the British home computer market with its ferocious independence and reputation for entrepreneurship will not easily knuckle under to the threat from its big blue brother from over the water. IBM may have a stranglehold on the business market but this is only because standardisation is so very desirable among firms whose very livelihood may depend on their computers and the speed at which they can communicate with each other.

Indeed, against competition like Sinclair, Acorn, Commodore and Atari, who are well versed in the ways of the bitter back-biting of the home computer market, IBM may have bitten off more than it can chew. As Martin says, TI and Mattel have already retreated licking their wounds despite large resources, and IBM, with its large corporation may well misread what is a highly volatile situation in which the average 14 year old computer whizz-kid will not take kindly to being dictated to by the likes of IBM.

IBM is certainly 'looming ominously' over the market, but with the launch of the new Sinclair QL it would appear that David has it in for Goliath once again. After all, who is going to pay enormous sums (to the home user anyway) for a PC Junior when an only slightly inferior QL can be obtained for £400? In fact, if the current trend continues the two big markets developing upwards and downwards respectively look like meeting head on in the middle, which will certainly shake up the computer market and it may well be IBM that retires with a sore head.

The main problem IBM can pose to the current market leaders is through its ability to support the product with massive resources and reliability. However, it seems to have arrived on the scene just too late for this to have the impact it might once have had. Sinclair, Commodore and Acorn have all had their problems in supplying both hardware and software on demand, but in three or four years they have learnt many lessons that IBM still has to face, particularly that of dealing with production schedules of over 100,000 machines a month, something that even IBM may find tough to deal with.

Next year seems to be the year, not in which the fun will come to an end, but the one in which the computer user will be treated to a bloodthirsty battle the like of which can never be matched on any computer screen. As for buying India for jaded executives, that may be the only place the IBM executives will find work if they lose this particular battle.

Bob Wade, Orpington, Kent

Unreliable

Mr. Whitfield's letter in your February issue struck a responsive chord with me. As a professional technical translator, I make full use, all day and every day, of the full facilities of a word processor.

A few months back, the adulatory reviews of the BBC Micro led me to think that I should bring my equipment up to date and order a BBC machine, complete with the essential disk drive.

In due (delayed) course the machine arrived, but minus the 'non available' disk drive. Attempts to familiarise myself with it showed that it would print only gibberish, and further investigation revealed that I had been given a bonus in the shape of an inter-bus short circuit in the printer interface section.

Enforced use of cassettes soon introduced me to the Acorn philosophy that cassette program buyers need to spend a further £10 on a book that tells them how to use the program. However, most books of this kind are not available.

My dealer has now received the necessary interface chips for the disks, but on fitting them found once again that the system was inoperative, and after much delving into the works found an IC holder minus contacts for the IC pins.

Fortunately my trusty 'obsolete' Genie II plus 'obsolete' Word-for-Word keeps my professional practice going. I naturally feel that I have been the victim of a racket when I survey the very expensive pile of Acorn junk littering my office, but more to the point I am extremely concerned that such an unreliable product, marketed by a company whose marketing methods my solicitor forbids me to describe, should be receiving powerful official support from the BBC and from government ministries in its introduction into educational establishments.

R A Fereday, OBE., PhD., Hove, East Sussex

Out of stock

I recently had to replace the power supply unit on my BBC Micro. Living close to central London, I rang the Acorn shop at Covent Garden and was told that not only did they not have one in stock, but were also unable to order one. It seems the reason for this is that the shop does not have an order number allowing them to order spares; the shop is owned by Acorn!

The shop was unable to give me the name of a dealer who would be able to supply a power unit, offering me instead the telephone number of the Customer Services department in Cambridge—'they might be able to help'. Perhaps not suprisingly, if this incident is typical, the customer services number seems to be permanently engaged.

Any ideas on where I can buy a BBC power supply unit, anyone?

Sean Phillips, EC2 END

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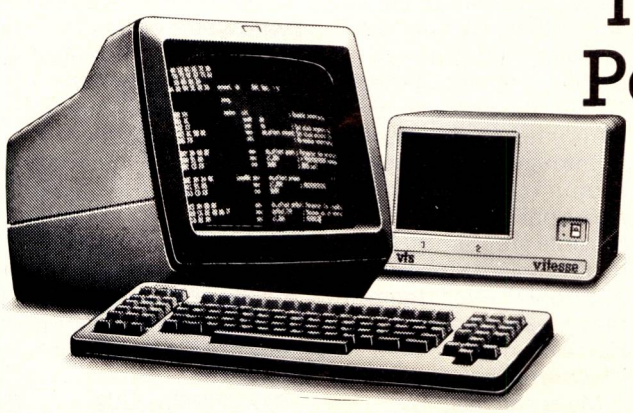

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CHIP CHAT

Amid cries of 'ageist product promotion', writers on the new US magazine *PCjr* aren't getting the chance to write at all because the launch has been delayed.

David Schissler, director of the publishing house hoping to produce the periodical, blames IBM for not getting the machines to the dealers on time. At the last count, each store had one PC Junior in stock for window shopping only.

* * *

The QL almost swept the micro market clean before it was announced. QDOS, the operating system with kudos, was originally to have been known as Domestic Operating System, DomesDos for short. Goes on working even after the rush (for QLs that is), killing 99% of all known bugs.

* * *

New York publisher Harper and Row has produced a glossary for Gweeps which should be groked by users and lusers alike. This glitch-free manual provides a canonical reference to the cuspy talk we're supposed to flame. *Time* magazine has given it a rave review, but it's certain that this moby mumblage will punt before login to language used in the *real world* (Noun, singular: where hacks don't live).

* * *

Junk food becomes junkie fodder for four programmers from Imagine Software. Their cruel boss has locked them in a dungeon for three months with nothing but limitless supplies of soft drinks and take-away toasties. If they haven't produced the biggest and best games ever for the Spectrum and Commodore 64 by launch time in May, they'll be sent to a fate worse than the biggest and best game ever written. The signs are that targets will be met: with only six weeks gone, both programs already have titles.

