Australian Personal Computer

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DICK SMITH CHALLENGER

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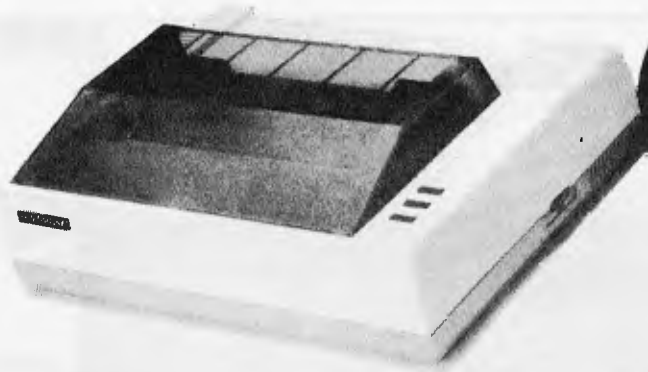

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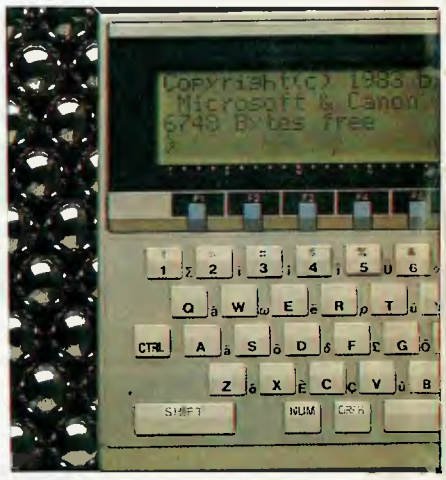

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Volume 5, Number 5, May 1984

APC

FEATURES AND SERIES

BENCHTESTS & REVIEWS

N·E·W·S·P·R·I·N·T

In the cause of friendlier operating systems, APC reports on Unix-like SI and Digital Research's Virtual Mouse. Plus a look to the future with voice-driven programs and a glance at Apple's latest — the IIc.

Brave new operating system

Unix expects you to sit at a remote terminal and be very clever, CP/M expects you to be very patient, and MS-DOS is hardly any different.

None of these understands multiple computers, only one knows the first thing about multi-tasking, and parallel processing and networks are beyond them all.

But it takes a brave man to look disparagingly at CP/M, Unix and MS-DOS and throw them out, sit down and write his own operating system.

It takes a braver man to bring that operating system to market and try to get other people to throw their established systems away — Multi-Solutions boss Charles Lombardo is the brave man in question.

His product is S1, and he announced it at Softcon with the ringing headline:

'Unix is a dinosaur.'

He went on to castigate CP/M and MS-DOS as 'toys' and offered his product as 'the world's first 4th generation operating system.'

What impressed me was that nobody laughed.

S1 is a child of Unix, in the sense that it is Unix source code compatible — programs written for Unix will run on S1, says Lombardo.

But it looks a lot further into the future. It can read and write CP/M, Unix, p-system, Flex, IBM3741, DEC Files 11, MS-DOS, and other files. It also does complex data handling, which goes under such inexplicable labels as record files, stream files and keyed files, Isam Vsam and B-Tree.

What makes it truly special (for me) is that any task in a system can run on any computer in the network. And each system will display a full, quickly-changing, bit-mapped screen.

Lombardo claims that up to 256 processors can be simultaneously operating.

It isn't just the computer freaks and Unix enthusiasts who take him seriously. The US stock market has already found over a million dollars for him, and the general comment from people is: 'We're watching you very carefully, Lombardo!'

He's contactable in Lawrenceville, New Jersey, on (609) 695 1337.

Guy Kewney

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Wake up, Commodore!

Commodore didn't announce its new machines, nor did the company cancel its old machines, at Softcon. At press time it was expected that the new Commodore machine would, after all, be an IBM lookalike, to be priced somewhere under $2000, and portable.

Word reaches me that it could look like the Bytec Hyperion, and that Commodore hopes to have them to sell this year — September is the rumoured month.

So the question is: What has happened to the Zilog Z8000 chip which Commodore has the rights to build and use?

This machine, when it comes, will probably not be a Z8000 machine, but an Intel 8088 or 8086 machine, running MS-DOS. You can't do that on the Z8000. With the Z8000, however, you might well build a multi-user system with Unix, but that's a long way away yet — sources suggest a year away, which in Commodore terms means just guesswork.

The failure to cancel, however, is less certain. News of the machine (the 264) announced at the Las Vegas Consumer Electronics Show is of the unofficial sort, and it all reads 'not for release this year, after all, unless somebody changes their mind.'

Commodore got into this business by leading with technology. The PET beat the Apple II into the world and, at the time, everybody said that it was an impossible product. The

Quarterdeck Office Systems' DesQ package allows a user to put his own sofwtare into the computer windows.

The picture shows a DEC Rainbow, with WordStar, Lotus 1-2-3, and dBaseII all running together.

Actually, it isn't a simple process, making several software items all live happily together in the same machine, and all run at the same time, too (Quarterdeck suggests that users don't try this themselves).

Let the dealer do it, the company says. Therese Myers, Quarterdeck president, said: 'It was because of our experience in office automation that we learned that users did not want everything packaged for them. They wanted to feel as if they could customise a system, especially the software, to fit the way they worked — rather than be forced to follow rigid guidelines.'

Cost of DesQ, initially, is $399, for MS-DOS and IBM PC computers. I know of no plans to put it on the Sirius or Apricot, however.

Quarterdeck is in California on 1918 Main Street, Suite 240, Santa Monica, CA 90405.

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Commodore 64 is, in all essential details, just a cheaper PET, with colour and noises.

It really is time that the company got off its comfy chair and did something.

Guy Kewney

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Window dressing

Pascal is building a big claim to being the only truly professional operating system around, its main supplier, Softech Microsystems, announced a new development at Softcon — windows — which gives the p-System a unique position in operating environments.

It has only to get concurrent multi-tasking on a single workstation, to have the lot — graphics, networking, portable software (programs run on any machine) and windows, even on 8-bit machines.

The latest product was announced on the PC Junior, with the explanation that 'this puts us far ahead of the competition in the 64k environment' — from Larry Allman, director of marketing.

The really interesting product is not the Junior, however, nor the other long list of IBM PC, DEC Rainbow, TI Professional, or even the Corvus Concept and Sage II and IV.

Nice though that list is, the machine which pleases me by appearing on the list is the Apple IIe. That means that the system really will run on 8-bit machines, and Softech can be believed when it promises other 8-bit machines will get Insight Window Designer.

Special offer price is $99, if you order before 1 June; after that, the price will rise to $150. Softech is on (619) 451 1230.

Guy Kewney

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Texan start-up

If Apple is really planning to plug a 68000 chip into the IIe, it has been beaten to the punch.

The Saybrook, first announced a year ago at the West Coast Faire Computer in San Francisco, is finally at large.

The Texas-based start-up, Analytical Engines, has now announced that a model II is available, with additional languages and programming aids.

There are two versions of this model II: one including 128k bytes, Pascal run-time p-System, Applesoft-compatible Basic, Turtle graphics clock and timers. That costs from $900 to $1400. The other version costs $1000 upwards (the price depends on clock speed) and includes a compiler, screen editor, graphics, and cross assembler.

Details from Todd Miller, marketing up, on (512) 346 8430, or write to 3415 Greystone Suite 305, Austin, Texas 78731.

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It's so easy

Ultra Basic is for the Commodore 64, and expands it with 50 extra commands which eliminate the user's need to remember and understand PEEK and POKE numbers.

Mainly, these features are in graphics and sound, with the addition of sprite graphics control, Turtle commands (as in the Logo language) and time-based operations.

It also handles graphics dumps to printers — Epson, Oki or Commodore printers — and costs around $40 (for cassette — $43 on disk) from Abacus Software, P.O. Box 7211, Grand Rapids, Mi 49510. Telephone: (616) 241 5510.

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Small move, big impact

Much to the rage of software exhibitors, hardware people took space at Softcon, too. IBM showed its portable micro, and Canaan showed its personal IBM mainframe.

Canaan is a firm I'd never heard of, but it's been around a while: its contribution was to 'take the IBM 370 mainframe, and discard all the features that were irrelevant to the single-user situation'.

The company sells a cheap mini (a bit too pricey to be a micro) which will run programs written for IBM 370 mainframes.