* * *

Model Brigade describes itself as 'a small select group of working models and promotion girls with a wealth of experience: efficient, attractive and conscientious, and aiming to satisfy both client and girls by ensuring that financial arrangements are sensible, in so far as the client is not overcharged and the girls are suitably rewarded for their endeavours.' This pen portrait comes in a letter to Computer Town UK! suggesting that personality girls will enhance CTUK! events. Well, Model Brigade, all CTUK! events depend on the voluntary service of participants: ChipChat is sure you'll agree this is a sensible financial arrangement, and we look forward to seeing you soon.

* * *

Radio 4's Roger Cook featured restaurateur Peter Sanders on a recent 'Checkpoint' programme. Mr Sanders, ex-barrister and Ferrari owner, runs West End restaurant La Vie en Rose, where Hitachi launched its PC. Cook interviewed a number of people who were far from happy with Sanders' business practices; we hope Hitachi managed to escape without serious commercial damage from its association with Mr S. Anyone else contemplating La Vie en Rose as a press conference venue might be wise to have a chat with Roger Cook first.

* * *

Have you heard about the Metropolitan Police Computer Group? The group newsletter's communications page is rumoured to begin: 'My program was proceeding in an orderly fashion when I observed a bug acting in a manner likely to arouse suspicion.'

* * *

```
10 MEWN "A
20 GAN X =1 AT 10 CAM 3
30 PROCIO(A + 1000),X
40 NESAS X
```

No, not another newhack lingo, but Basic Cymraeg 700 for the Sharp MZ-700. Welsh TJs are keen to compute in the vernacular, so David Computer Software of Stockport has come up with the answer. A company spokesman told ChipChat: 'Oh yes, in mid-Wales particularly they prefer to do everything in their own language.' Well, I mean, don't we all?

* * *

Oh dear, there goes another petard, and hoist with it is Commodore Computers UK, whose recent adverts have been promising 'peripherals not promises'. Customer Richard Hargrave waited six months for a 1526 printer before cancelling his order, but — and here's the rub — Richard is a member of the legal profession and has written to the Advertising Standards Authority (ASA). Tough luck on Commodore, but good news for all those consumers who, after much frustration with a variety of manufacturers, end up trying to forget the whole sorry business of their missing equipment. In fact, anyone can — and should — write to the ASA with details of advertising apparently 'calculated to deceive the consumer'. The more we let 'em get away with it, the more they try it on.

* * *

The single most expensive item on the Royal shopping list last year was a £9 million refit for the Royal Yacht Britannia. Maintenance on palaces ran to £8 million, so in an attempt to tighten belts and improve efficiency in palace budgeting, £133,000 has been spent in the last two years on a Burroughs 930 minicomputer and seven microchip-based word processors. A select committee of Palace security staff is expected to announce soon that tourists in the 1985 summer season will be able to watch the Changing of the Robots at 11 am and 4 pm.

* * *

Word processors are revealing the truth about their users, and the truth is that the users can't write. IBM gets at least one call a week from US universities begging for a program to teach good writing habits, and willing to pay anything for one. So, IBM has developed algorithms for style-checking software — a prototype is soon to be installed in Carnegie University. One option under consideration is a sexist-prose checker. Have *you* put that hyphen in the right place?

* * *

BLUDNERS



BBC 'Video Credits Generator' (*PCW*, February) suffered an attack of the gremlins. In lines 160, 170, 180 and 200, the 'less than' (<) and 'greater than' (>) signs crept off the page when nobody was looking. The relevant lines should read 'IF C1<1 OR C1>7 . . .'; 'IF C2<1 OR C2>7 . . .'; 'IF 0<1 OR 0>2 . . .'; and 'IF S<1 OR S>10 . . .'.

Line 230 also wrapped onto the next line at a rather unfortunate place: there should be a space between the quotes, or the last part of the line can be written as '. . . GET$=CHR$(32)'.

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Maximising



The British computer industry is small when judged by international standards. Two large American companies control 90% of world markets. They can do this because their products represent the standard by which others are judged. When these standards are accepted by the marketplace they have the effect of stabilising the technology. Thus CP/M is accepted as the industry standard operating system for 8 bit processors, and subsequent computer development has employed this standard, with the dual effect of making both man and machine portable. Operators can use different computers, with CP/M, and software can be switched from machine to machine. For the end user the emergence of



technology

these standards is critical because they allow him to experiment with the technology without risk of entering blind alleys where systems and products disappear. In order to avoid this situation Memotech has employed these standards within the MTX Series.

In the UK there has been such rapid development in microsystems that in many cases users have been seduced by the technology rather than the standards they should be following. In educational and business applications the need for continuity is obvious. This is accentuated by the development of database technology, where very large information files are accumulated, the primary expense being the input of data. Companies and schools will not relish the idea of trying to rescue data when the standard 32 bit machines appear in two years time.

There has been a tendency for manufacturers to launch machines which are still on the drawing board, and for which no software standards exist. CP/M 80, the industry standard micro operating system, supports tens of thousands of commercially available software packages. IBM take the view that things should be done properly and *then* released to the user. This is a well tried and clearly well tested premise which Memotech has implemented in the MTX series.

The MTX Series begins with the MTX500, which costs £275.00 including VAT. The MTX512, illustrated below, costs £315.00 including VAT, has 64K of User RAM plus 16K of dedicated Video RAM, and comes with extended BASIC, a powerful assembler/disassembler, Front Panel machine level editor/monitor, and Noddy, a new text and graphics processing language.

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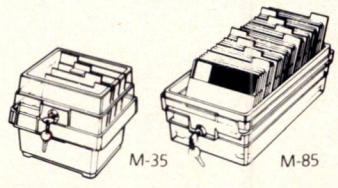

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This month the mutant camels strike back, with plumbers, manic train drivers and cosmic guerillas bringing up the rear. Commodore 64, Atari, Spectrum and Oric machines make further strategic moves.







REVENGE OF THE MUTANT CAMELS

Supplier: Llamasoft
Computer: Commodore 64
Price: £7.50

Remember the mutant camels that invaded the Earth in last month's Screenplay? Well, they're back, but this time they're on our side.

A group of these camels has apparently been convinced of their loyalty to Earth (with the aid of 10,000 telepathic MetaGoats), so a brave band of them (five per game) are off to do battle with the Zzaxians on their Psychological Disorientation Warfare Development planetoid, Phensyk III. This planetoid is used to develop bizarre disorientation weapons scheduled for use against Earth but now thrown against the attacking camels.

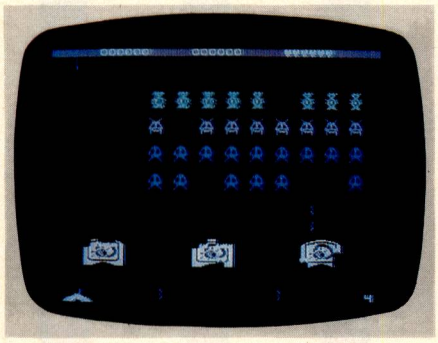
It's this variety of nasties that supplies the flavour of this sequel game. There are 42 different screens of nasties for your camel to plod through before you achieve the usual goal of a high score.

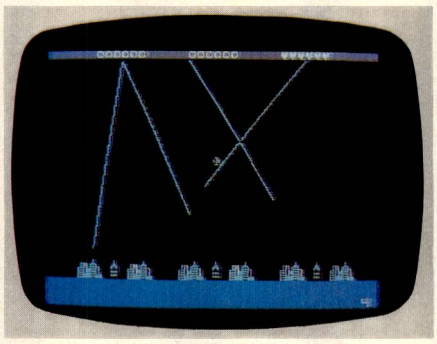
To survive, and thereby achieve a decent score in Revenge, you must discover tactics for each of the screens you meet. The tactics employed are as varied as the screens themselves. In some screens there are safe spots where your camels can walk unhindered. In other areas you must shoot your way out, and yet in others the aliens' nastiness is directly related to your own aggression.

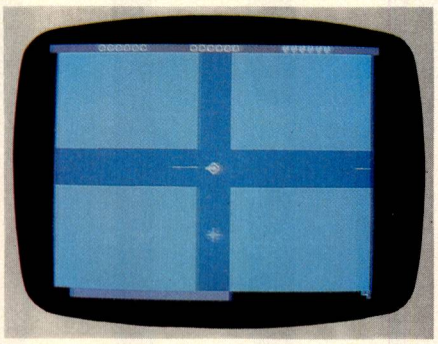
Before the action begins, each screen title is displayed in the form of a pun, which rapidly wears thin as the humour is lost along with your camels. These screen titles include: 'Mind your axe Eugene', 'Manic Minter', 'Inky, Pinky, Blinky and Thud' (Pacman characters), 'Through pastures blue' (exploding sheep), 'No Cruise is good Cruise' and 'Haven't we met somewhere before', which features an attack by ships similar to those in the original 'Attack of the Mutant Camels'.

'Revenge' is an object lesson in both the use of sprites and the Commodore 64's sound capabilities, but as the games tactics are learned and practised by the player, the game's addictive qualities rapidly decrease. **TH**

Presentation	**90%**
Addictive quality	**35%**
Use of Graphics	**90%**
Value for money	**60%**







DELTA 4

Supplier: Nectarine
Computer: 48k Oric
Price: £8.95

As if designed deliberately to bear out my remarks on arcade clones in the Spectrum reviews, here's a 'new' arcade game for the 48k Oric. Delta 4 consists of four individual games, at least two of which you will recognise immediately, linked together in a 'lasergramme' on the cassette inlay that informs you that the Galactic Alliance is under permanent attack on four fronts. You have the option of going on a 'tour of duty' which covers all battle fronts in turn, or you may select any one front on which to fight. Your enemy is a force of implacable invading alien androids.

Delta 4 loads very easily — which is just as well, as it's recorded at 'fast' speed only. Once the tape has loaded, a tap of the space bar takes you into — stop me if you've heard this before — Space Invasion. As the inlay tells you: 'An armada of invading aliens seems to be sweeping inexorably down to annihilate our planet'. You can stop them by positioning your laser base and firing at them as they descend. If a single alien reaches the planet surface you will lose all your lives, and perhaps I should mention that there's the occasional chance to take a potshot at the alien Mother Ship; this scores a bonus . . .

After seeing off the Space Invaders, you move on to Crossfire. Here you control a swivelling turret gun at the crossroads of four channels, down