It also links up to other Canaan minis, so that if a user wants to run extra programs, he can run them on whichever one is free. You end up with something that functions distinctly like a 370 mainframe, but in single-user chunks, linked by Ethernet.

And you get windows and graphics, too.

Officially, of course, Canaan wasn't selling hard-

N·E·W·S·P·R·I·N·T

ware, but a 'decision support package' — a sort of spreadsheet — called Impact, at $6500.

The really interesting thing, however, is that in less than five years, every new personal micro will be about as powerful as each Canaan unit today.

Canaan is in Trumbull, Conneticut, on (203) 372 8100.

Guy Kewney

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Optical storage

Optical memory is something which people admit would be nice, but think of as expensive.

Plans by Information Storage could change that: the company (based in Colorado Springs) expects to produce a diskette with 100-300 megabytes of capacity 'at prices comparable to currently available removable media magnetic disk drives'.

Plans by Philips and Shugart, so far as we know, are aimed at releasing a thousand megabyte drive, for people who can afford to spend around $8000, some time this year.

This company, launched by an ex-Philips man, Steve S Popovich, is looking further away — more than a year away, in fact. But Popovich's new outfit is looking at the IBM XT type of computer, and hoping to replace the hard disk drives with an optical drive.

The advantage would be much more capacity, and a lower price for data storage. The disadvantage would be that you'd need to get new software, because optical disks are not erasable. Once they are full, they stay full.

Later models, says ISI, will be erasable.

The new thing about ISI drives is the idea of five-plus inch optical disks — about the size of compact music cassettes, but — holding the same as about 300 floppies.

Guy Kewney

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Commodore mail order

In a major departure from their previous practices, Commodore have announced that they are moving into the direct marketing of software, placing as much emphasis on the programs as they do on computers. Nigel Shepherd (head of Commodore's Australian operations) explained the reasons for the change.

He made it clear that Commodore is not trying to take business away from retailers by offering software by mail order, as users will be encouraged to try their local dealer first. The problem facing retailers is that Commodore's next software catalogue is expected to contain over 200 titles, and there are many other programs from independent producers — keeping them all in stock just isn't practical. The new system will mean dealers can sell the most popular programs and give customers a catalogue and order form if they want one of the others. This should be especially popular with the large retailers who work by stocking relatively few, but fast-moving items.

Users of Commodore computers stand to benefit as well, as they will have easy access to a wide range of programs. The scheme is already proving popular among country users, even though Commodore didn't publicise the catalogue before the *APC* Show — word simply spread, even to mining camps in WA!

And what does Commodore expect to get for its efforts? Quite obviously, increased software sales, to the tune of $5 million for the year, but there is also a more subtle consideration. It seems likely that there are a number of home computers sitting around gathering dust, and these units don't make good adverts for their manufacturers. Commodore is determined to maintain its users' interest with a regular supply of new programs.

Nigel Shepherd sees 1985 as being a crucial year for the home computer industry. He estimates that by the end of this year 10% of Australian homes will have a Commodore, and a further 20% will either have absolutely no interest in computers, or be unable to afford one. Other manufacturers will have their share of users, so the competition for the remaining potential buyers will be intense. My guess is that Commodore is

Giant distributors Softsel obviously don't share my own initial disbelief of 'Jane' — a product from a new company, and described as 'the simplest way to operate a computer'.

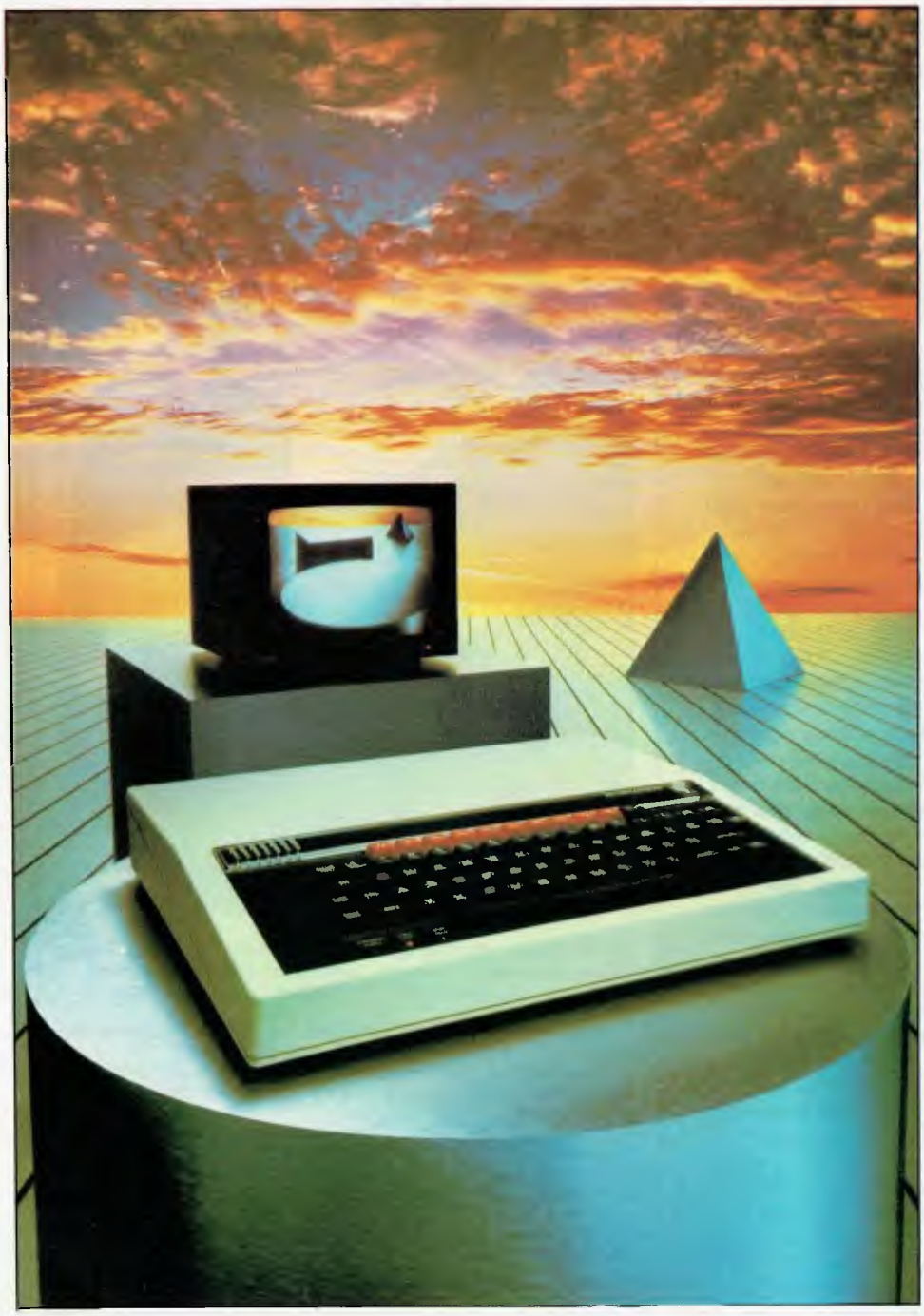
Jane is a mouse and windows, for the Commodore 64 upwards. It costs nearly $300, and does word processing, spreadsheet, and list management; and can generate up to four on screen windows for display of information.

It also runs on Apple, Atari and IBM micros, and the founders of Arktronics Corp, who released it last August in a small way, have signed a deal with Softsel, giving Softsel shops the right to sell the product.

It runs 'under its own operating system', says Howard Marks and Bobby Kotick, who promise delivery of IBM versions by May.

Guy Kewney

BBC Microcomputer
The teaching computer
for those who have done their homework



The BBC Microcomputer is the mainstay of the British educational system and will take their youth confidently into the 21st century.

The success of the BBC Computer Literacy Project is spreading rapidly across the world.

In Australia, a very large number of BBC school computer systems have already been installed in every state.

Why? Because 'The BBC' is not just an educational computer. It is one part of the British Government's project to produce the best microcomputer for education, plus the whole range of software and training aids needed to secure for youth the advantages of computer literacy in the coming computer age. Software abounds. The TV 'Computer Programme' has only begun. There is a wide variety of books and teacher aids. And the list grows constantly.

Australia is fortunate to be able to adopt the entire project without change — and to enjoy all the future developments. For the BBC Computer Literacy Project is ongoing. It will still be with us in the 21st century.

Of course, you are probably aware that Barson Computers were selected to distribute the BBC micro in Australia and New Zealand because they have the desired technical expertise, and are capable of giving BBC Microcomputer users a very high level of support indeed.

You see, the BBC did their homework, too.

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Games and Educational Games
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Word Processing
VIEW. Wordwise. Wordpack.

Note: The above describes existing cassette or disk software by title or content, and is a partial list only. Additional teaching aids including books, audio and video cassettes, tutors and OHP's, are all part of the BBC Computer Literacy Project. Software by Australian and International publishers and developers: Acornsoft, Advisory Unit, Cambridge Educational Software, Edward Arnold, Golem Software, Heineman, Input, Longman, Micro Primer, Passionfruit Software, Tas & WA Education Departments.

BBC MICROCOMPUTER / BARSON computers

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trying to develop a firm base of satisfied, loyal users who will stay with the company when the time comes to replace their systems.

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Remote-control future

Another comms product which appears to be evolving towards the idea of remote-control is a 'master-slave' package from CDI (Computer Development Inc) of Oregon.

CDI showed its interesting software on its own equally interesting hardware: unfortunately, most of us have not the slightest plan of throwing away our existing computers just to buy something that adds very little.

However, the idea of having two micros working as if from the same keyboard, one at each end of a phone line, means that two executives can discuss a document or spreadsheet, then switch to data and carry out the alterations, then switch back to voice, until they have agreed on their ideas.

Guy Kewney

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$10 Pot-pourri

GS Webber and Associates, a self-confessed software dwarf, has decided to discontinue its current range of software products and concentrate on the Commodore 64.

The company intends to establish a distributorship for a large range of '64 games, endeavouring to utilize Australian manufacture wherever possible.

Prices will be kept down, according to Webber, and as evidence of this, a tape of games, utilities and applications has been released for $10. Telephone (02) 526 1267.

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Gentlemanly agreement?

It sounds like the legal fight that the computer press has been waiting for — but in fact the case of IBM's charge that Corona had copied IBM's micro BIOS (basic input and output system) software, is all very gentlemanly, and over.

Corona makes cheaper versions of the IBM, including a portable. Inside it, said IBM, was a ROM chip, with permanently inscribed code that was a straight copy of IBM's own code.

IBM won its case in Los Angeles in January, but then agreed, very chivalrously, not to enforce the law for any machines shipped before 18 February.

This was to ensure 'an orderly transition' in view of Corona's move to a new factory, said IBM.

So, with IBM's blessing, Corona's organisation managed to get a new version of the software ready, worked out when it would be available, and (say industry sources) arranged for its customers to order enough machines to see them through to April.

Guy Kewney

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Commodore peripheral release

Computer Technics is about to release a range of peripherals for the Commodore 64 and VIC 20 and then follow these up with a 'direct connect' modem for the '64 which will retail for around $150.

The peripherals are CHAT (a speech synthesiser companion for the awfully named voice recognition CHIT), Opti-Wand a light pen with hi-res screen drawing capability, and a 'Universal Parallel Printer Interface'. It permits Commodore owners to use any standard parallel printer without any special

N·E·W·S·P·R·I·N·T

Another Apple offering

A further member of the Apple II family made its Australian debut on April 24. Called the IIc, it is a 3.5kg transportable comprising 128k of RAM, 16k of ROM, CPU, keyboard and disk drive. At the moment, you'll need a TV or monitor for a visual display, but later this year, Apple has promised an optional 80 column, 24 line LCD which attaches to the top of the machine. As far as we know this is a world first — several other companies have been talking about such a display but none has produced working prototypes (although it should be pointed out that by the time Apple has its LCD on the market, other manufacturers are likely to have similar units on sale or be very close to it). Apple will not even give an estimate of the cost of the LCD.

The IIc also comes with a 20 hour disk-based training course in the form of "an interactive owner's manual/ computer literacy course". It's designed to enhance two aspects of the machine Apple is heavily pushing — user friendliness and ease of use.

In what many would see as a surprising move, Apple has produced a machine which, by its own admission is not entirely compatible with the many thousands of commercially available Apple II programs. While the claimed 90% compatibility may be quite correct, it's a nuisance to have to actually test your intended applications software on a IIc before purchase.

Accessories available for the IIc include a "Scribe" low-cost plain paper thermal printer, a mouse, monitor, stand, carrying case and additional disk drive.

We were shown the IIc at a delightful lunch of seafood and chicken by David Strong, Apple Australia's managing director, and several publicity men from Apple in the US. According to these gentlemen the nervousness about Apple's financial stability has subsided following the launch of the Macintosh. An air of optimism has enveloped the parent firm which is embodied in a quote from the lunch: "It took two and a half years to sell 50,000 of the original Apple II, seven and a half months to sell 50,000 IBM PCs, seventy two days to sell 50,000 Macintoshes, but only seven and a half hours to sell 50,000 Apple IIc units".

The IIc sells for $1775 including tax.

printer commands or software driver programs and sells for $99.

Further details are available on (02) 29 7244.

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Programmer's paradise

Journalist and programmer Peter Laurie is going to call his next book: *I wonder why it did that?* — a cry which is an encapsulation of the frustrated programmer's despair at ever getting the bugs out of a program.

Anybody who has ever used a computer of the IBM generation or earlier will know at once what I mean.

All this is propaganda in the cause of better operating systems.

It is also, more to the point, wisdom which is now being preached inside Digital Research (DR), which has discovered a Virtual Mouse.

A mouse is something which moves a pointer around the screen. A Virtual Mouse is more complex: it moves around a three dimensional space which contains all your data, and all your programs, and all your memory.

It may sound complex: to build one certainly is. But to use one may be to bring the computer's habits one step closer to those of humans.

The CP/M people are now talking about a Version 4 of Concurrent CP/M. The difference between the current version (Version 3.1)

1984 PRODUCT RELEASES

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C-64

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and 4 is that Version 3 claimed to be the last of the old, unfriendly, mousetrap CP/Ms.

Version 4, says DR, will have the new user interface. In that version, you will not have to find and understand a programmer's manual to protect a data file with a password. It will be obvious how to do it.

And having done so, all you will need in order to read your own file will be the password — something certainly not true with all previous versions of Concurrent.

The advantages of this operating system are all in the future, and there are lots of other hurdles for DR to pass before the future arrives. But the executives in charge of the company obviously believe that their window on the future is brighter than Microsoft's Windows.

Paul Bailey of DRI, recently showed me a demonstration organised by a collection of manufacturers, all of whom were running Concurrent on their machines, and held out the promise of more.

The parade was impressive, and since Bailey was able to show the clincher — IBM programs running as if under PC-DOS on an IBM, but concurrently with CP/M programs — he obviously felt that the victory was won.

After all, you can't run Lotus 1-2-3, Supercalc and WordStar simultaneously on any micro, unless you have Concurrent, even if the machine will run all three separately. And many machines (without Concurrent, of course) can't manage all those titles.

I wasn't the least bit surprised to be able to crash Version 3.1 and Softnet (the networking part) and PC-Mode (emulating the IBM micro) all at the demo.

What still worries me is that programs like PIP, the most useful CP/M program ever written,still don't understand all the clever things that CP/M can do.

You can use PIP to copy part of a file off disk onto paper, spacing it to 50 lines a page, and adding a few other bits and pieces. It takes concentration, lots of trial and error, and the patience of Job.

But you can't do it if PIP finds that the file has a password. It should ask 'password' — but it hasn't been re-written, yet, to do so.

The Virtual Mouse, when it comes, will be five times as wonderful as password protection on text files. Or maybe fifty times as wonderful.

But how long will it be before I can Virtually Mouse my way around dBaseII? How soon will MicroPro wake up to the Virtual Mouse and put holes in WordStar for it to run through?

For people like Olivetti, just releasing a real microcomputer and the likelihood of seeing American Telephone and Telegraph adopt it as the AT&T micro, the Virtual Mouse and Softnet must look like winners.

For the rest of us, however, the wait for a friendly operating system (even 3.1 can still crash with an operating system error, leaving you despairing about an hour's wasted typing) is at least a year away.

Unless somebody else gets there first.

Guy Kewney

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PCterminal

If you want to network IBM PCs but reckon the basic cost of the machine plus network interface card is just too much, Telecomputing PCS might have the answer for you.

The firm has just landed a shipment of Santa Clara PCterminals. This is essentially an IBM PC workalike without disks but with the networking card. It works on Santa Clara's PCnet local area network and sounds like a damn good idea.