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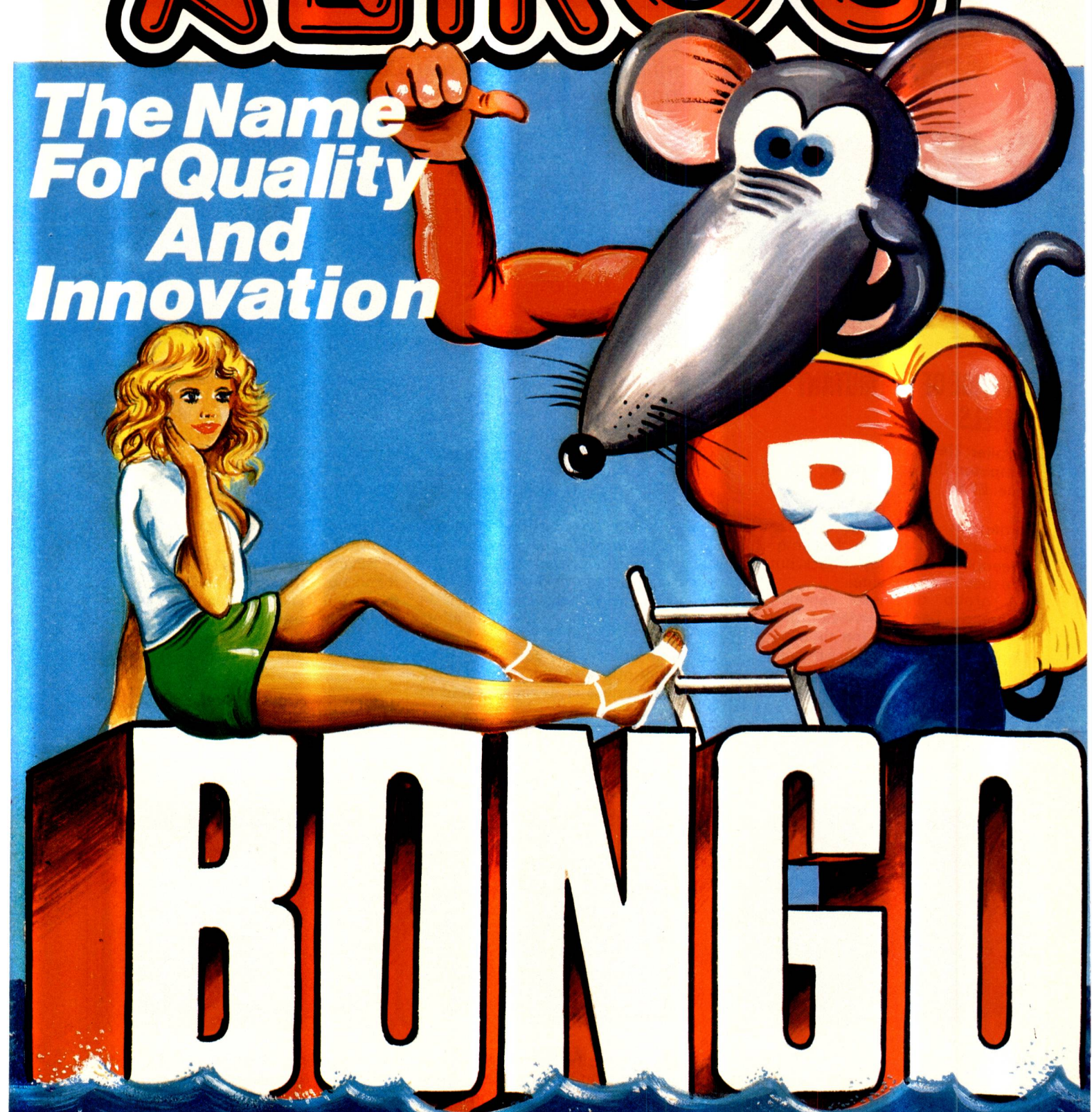

BONGO

Enjoy the hilarious antics of the Comical Mouse as he overcomes all dangers to win the heart of the lovely princess by collecting her lost diamonds. He must climb ladders, slide down the chutes, use transporters and trampolines to jump across divides to escape and outwit his pursuers. Six screens with three levels of difficulty.

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which the robots pour in a kamikaze-style attack.

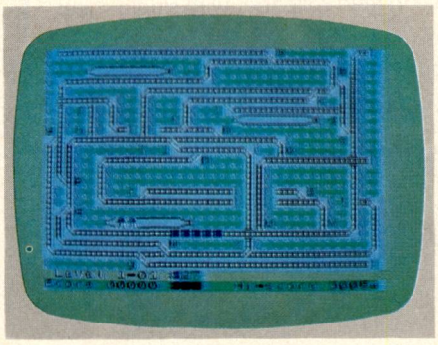
Then it's onwards, ever onwards, to Cosmic Guerillas, in which two flights of robots are lined up in formation, one on each side of the defending bases. Protecting the bases are three layers of protective pods. The robots move inwards to remove the pods one at a time, thus exposing the bases themselves to attack. You attempt to thwart them by firing upwards from the bottom of the screen. Destroy the guerillas and the pods will re-form for the next wave.

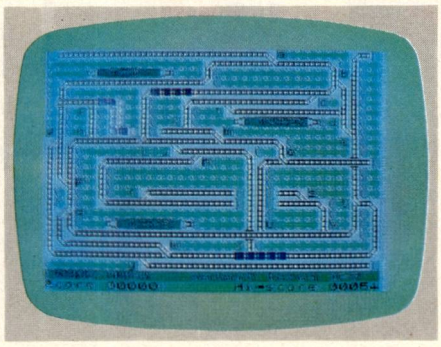
The final part of the Delta 4 package will also bring on a touch of *déjà vu*. Missile Command is, surprisingly, Missile Command. This particular version limits you to 10 missiles per wave for each of your three turrets, so you must be careful to avoid wasting shots.

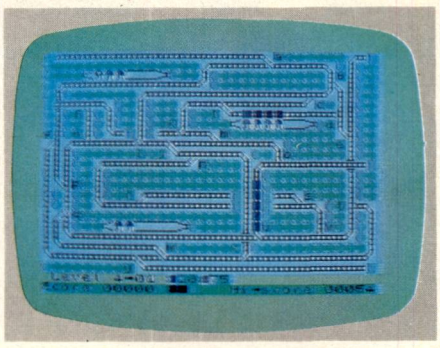
Each of the games has eight levels of difficulty, and on completion of a game the player moves automatically to the next game at the same level. When you can beat all four games at one level you will move onto the next automatically. The Hall of Fame gives an overall score, rather than displaying individual high scores for each game.