We haven't seen it yet and cannot therefore offer an assessment of the degree of IBM compatibility at this stage. Details on (02) 923 1266.

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Where d'ya get it?

We did not attempt to hide our embarrassment when the "screen wipes" proudly promised in the March issue to accompany the April issue turned out to be keyboard cleaners. Screen cleaners were asked for; screen cleaners, we were told, had been sent (all the way from Denmark); and screen cleaners, we were told, had arrived in Australia, were on the dock and were just awaiting customs clearance. And all this before we dared promise "screen cleaners" for fear of a hick-up in their transportation to Australia. So you were as surprised as we were to see the April issue wearing a keyboard cleaner.

If you want a screen cleaner, or for that matter, another keyboard cleaner, contact Danish Documentation Standard on (03) 51 7603.

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Software shake-out

Something unique in my experience is a trade show where the major subject of conversation is a magazine — and Softcon was that show.

The magazine was *Business Week (BW)*, which came out the week before the show with a Special Report on 'software': the new driving force'.

The magazine is

The Apple IIc personal computer with mouse, and large portable LCD display.

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sufficiently minority-interest in its readership for me to feel no shame in drawing your attention to the edition (Feb 27) as an excellent primer on the American software business.

Facts and figures (*BW* can dig these out of a report on the hum of a bumble-bee) showing how software is booming, were fascinating. For instance, the amount of money spent on personal computers will be about a third of the total computer budget, by 1989. But on software, personal software will only account for roughly a fifth.

The interesting thing was the suggestion, just before an analysis of the Japanese future, that money is available, at last, for software start-ups.

Ovation raised $5 million on the venture market last year, and *BW* quoted Thomas Gregory, president, saying that the hardware side had frightened so many capitalists, they had turned to software. What really tickled me, however, was the suggestion that 'the best time is over' already.

Over already? Software hasn't even started, and the money men are ready to get cold feet *already*.

I'm afraid, however, it is so. A few 'stars' will be able to raise money. But innovators, for the next couple of years, are going to live in the shadow of financiers' ignorance, and the general belief that the IBM micro is an advanced machine. The market is getting hopelessly stagnant, both hard and software.

Guy Kewney

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Australian Knight

SME Systems has announced a $3,300 business micro running CP/M 3.0. The Knight 2000 uses a Z80 processor with 256k of RAM. On line storage is provided by two 780k floppy disk drives with the option of upgrading to a 20 Mb hard disk.

Voice synthesis and graphics are also provided. Details on (03) 874 3666.

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Paying for the privilege

Wonderful though electronic mail is, I suspect Hawkeye Graphix is onto a winner. The company is offering software to let you establish your own electronic link with your office rather than having to work through some outside corporation.

The company has considerable experience with comms software and so I do expect its 'private electronic mail system' to work.

Electronic Mail Manager is described as 'a powerful method of coordinating communications between several offices in a business'.

In other words, just because you are out of your office, it doesn't mean you can't reach your micro. With a portable micro, or borrowing the micro of the person whose office you are visiting, you dial into your own computer, and run it.

The catch is the price. You need the Comms package at $150 per micro, and you then have to buy EMM (written in dBasell) at $150 for the run-time module, then a master-slave pair program at $400, with $100 extra for each additional slave branch . . .

Details on (213) 373 9627 at Torrance, California.

Guy Kewney

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The Australian Knight 2000 personal computer

N·E·W·S·P·R·I·N·T

VIEW FROM AMERICA

Expert Software

By Chris Rowley

Yet another sign of the times — The Securities & Exchange Commission has announced that by mid 1985 all US public company quarterly reports must be filed electronically to the SEC's mainframe in Washington D.C. This will bring to an end the colossal quatrennial blizzard of paper that currently overflows the SEC at report time.

It's interesting to note that ALL US public companies are expected to have computers now.

The SEC also intends to make the information public as fast as it's filed, all by computer phone link. This will revolutionise the quality of stock market research and the timeliness of valuable investment information.

Ken Fogash, SEC Administrator in charge of the project says it will open up "a whole new era for investors".

It will most certainly open a new and unwelcome era for commission stockbrokers who are already uncomfortably aware that something like 540,000 home computers are being used for portfolio management applications. There are currently about 80,000 full service brokers in the USA who charge anything up to half a dollar per share on stock transactions. In addition there are fast growing discount brokerages that don't offer research and advice but only take 5 cents a share.

To stay competitive in changing times major Wall St broker giants, like Merrill Lynch have equipped hundreds of their staff brokers with "Expert" or "Knowledge Based" software called "Broker's Edge".

This kind of software may well prove to cut both ways however. Like other rapidly burgeoning examples, the "Human Edge" series of "knowledge based" software provides — on floppy disks — a distillation of advice and reasoning, with some diagnostic power, to take the raw data of the market and find the interesting investments.

Of course once investors have "Expert" software and access to the SEC data base they may decide to give up paying 40 cents a share brokerage fees.

Other "Expert" packages include "Negotiation Edge" and "Sales Edge". Here mathematical decision theory is used to pick through fields of research data, human factors, plus stored expert opinions, to provide the user with a quick 8 page briefing on the situation.

These programs require IBM PC XTs, systems with half a megabyte and a hard disk, the prices of which it should be noted are falling. Hard disk storage systems are getting down under $2,000 for 5 megabytes, and the Kaypro 10 of course is $2750.

Such "Knowledge based" programs cost $200 to $750 and they provide a good example of the increasing sophistication of software becoming available to small business and professionals.

Another example is the growth of "Vertical Market" programs. There are almost 10,000 "vertical markets" capable of receiving a distinct vertical software package, according to F&S Computer Vertical Market Industries Newsletter. Some of them have the big numbers too. American farmers for instance are expected to spend almost half a billion dollars for computing in the next three years.

Sales of Vertical Software packages could reach $210 million this year, more than double last year's $90 million.

Education, training, health sciences are another area where big growth is predicted. Already the success of NURSESTAR for Mosby Systems of St Louis has inspired them to launch TESTAR, a more general testing package.

But even relatively small markets, like America's 90,000 odd licensed gun dealers, are attracting specific software packages to make running their businesses a breeze. In fact there are thousands of "Niche Markets" like the nation's 400 or so pet cemetries that are also attracting attention.

Watch for the introduction of "Life Strategy" software soon to give advice on raising children, getting along with teens or elderly parents.

The real kaboom though may well be in self health diagnostics. Already Doctors are discovering the benefits of diagnostic programs on microcomputers. Naturally those programs are going to be out on floppy disk soon and once the general public can lay its hands on them the whole country will be diagnosing its own ills every day. That is something that distraught Doctors might contemplate as they switch their investments around in the stock market using Broker's Edge thus saving on broker's fees, before changing the disks and putting themmselves back on the couch with Psychiatrist's Edge.

New O/S for universe

AED Computers has introduced a new operating system for the Universe Super-computer. The operating system referred to as MP/M 8/16 'PLUS' is, according to AED, a flexible and fast operating system for single-user multi-tasking or multi-user multi-tasking applications.

The system offers compatibility with both 8-bit CP/M software and 16-bit CP/M-86 software (and can run both types at the same time). The system also offers concurrency.

According to AED's director of R&D, Wayne Wilson, the Universe with this new operating system has been speed benchmarked against several of the most respected multi-user systems and, with several terminals, out performs them all by a margin of at least 3 to 1. He also claims that a typical configuration is considerably less expensive than a net-

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RS232/C port	Y	Y	Optional
Composite B/W video	Y	Y	Y
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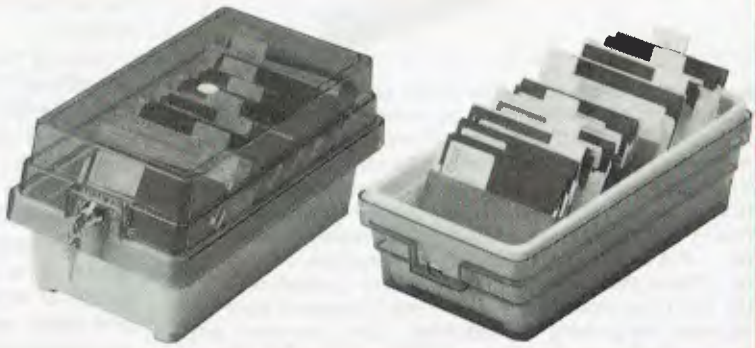

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working approach. A faster 16-bit only version is available for the Universe's 8086 processor which runs at 10 Mhz clock speed and the new 80286 processor which yields even higher speeds.