Despite the fact that there's nothing too new here, it must be said that this cassette is very professionally produced. There are demo modes for all four games, plus a digitised photograph of author Andy Green, which certainly shows off the capability of the Oric's hi-res mode. At the lower levels, Space Invasion in particular is abysmally slow-moving, but things improve considerably as the levels get higher. The controls are kept very simple, and the graphics and sound are certainly as good as they need to be. I found the procedure for moving directly to any game other than Space Invasion rather tiresome — you must wait until the demo mode cycles to your chosen game, then press CTRL while the game is being displayed. Still, if you are an arcade freak who owns an Oric and you don't yet possess a copy of Missile Command or Space Invaders, you might as well try this. Taken individually, the games may not be quite as good as other versions that have the luxury of the whole of addressable RAM to draw on, but they do the job more than adequately. **SM**

Presentation:	**90%**
Use of graphics:	**75%**
Addictive quality:	**30%**
Value for money:	**70%**







THE TRAIN GAME

Supplier: Microsphere
Computer: 16/48k Spectrum
Price: £5.95

The Train Game has been on sale for a few months now, but earns its place here as an example of an increasingly rare breed — a totally *original* home computer game. With very few exceptions, the monthly batches of 'new exciting' games for the popular machines are, on closer examination, mere anagrams of themselves — like Status Quo singles! Conventional arcade games all fall into a few clearly defined formats and, while not denying that some companies do manage to maintain a high standard of stunningly good games, I find that the bulk of the material that arrives for review consists of the same old games, disguised with the aid of various cosmetic differences. This is best illustrated by taking as an example Quicksilva's Games Designer package — the blurb boasts that the Games Designer will allow the user to create a whole range of professional-looking arcade games, but in fact all these games must operate in one of four formats. Using the Space Invaders format, one game features witches on broomsticks who must be shot down in the usual manner. The graphics for this are certainly well done — but this can't disguise the fact that you are still playing Space Invaders . . .

The Train Game, refreshingly, refuses to be pigeon-holed — there's not an alien, a ghost, a frog or a robot in sight. Instead, it harkens back to those far-off days when every small boy's dream was an electric train set — and when every proud father would buy one so that he could play with it himself. Load the cassette, and a plan view of a railway network appears with a blue train chugging merrily around the circuit. Pressing any number between one and seven gets rid of the demo and puts you in charge of the train. At the simplest level, all you need do is guide the train around the circuit, switching points as necessary and stopping at the stations to pick up passengers. All the points are labelled with a single letter and pressing the relevant key determines the path the train takes. To stop at a station you need only press the '1' key. Of course, there are hazards — a wrong points setting leads to derailment, and if you delay too long before stopping at a station there's a good chance that one or more of the passengers will go white with rage and hijack the train when it finally arrives, or else the platform will fill up and members of the public will end up on the tracks. You start with four lives and lose one with each of these incidents. Onscreen at all times is a display showing your current level, the number of lives left, the speed of the train and your score.

This is all great fun, but the novelty would soon wear off if this were all that happened. However, picking up 25 passengers allows you to move to the next sub-level. At level 1 your blue train is replaced by a red one and things proceed as before, with the exception that this time you must remember to press '2' to make the train stop at a station. Another 25 passengers and on you go to sub-level 3 and a magenta train . . .

Progress through the levels is automatic, but as you become more proficient you may elect to start off at a more difficult stage. The Train Game gets very difficult indeed — as you reach the higher levels you find yourself in charge of three trains at once, any one of which may only pick up passengers of the same colour. If nothing else, it'll do wonders for your keyboard techni-

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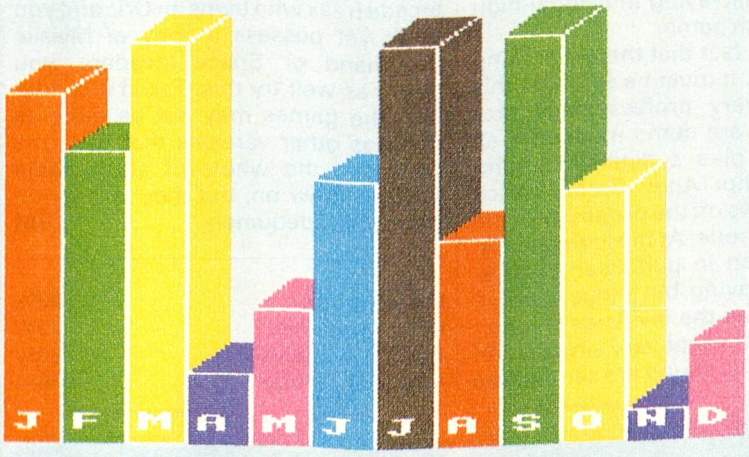

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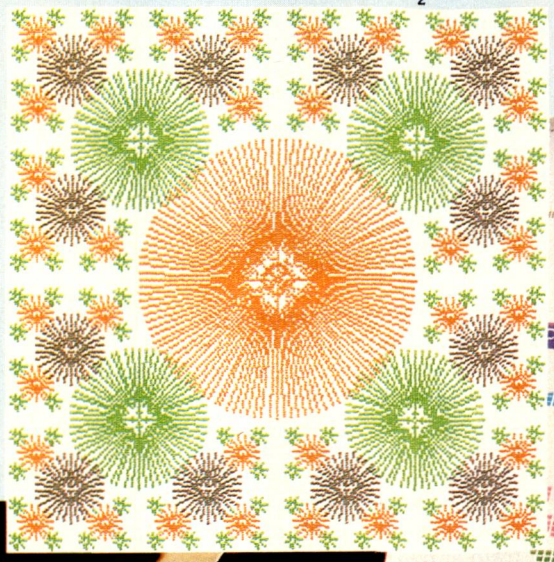



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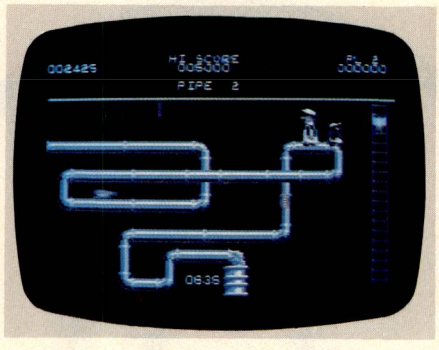
que — you must hit the right key out of a choice of 20 or so, and you must do it without hesitation. Just to add to the fun, the odd 'lost' express or goods train will appear from the tunnel at the bottom right of the screen. The only way to get rid of these interlopers is to send them back whence they came — but make sure that one of your own trains doesn't follow or it's another lost life. There are also 'bonus' games, in which train direction is changed by means of a turntable instead of points-switching.