Japanese computer company Sord has entered the portable market with a lap-held micro running PIPS software.

The Sord IS-11 (the 'IS' stands for 'integrated software') is not made by Kyocera — unlike the Tandy, NEC and Olivetti portables — but is designed and manufactured by Sord itself. Although the hardware is similar to the Kyocera machines — 32k CMOS RAM, 40x8 LCD display, battery-powered — the IS-11 takes a different approach on software. Where the Kyocera machines use custom-written software, Sord has opted for PIPS — an integrated business package comprising spreadsheet, word processor and database, normally running under CP/M or MS-DOS. The version of PIPS running on the IS-11 is a cut-down one, but SORD is confident that the package offers enough features of the original to be taken seriously by business users.

The ability to run a familiar package on a true portable is a step in the right direction — at least, so far as the business user is concerned. Promised features include a program to convert IS-11 data files to a number of different file formats prior to uploading to a desktop micro. The formats to be offered are Lotus 1-2-3. ,Multiplan, VisiCalc, Supercalc, dBaseII and WordStar. Also included is a communications program which looks very similar to the TELCOM program of the Kyocera micros. No mention is made of a Basic Interpreter but that probably won't deter business users.

On the hardware side, The Sord has a built-in microcassette unit similar to that of the Epson HX-20. It operates under software control at an impressive 2000-baud, in contrast to the 300-1200 baud of most computers using standard cassettes. Surprisingly, the processor is an 8-bit Z80A rather than the 16-bit 8085 of the Kyocera machines. Maximum RAM limit is 64k.

The IS-11 has an RS232 and Centronics port and provision for an internal or external modem. It is powered by a rechargeable battery, each charge giving approximately eight hours' life. An optional portable printer and clip-on numeric keypad will also be produced.

The machine will probably sell in the $1,000 to $1,300 range. Mitsui, on (02) 451 7711, will be distributing the machine in Australia, availability still being several months away.

MP/M 8/16 is based on DRI's (Digital Research Inc's) MP/M-86 which only runs 16-bit software. However, the writers (Gifford) of MP/M 8/16 have added a huge number of enhancements including 8-bit CP/M-80 compatibility. MP/M 8/16 is available from only 3 sources: Gifford — the writers, CompuPro — the company that commissioned the work from Gifford, and AED — who due to a unique joint engineering agreement with Gifford, have the source code and also participate in the products future evolution.

Among the many features not offered by other CP/M or CP/M-86 compatible multi-user operating systems are: Modem support, networking of multiple MP/M 8/16 systems, electronic mail, support of MP/M II queue calls, auto run of programs at scheduled times and dates, automatic background memory test. 'Who' command to report users currently logged on to which terminal, password protection of user areas, concurrent control and monitoring of several 8-bit and 16-bit programs from one terminal.

AED is on (02) 689 1744.

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Menu and windows

Eager to take IBM's PC Junior seriously, the US software industry is writing software for it as if you could just go out and buy one. It still isn't that easy, even in America.

Best of a large amount of indifferent stuff was a windowing package from Trillian Computer Corporation. Still unfinished, it follows a package called Visuall, on the IBM Senior, released last year.

It's simple enough: it replaces the menu with windows, so that you can see something of what you are doing on the screen while you read the menu. And it works with a mouse.

Trillian is in Los Gatos, California on (408) 358 2761.

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Voice-driven programs

If ever there were an application crying out for a computer which could understand human speech, it must be the spreadsheet.

Now there is going to be one (actually there are quite a few coming out of various laboratories) from Texas Instruments (TI) and American Supersoft.

Supersoft is to produce three voice-driven programs: Scratchpad (spreadsheet) DAX (database) and Pages (word processing).

The software will work on TI's Professional and, very sensibly, neither TI nor Supersoft have made any predictions about when the programs will be ready.

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Along the right lines

Matrix printers draw lines across the paper, just like a TV screen. Of course, they *could* draw any picture, any type of lettering, any pattern we liked: but it's beyond the likes of you or me.

Print Command is a

N·E·W·S·P·R·I·N·T

'printer set-up utility' for the Epson, assuming an IBM computer, which contains most of the information in the Epson printer manual, is ready to drive the printer.

The thing does all those fancy things you wish you could persuade your word processor to do — bold face, double height, condensed characters — but it also opens up graphics.

Apex Resource, the writer, also promises that a 'create new fonts' package will be available *soon* which will turn your word processor into a print typesetter. Or something.

Details on (914) 221 2611 in Stormville, NY.

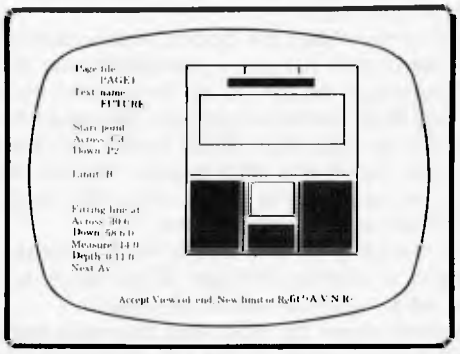
Guy Kewney

Micro typesetting

Page Planner is a micro (currently only IBM PC) based "typesetting" package. It is comprised of three modules allowing text entry, hyphenation and justification of the text and then a simulated display of a completed page of text prior to its transfer to an actual typesetting machine.

The idea of all of this is that the expensive part of any computerised photo-typesetting machine is the actual mechanical typesetter; the software and computer are relatively cheap. As there are so many micros around, it seems logical to adapt software to run on these and then transfer, either down-line or by physically pulling the disk out of the micro-computer and putting it into the typesetter. Page Planner goes further than previous attempts to turn personal computers into the "front ends" of typesetting machines, because it actually allows the operator to design the finished typeset page. A sample page layout screen is shown elsewhere on this page.

Davey Graphics is the sole importer (and has a typesetting machine to download to). Details on (03) 51 9842



Page Planner layout screen

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VIEW FROM JAPAN

MSX holds out promise of silver lining

by Serge Powell

From Japan, the US lies to the East. The western block is China. In Japan, it goes without saying, you get a different perspective.

You will have noticed the current preoccupation with MSX, an attempt to produce a standard home micro. It isn't a Japanese invention but so far most of the active interest had been generated among Japanese firms. Their products will perhaps have flitted before your eyes in the pages of this (April) and other papers; Yamaha the music specialist, secretarial Sony, Matsushita with its strange cursor control keys, and the others.

This isn't another column about MSX hardware. It's about where the home computer of the future is coming from and what you'll be able to do with it.

The current vogue for MSX, you see, runs against the microcomputing current. In the US, manufacturers are all so panic-stricken about IBM that they're hurtling lemming-like into IBM compatibility and hence business systems. Even Atari has a good, solid, respectable business machine, the 1450XL, in its line, and the Commodore PC is good for a hearty laugh.

In Japan, by contrast, the MSX standard has proved to be a magnetic rallying point. The irony is that MSX machines shelter the business micro's best friend, the Z80.

Let's not bother to coin new phrases when perfectly adequate ones exist already; every cloud has a silver lining. But it was in a less than euphoric state that I wandered into my local computer superstore to see what the perpetrators of MSX Basic had come up with in the way of software.

I ought to declare an interest — or, to be strictly accurate, a lack of interest. I don't like computer games, with one major exception which I suppose puts me somewhat on a plane with an atheist who carries a rabbit's foot. As far as I'm concerned there are plenty of adventures and action to be found in working out documentation.

So . . . pretending to be interested I asked the shop assistant for a catalogue. Assuming you're interested, I've enlisted the aid of my wife and what follows are translated highlights of said catalogue. What follows them is the silver lining.

For the sporty there are Golf Game, 3D Tennis, Blackjack/Poker and MSX Derby. For the cerebral we find Majong, Shogi (a combination of chess and checkers), and at a pinch, Nyorolas — this is a snake game, nyoro-nyoro being the Japanese for how a snake moves. Incorrigible head-bangers will appreciate Marine Battle, Gangmaster, Star Command, Nandarona (cosmic traveller), Chopper, Fireball and many more.

On the educational front there are Yogimo Ego (English for infants), Ke-san ryoku (a maths test/game for seven year olds), Home Study for three year olds, and the Perfect Lesson series. If your educational disadvantages are more specific there is Canconsosai.

But it isn't all beer and skittles. Otemba bekino daiboken is an adventure search, and in Chutar the quest is for diamonds.

Now for the silver lining. The computer superstore has a display of the Macintosh. I'd seen pictures of it, read about it, and been unable to make up my mind whether or not to be impressed by it. I'm impressed — or more properly, depressed, because I want it, can't afford it, can't believe it, and don't think it's fair.

US and Australian writers get to play with and write about a micro that is ahead of its time. I get to write about an attempt at compatibility that's undeniably overdue but based on a technology that is behind the times. And yet, it may be that an MSX machine will be the last bastion of the home computer.

N•E•W•S•P•R•I•N•T

General industry improvement

A 'degree of stability' is returning to the video game industry, according to one of its more famous casualties, Atari.

Warner Communications has announced an 'improved performance' for its micro and games subsidiary, which helped the group to a $418 million loss in 1983 (compared with a profit of $258 million the previous year).

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Digital sound

DX-1 is a sound recording device for the Apple II. It's not like a tape recorder, which records sounds analogously, but rather runs input from, say, a microphone through an analog-to-digital converter to RAM from where it can be recorded, modified, sped up, slowed, etc.

It requires a 48k Apple II or IIe, DOS 3.3 and Applesoft Basic and while it costs $320, you can, for $3.00 purchase a demonstration tape "highlighting the incredible capabilities of the DX-1 unit". The $3 is refundable if you buy a DX-1. Telephone: (02) 90 6868 for details.

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New operating system for Apple II

ProDOS is the new operating system to enhance the Apple II when used with disks. It doesn't involve the purchase of any additional hardware.

ProDOS is fast. It always seemed strange that non-Apple alternatives to DOS 3.3 were so much faster; now Apple has caught up with the rest of the pack. The observed speed increase seems to be between 3-10 times, depending on the application.

Also nice is the support for hierarchical structures for disk directories, and a Pascal-type FILER for managing them. This in turn makes it practical to support hard disks with the Apple II; the standard version of ProDOS will support the AppleProFile hard disk (which was previously only available with the Apple III).

Apple III compatibility is further enhanced because ProDOS is a subset of Apple III SOS (Sophisticated Operating System). This means that the II and the III will be able to work side-by-side on a network, as well as exchange files and read each other's disks.

Of course, the additional features of ProDOS do require additional memory. The impact of this on most applications has been minimised by putting the bulk of ProDOS in the Language Card (which is required, if you haven't already got one). In fact, the space available to Basic programs is about the same as it was under DOS 3.3. Converting files from DOS 3.3 to ProDOS is easy, using the conversion utility provided. Sensibly, Apple has given the utility the capability of converting from ProDOS to DOS 3.3, as well.

Apple has completely overhauled the machine code interface, meaning that it is much easier to write machine code for ProDOS than it was for DOS 3.3. This should mean a rapid availability of programs to run under ProDOS.

Like DOS 3.3 (and unlike CP/M), ProDOS will be on every disk sold to run under

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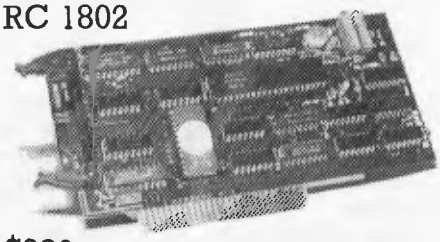

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Control codes are identical to Diablo Printer.
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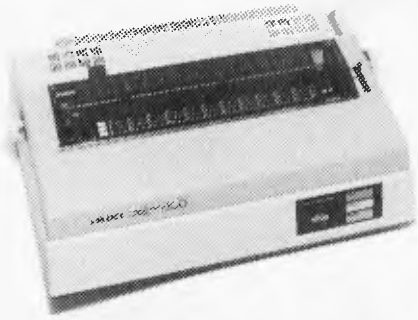

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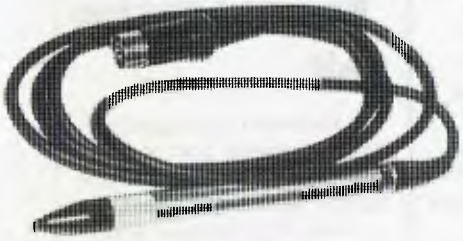

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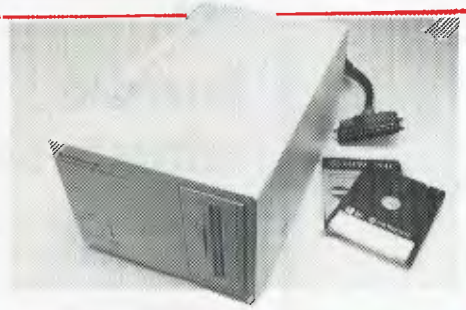

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it, so most people will acquire it as a matter of course, when they purchase new software. (It may be purchased alone 'for a nominal sum', from your Apple dealer.) Also, it will be shipped with every new floppy disk drive, after the release date, so you may be confident that migrating to ProDOS will not make you incompatible with everyone else.

It is rumoured that Apple is working on a major new language specifically designed to run under ProDOS, which will be 'interactive, fast, and substantially easier to use than either Basic or Pascal'.

ProDOS offers considerable advantages to applications programmers but it is likely that DOS 3.3 will continue to be used for some time.

Chris Moller

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Wang builds in Australia

Wang Computer has opened a manufacturing plant at Bruce in the ACT aimed at allowing 90% of Wang Computer's revenue to be generated from computer products that are manufactured locally by the bicentennial year of 1988.

In the initial stages, the $3 million plant at Canberra will be the only centre in the world producing the new Wang 4245 colour work stations. A year from now the production schedule is set to see more than 800 colour workstations being produced each month, with some of the units earmarked for export.

The plant will also be producing the Wang 4230 monochrome workstation, and building and testing Australian supplied multiwire circuit boards for the central processing units of the Wang VS range of computer systems.

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Extended software range

Dolphin Computers has announced that it is making available in Australia products from the following companies: Currah Computer Components, Bug Byte Software, Fuller MicroSystems, Stonechip Electronics, Tasman and Ultimate Software. These products include hardware and software for the VIC 20, Spectrum and ZX81.

So if you've been looking at and salivating over advertisements in O.S. PC magazines, Dolphin may have the product in Australia. Telephone: (02) 438 4933.

➔➔➔

'Bee expansion unit

The Enhancer is plugged into the parallel port of the MicroBee to provide a multitude of additional features:

- Atari, Commodore and TRS-80 Color Computer compatible joystick inputs;
- a music/sound effects synthesizer;
- a real-time clock;
- speech and sound digitization;
- analog to digital converter (and vice versa);
- a voice input channel;

and that's not all.

Two versions are available depending on whether you have an older or newer 'Bee. Both versions sell for around $140.

Write to Vitronics, 109 Lawrence Road, Mt Waverley, 3149.

➔➔➔

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BENCHTEST

HP150

The 150 from Hewlett Packard features the very latest in microcomputer engineering — a touch screen. Bearing in mind the company's hesitation in producing new products before closely examining its competitors' offerings, Peter Bright assesses this well-publicised machine: a gimmick or a vastly superior innovation?

BENCHTEST

Whenever Hewlett Packard (HP) releases a new machine you can rely on two things: 1) it will work; and 2) it will be expensive. HP's latest machine, the 150, seems to fulfil these criteria: it certainly works, but will cost you well over $5,000.

If you have seen the television advertisement for the 150 you will know that its main selling point is a touch screen. Instead of pressing keys or moving mice to control the machine, you just wave your finger in the general direction of the screen and it will obey your every whim. To back up the screen, the 150 sports an Intel 8088 16-bit processor, 256k of user RAM and some ultra sharp graphics. But does all this justify the high price tag?

Hardware

The 150's main processor/display unit is extremely small. The main unit contains the VDU and touch screen, processor, RAM and an (optional) internal thermal printer, all contained in a box measuring just 30 × 30 × 29 cms (approximately one cubic foot). In addition to the main processor/display unit the machine also came with a floppy disk unit and a keyboard. All casings are made of high density plastic.

The 150 is well catered for as far as I/O is concerned. A look along the back panel shows that it has two RS232 serial ports and one HBIB parallel port. Both of the RS232 ports can be set under software control at speeds of up to 19,200 baud.

The HBIB was invented by HP (but is better known as the IEEE 488 interface) and allows up to seven devices to be daisychained onto one port. These devices can be printers, plotters, disks, lab equipment or any device conforming to the IEEE 488 standard. The only problem is that the 150 hasn't got a Centronics parallel printer interface so you may have to fork out more money and buy a RS232 card for your printer.