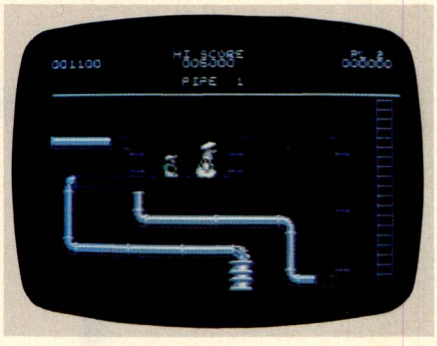
All in all, there are seven main levels of play. Levels 1-6 each have five sub-levels while level 7 features no less than nine. Each sub-level has a unique combination of trains and speeds, and when you finally get bored with all the alternatives you can go through the whole thing again using a different track layout.

The Train Game impressed me greatly. After the initial period of familiarisation I soon got the hang of the controls, and the action at the higher levels is fast and furious enough for anyone. The huge number of possible combinations ensures that this is not a game that will pall quickly, and the sheer novelty of the concept makes a very welcome change from the hordes of arcade clones. The Spectrum even manages a passable imitation of the noise of a steam engine, although this does grate after a while (it may be switched on or off as desired). The graphics could have been a little better, but this is a minor quibble in this instance and in no way detracted from my enjoyment of what is a very well thought out and hugely entertaining game. **SM**

Presentation	**75%**
Use of graphics	**65%**
Addictive quality	**90%**
Value for money	**90%**







SUPER PIPELINE

Supplier: Task Set
Computer: Commodore 64
Price: £6.90

Despite the label 'arcade games', there are very few so-called games that would actually survive the coin-slot test. I doubt the enjoyment of these games at 20p a go. Super Pipeline would do very well if it were installed in pubs and arcades alongside the Galaxians, Pacmen and fruit machines. In fact, I wouldn't be at all surprised if it were the first game to make the transition from home computer to arcade against the flood of games moving from the arcade to the home.

The idea behind the game is basically simple, as are all the best games. You are a plumber whose job it is to ensure that oil flows along the pipe that winds from the top left hand corner of the screen down to the barrel at the bottom. The oil flows through at a steady rate until 1000 gallons are collected.

Obviously, this would be too easy without any nasties acting against you and so the Commodore 64 organises a three-pronged attack.

To the right of the pipe is a ladder, up which two of the attacks approach. The first is a series of men who run up the ladder and along a shelf above the pipe, dropping plugs that break the pipe and stop the flow. Being a good union man, you don't repair these breaks yourself, as it's the job of your mate to do the work. All you have to do is lead your mate to the damaged pipe.

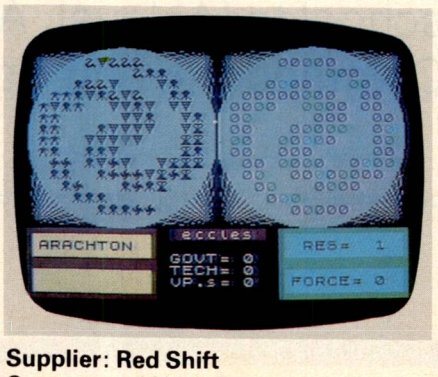
However, the ladder is also the entry point for spiders which drop down on the pipe and try to bite (kill) you. Luckily you are provided with a gun to shoot these spiders (and the men while they're on the ladder) and if all else fails your plumber's mate is dispensable, since as one dies another is employed.

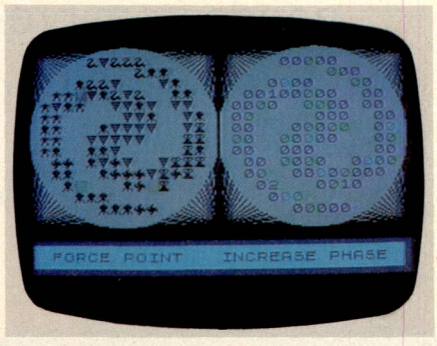
The third prong of the attack is more deadly and consists of lobsters which cannot be shot, and pursue you until they taste blood.

When the barrel has been filled you move on to the next screen which consists of a longer pipe, more spiders and more frequent lobsters. **TH**

Presentation	**60%**
Addictive quality	**70%**
Use of graphics	**75%**
Value for money	**65%**







NEBULA

Supplier: Red Shift
Computer: 16/48k Spectrum
Price: £6.95

My decision this month to try to get away from Spectrum arcade games, and instead to concentrate on material

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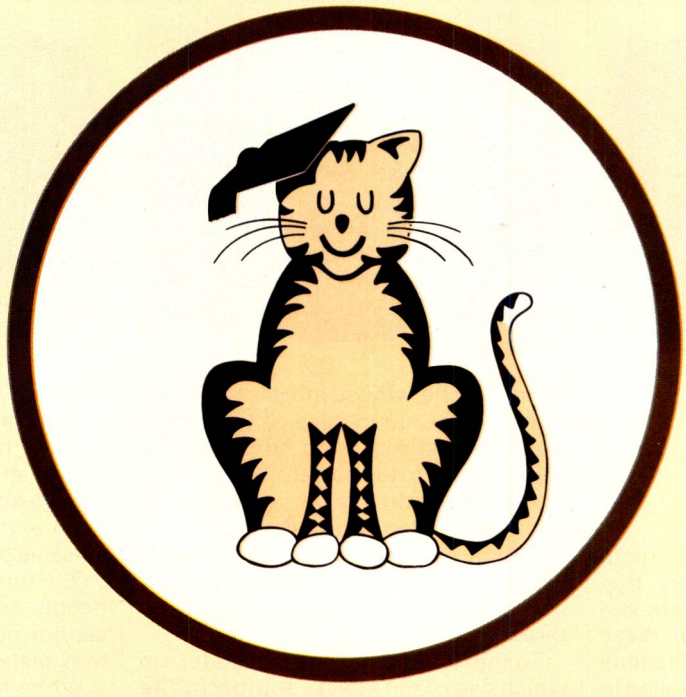