The rear panel also houses the on/off switch, along with a battery holder which takes two Duracell-type batteries to run the clock and the battery-backed CMOS RAM.

Inside the machine is a work of art. Virtually every available space within the casings has been used and every

The innovative touch screen—just touch and go

The keyboard is excellent: 107 well laid out keys divided into four functional areas

In the realm of computer learning and imagination, there is nothing like a touch of genius.

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Available for Commodore, Apple and Atari home computers.

Leonardo's Library, Chalkboard's revolutionary approach to software is structured to provide an entertaining, innovative entrance into the worlds of visual arts, music, mathematics, science, language arts, and social studies. Five strands within each subject area explore the ideas of similarities, patterns, interaction, change and evolution.

Each package includes software in either cartridge or disk format, as well as a tough plastic overlay that is imprinted with each product's unique function buttons and a manual describing a number of learning activities.

$199:00

Ask to see a demonstration of PowerPad at your nearest computer retailer:

ASHTRON SOFTWARE

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board is of the highest quality.

The main processor in the 150 is an Intel 8088, souped up slightly and running at 8MHz rather than the more usual 5MHz.

The entry level machine comes with 256k of user RAM. This is in addition to 60k of alpha and 32k of graphics video RAM used by the system. The user RAM can be expanded up to 640k by slotting in extra RAM cards. The 150 also has 256 × 4 bits of battery-backed CMOS RAM, which is used to hold the current default system settings — such as which keyboard character set you are currently using.

Most other business micros have 4k, or at the most 8k of ROM which is usually only used to hold the bootstrap operating system loader. The 150 has 160k of ROM, which not only holds the bootstrap but also diagnostics, terminal mode firmware, touch screen decoding firmware, and so on. The result is that much of the software the machine needs is already resident and does not need to be loaded from disk. This is most evident when the machine is in terminal mode, when the disks are unnecessary.

The 150 is based on a bus architecture using a mother board and a number of daughter boards. The mother board has four slots, two of which are used by the processor board and the video controlled board.

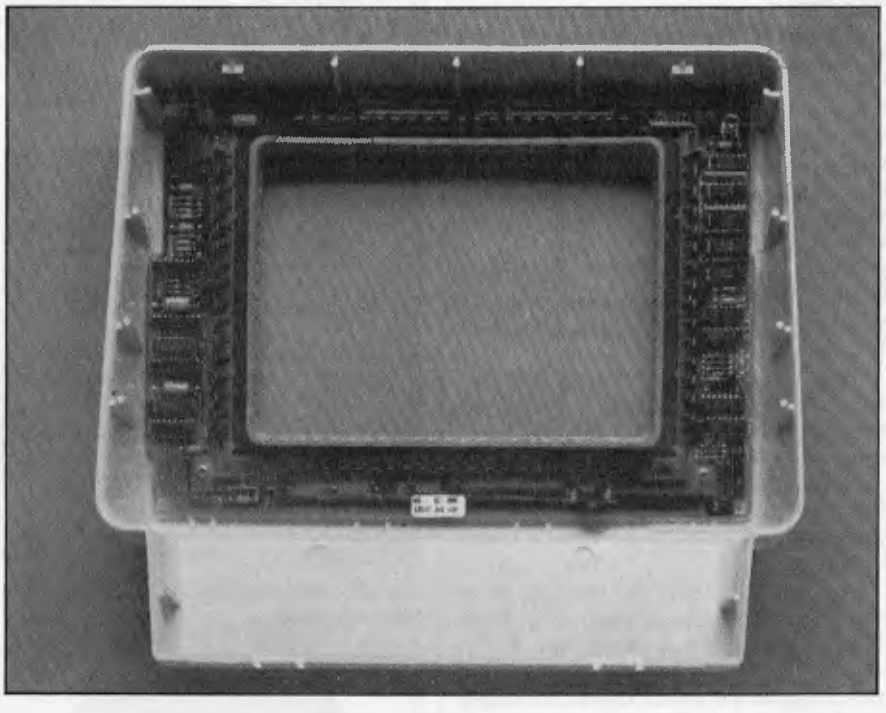
The main processor board has a 256k RAM board and an RS232 board piggy-backed onto it. The two other slots on the motherboard can be used for extra 256k RAM cards.

All the PCBs are well made with no evidence of jumper leads or last minute changes. The power supply and the high voltage screen circuitry live either side of the tube.

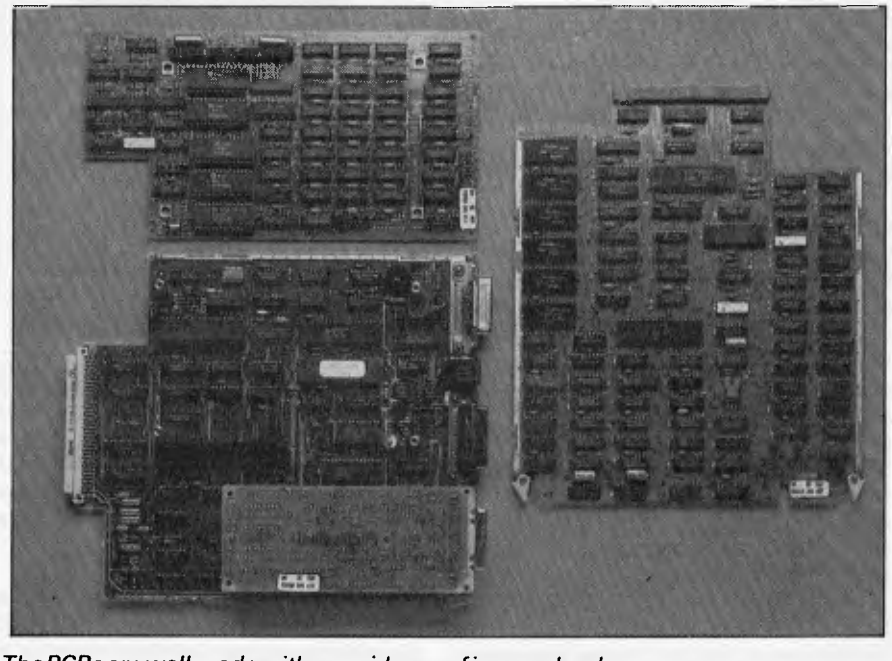
Getting into the machine to change the boards is very easy. To reach the processor board and the video board, remove a cover on the back panel and slide the boards out. To get at anything else remove the top cover and/or the front cover: these come off easily by undoing two quick release screws on the top panel and a couple of snap-on connectors underneath the front panel.

Touch Screen

Whenever the screen is touched the machine can reason where your finger is and act accordingly. The operation behind this is very simple. Two banks of LEDs and photodiodes are arranged so that the light beams from the LEDs form a 23 × 40 matrix just in front of the screen. When you point at the screen your pen (or finger) will break one or more of the horizontal and vertical light beams. The machine works out where the intersection of the two beams is and acts accordingly.



The HP150 is based on a bus architecture using mother and daughter boards



The PCBs are well made with no evidence of jumper leads

This arrangement works very well. The LEDs and photodiodes are set into the cowling around the screen and the only indication that it's different from a normal screen are the rows of holes for the light beams.

The major drawback of the system is the resolution of the touch sensors. As they only have a resolution of 23 × 40 it's difficult to position the cursor with your finger accurately — I found it easier to use a pen or pencil. The other option is to position the cursor roughly with your finger and then use the cursor keys to finish the job. This is only a problem when the target is small: however, the targets are usually large enough to be located easily with your finger.

The only other problem is that the machine occasionally fails the start-up diagnostics, due to dust building up on the screen and round the edges which obscures the light beams. This happens with very low levels of dust but is easily cured with a quick wipe with a clean cloth.

The display itself is worthy of a mention because of its very high quality. Although it only has a 9in screen, the resolution is very sharp. All the characters are well formed and easy to read: the graphics are needle sharp.

The 150 has two display modes: 720 × 378 in alpha mode and 512 × 390 bit mapped in graphics mode. The screen displays 80 characters by 27 lines. Lines one to 24 are used in the same way as any other display, lines 25 and 26 are used to display eight touch-sensitive softkey labels and line 27 is a status line.