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that involves planning and strategy rather than just good coordination and a quick trigger finger, took me to a small shop-cum-office in darkest Stoke Newington. Here, a large sign saying 'CONFLICT' leads into the lair of the lads from Red Shift, all of whom seem to hate arcade games but who positively wallow in the delights of war-gaming. (For the uninitiated, it should be stated that 'war-gaming' is a term that covers a wide range of activities, from recreated battles of the past fought out on a table-top, using painstakingly exact scale models of the troops of the period, to board games like Diplomacy.)

A computer is an ideal aid to this sort of gaming. It will map out the playing area, keep track of the relevant moves and the relative strengths of the combatants, and can be used as an opponent when no humans are available.

I had initially been attracted by Red Shift's adverts for Apocalypse, a game which can be best described as 'all-encompassing'. Documentation for Apocalypse points out that play may last from four hours to four years (yes, years!), and expansion packs may be bought, allowing, for example, scenarios from the fall of the Roman Empire, the Napoleonic Wars or future wars in distant galaxies to be played out by two to four players (any millenium between 0 and 7999 AD may be selected). However, as a newcomer to this type of computer gaming, I allowed myself to be persuaded that Apocalypse could be left to a later occasion, and instead picked up a copy of Nebula for this review.

Nebula is described as 'a game of strategic galactic conflict'. Players (any number between one and five) take the roles of emperors attempting to expand and control their empires, all of which are based in different star systems. Inhabitants of the various systems are forced to serve their emperor, but imperial control may be threatened by war with other empires, civil unrest and plague.

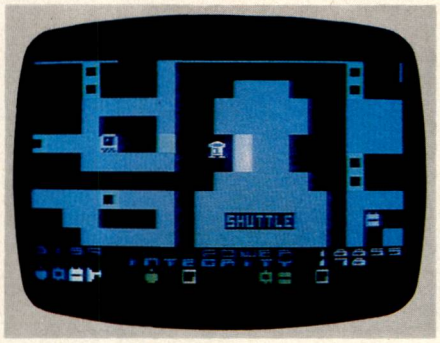
To start with, it is necessary to select a galaxy in which to play. Nebula offers a choice of four different galaxies, and the documentation explains which one is best for one-player games, or for short or long encounters. There are six different races inhabiting the galaxy, and a seventh — the Drakar — appears only when the one-player option is selected. Two different maps of the selected galaxy are displayed side by side on the screen: the left hand map shows the distribution of the six races, while the right hand map is colour-coded and shows the resource levels of the systems. To win the game, the victory conditions must be set, and tailored to suit the length of game desired.

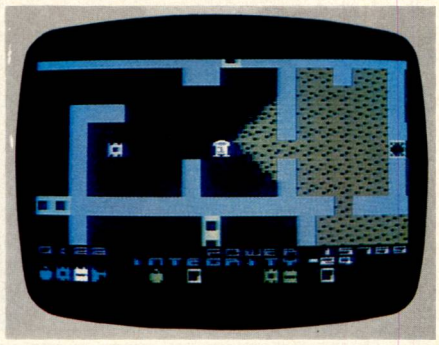
Andy at Red Shift assured me that the computer would thrash me at my first attempt (it did), and that the instructions, although confusing at first glance, are in fact easy to follow if you accept Red Shift's recommendation to load Nebula first and then go through the instructions while actually playing the game.

I found Nebula to be an extremely absorbing game; the graphics are clear enough, although this game would benefit from a computer that uses the full screen size, as the two adjacent maps mean that the figures are quite small. It's certainly a game that will stand up to repeated playing, and is recommended to anyone who can stand to put a bit more thought into their games-playing. **SM**

Presentation	**85%**
Use of graphics	**80%**
Addictive quality	**90%**
Value for money	**90%**







SS ACHILLES

Supplier: Beyond Software
Computer: Atari 400/800 with 48k + one joystick
Price: £19.95

When I first saw this game in the office I thought it was a version of an excellent board game produced by TSR Hobbies called the 'Awful Green Things From Outer Space'. It's based on those awful Sixties space films where countless spaceships were invaded by aliens with a common aim: to destroy the Earth. SS Achilles is obviously inspired by those same films but they have missed their chance to produce a really good game, in which the crew would fight the aliens with whatever weapons they could find.

Unfortunately, the crew of SS Achilles has given up without a fight and is content to collect its ill-gotten gains before escaping in a shuttle.

Realism takes a day off, as this game results in a version of the age-old maze format. Happily, there are still sufficient differences to make the game worth playing but I can't help feeling that SS Achilles is the game that got away. Having said that, the game is a race against time and is well worth playing.

The objective is to collect as many of the alien relics (acquired from earlier exploits) as possible, before escaping in the shuttle. Of course, ever present in your mind, and indeed the ship, is the alien growth which is slowly taking over. The growth starts from a seed and gradually spreads throughout the ship. Ultimately you must destroy the growth but its progress can be delayed by sealing doors with sealant guns.

To add to your troubles, additional seeds infect the ship and start other growths. Alien spores also move freely around the ship and are a hazard that should be avoided.

The game is played at any of five skill levels which range from INEPT to EXPERT. It lasts about twenty minutes and ends when you are killed or escape in the shuttle. Your performance is then assessed and a rating is awarded, ranging from a Commendation (the lowest of the low) to a Platinum Imperial Medal.

The graphics are adequate but disappointing when compared with the title page illustration of the ship itself. The game is initially confusing but, as a passing colleague commented: 'It grows on you.' **TH**

Presentation	**80%**
Addictive quality	**50%**
Use of graphics	**50%**
Value for money	**50%**

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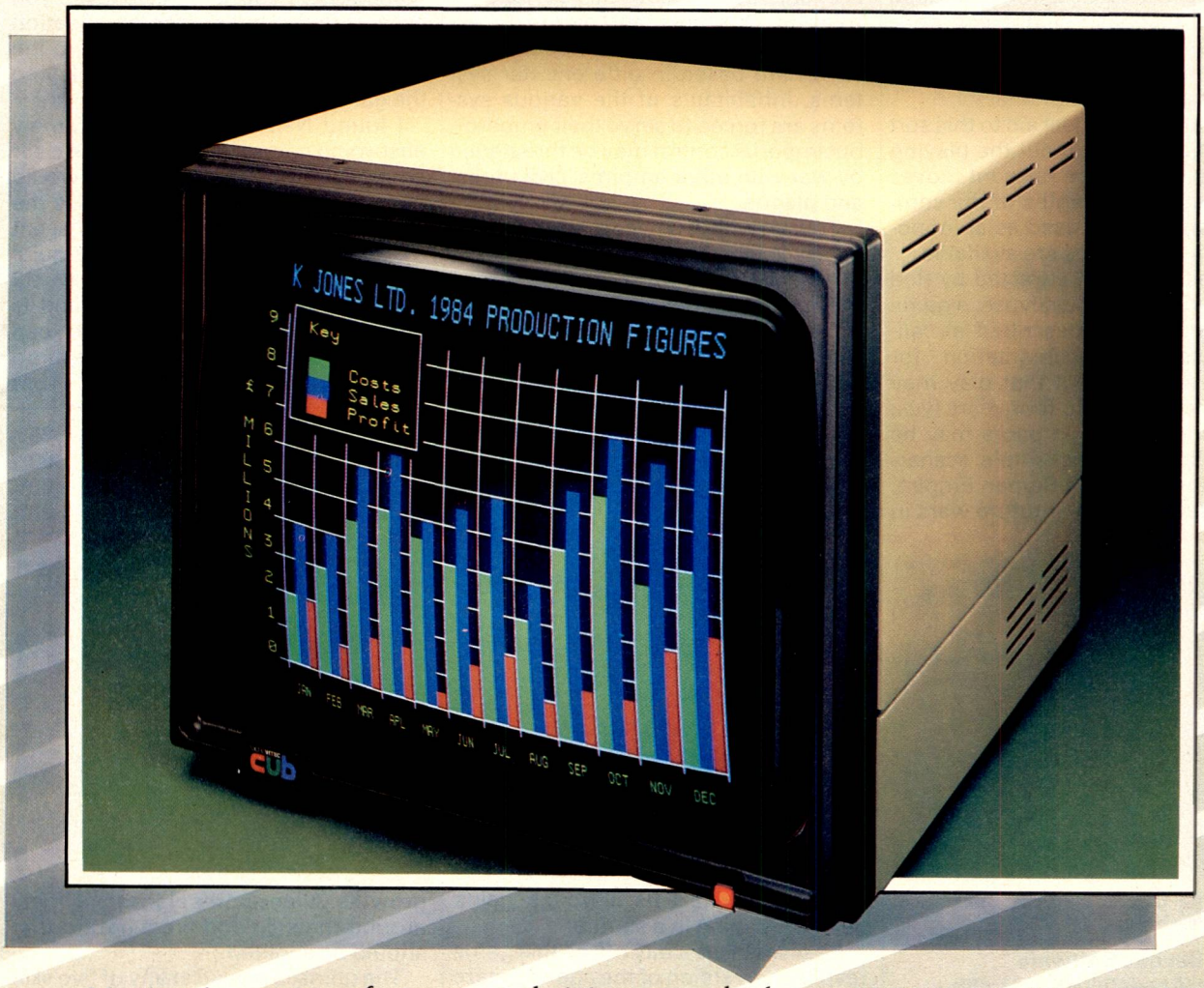

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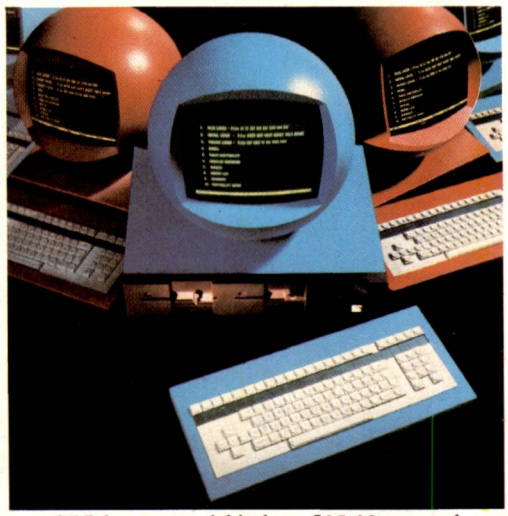

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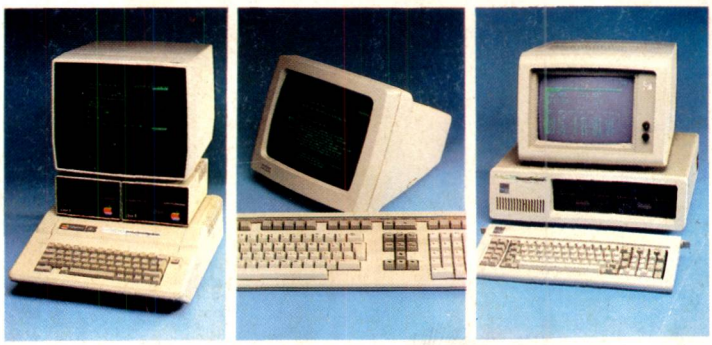

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