Each display mode is handled by its own hardware and software drivers which can be used independently and then mixed on the screen. The problem is that although both pages can be displayed on the screen at the same time, the data is held in two different areas of memory therefore screen dumps to a printer are difficult.

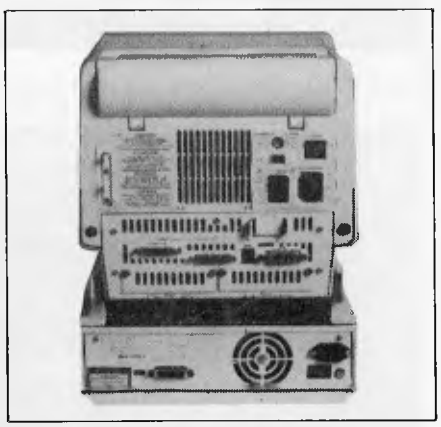
Disks

The review machine was supplied with twin Sony 3.5in 270k microfloppy disk drives, housed in a separate unit which needs its own power supply and has its own on/off switch.

HP has removed all references to Sony on the disks and has even been cheeky enough to print its own name on the shutters in place of the Sony logo.

The drive unit is connected to the main unit via the HPIB interface. The advantage of this system is that it is very easy to hook up hard disks or 8in or 5.25in floppies so long as they conform to the HPIB standard. I have no complaints about the disks other than they are occasionally slow; it's difficult to know whether this is the fault of the drives or the Personal Applications Manager (see below).

Inside: very compact and high quality components



Input/output ports are well supplied

The review machine was supplied with an integral 80 character thermal printer built into the top cover of the main unit. I am not a great fan of thermal printers — this one prints in a strange light blue colour — but it served its purpose.

Keyboard

This is the widest unit of the whole machine. In fact, it looks rather out of place because the rest of the machine is so compact. It's connected to the main unit via a coiled cable and a multi-way plug, and can be made to tilt upwards by pulling down a flap on the back.

The keyboard holds a total of 107 keys divided into four functional areas. To the left hand side is the main qwerty typing section laid out in a standard manner. The only extra keys not normally found on a computer keyboard are two labelled EXTEND CHAR. These are placed at either side of the space bar and are used to produce continental characters.

When the CAPS LOCK key is pressed the word CAPS is displayed on the screen's bottom status line to show that it has been engaged. This is infinitely preferable to the LED indicator on most other micros.

To the right of the qwerty section is the screen handling and editing section. This contains all the usual cursor control keys along with keys to insert and delete characters and lines of text. To its right is the numeric keypad.

Running along the top of the keyboard are eight programmable function keys plus various assorted machine control keys. The function keys are perhaps superfluous simply because they duplicate the touch-screen softkeys.

The other control keys on the top line are BREAK, STOP, MENU and SYSTEM. The BREAK key performs either a hard or soft reset, the STOP key is only usually used when the 150 is in terminal mode but can also be used in shifted mode to take the machine from terminal mode back into being a computer. The MENU and SYSTEM keys control the touch screen softkeys.

In company with most other 150 features the keyboard is 'soft'. Perhaps a better term would be 'firm' as all the character sets are controlled by ROM-based firmware. The firmware supports 16 different European character sets and also allows the audible key-click to be switched on or off.

The keyboard is the best I've ever used. It's well laid out and every key has a light, positive feel which makes it very easy to use.

Software

The 150 runs under MS-DOS version Z, but it's unlikely that the average user

BENCHTEST

will ever see the MS-DOS command prompt: HP has put a friendly front end onto MS-DOS which it calls the Personal Applications Manager (PAM). Whenever the machine is switched on, it first loads MS-DOS from disk and then goes on to load PAM.

First of all, PAM reads both disks to look for installed applications and displays the names on the screen. If you have a WordStar disk in drive A and a VisiCalc disk in drive B, they would be displayed as two boxes on the screen.

To select VisiCalc, touch the VisiCalc box. This will then be displayed in double intensity to show that you have selected it. If you change your mind, touch another box and it will be selected. To run the program, touch the START APPLIC softkey at the bottom of the screen.

The use of softkeys means that a program can be selected and run by pointing a finger at two boxes — much easier than typing the program name and hitting CR.

Built-in functions

PAM has six built-in functions selected by touching the softkeys at the bottom of the screen. The first is START APPLIC as mentioned above. In addition, it's possible to set the date and time, reread the disks, play with files and directories, enter terminal mode and look at the help screen.

REREAD DISKS. If the disk drives are changed PAM will need to be informed. PAM will then reread the disks and redisplay the installed application.

FILE MANAGER. This lets you explore files and directories. You can display a directory, change to a new directory, look through the contents of a (ASCII) file and copy or rename files.

When in file manager the contents of the current directory are displayed on the screen. You can then touch the file(s) you wish to work on. If, for example, a file is to be deleted from the current directory you would touch the DELETE FILE/DIR softkey, touch the file to be deleted (which would then be highlighted), then touch the START DELETE softkey. All this is achieved without ever having to use the keyboard. If you make a complete mess of the operation, touch the START OVER key and start again.

TERMINAL. The 150 has some very extensive terminal facilities which allow it to be hooked up to a range of mainframe machines. All the terminal software is held in ROM so the disks are never used. To upload or download diskfiles use a comms package when the machine is in computer mode.

Both the RS232 ports can be configured under software control by touching the CONFIG KEYS softkey. The settings are held in the battery-backed CMOS RAM and are retained when the machine is switched off.

When it is shipped from the factory the 150 comes with two sets of default settings: 1200 baud full duplex hard-wired and 300 baud full duplex modem. Not only can the normal data bit/stop bit/parity settings be used, but protocols such as HP's EnqAck handshaking can be set and pins can be high or low.

The system defaults are also set in terminal mode, such as keyboard type and the printer port. You can also set the printer to echo everything that is displayed on the screen.

I tried the terminal mode on a wide range of dial-up services using an acoustic coupler and it worked very well — the ability to produce hard copy of current applications is very useful. In order to get from terminal mode back into computer mode press the shift and stop keys together.

HELP. If you get lost, touch the help softkey and the machine will display a one page help screen giving a potted description of each function.

In addition to the utilities directly available from PAM, there are a number of disk utilities which can be called from PAM as programs to make life easier:

FORMAT. To format a disk, touch the FORMAT box followed by the START APPLIC box. You are then faced with a list of drives from A to L. To format the disk in drive B touch the B box. The system will then ask for the disk name.

This utility does more than just format a disk. Eight-inch disks can be formatted to IBM 3740 format or standard HP format. If the formatted disk is to have MS-DOS system tracks, the format utility will copy them over. Finally, to wipe the files off a disk, touch the CLEAR option. This is much faster than using the full format option.

COPY/BACKUP. When selected this requests the name of the drive you are copying from and the drive you are copying to. You then choose whether to copy or backup your files, or copy to CP/M format (only copy to CP/M format if there is another HP machine available running CP/M and data is to be transferred).

The difference between copy and backup is that copy produces an exact replica of the original files, whereas backup stores its data in a compressed format. Files created using backup can't be read directly: they have to be reconstructed first.

To select the files to be copied touch the names that are displayed on the screen. Alternatively, you can select by using wild cards or the date that the file was last written to. This is very useful if you are regularly backing up files and only need the most recent version.

INSTALL. PAM will only pick up and display an applications program if it has been properly installed into the system. The install utility will copy an application onto a system disk, and install it so that it is recognisable by PAM.

Install works by looking across the disk for files with the extension IN$. All programs supplied by HP come with a IN$ file but if you have written the application yourself one will have to be created. By using a text editor or word processor a file is produced in the following form:

General form	**Example**
Display name	Myprog
Version no	1.2
Program name	BASIC.COM
MS-DOS command line	MYPROG.BAS
Program size (bytes)	128

'The touch screen is vastly superior to the mice that are breeding in the rest of the micro world . . . no messing around on the desk trying to get the cursor to go where you want it to — just point and go.'

Names of all files BASIC.COM
used by the program MYPROG.BAS
MS-DOS COMMANDS: These get you down into MS-DOS command mode complete with the A> prompt. I can't see any reason why you would want to do this — PAM is much better at most jobs.

Applications software

The review machine was supplied with four applications packages — VisiCalc, Graphics, Basic and a word processor called Memomaker. As the 150 runs under MS-DOS there is a wide range of software available but not all of it will work with the touch screen. Products like WordStar and Multiplan have been converted: dBase II and Lotus 1-2-3 will run but have not been converted for the screen.

VisiCalc has been modified to run on the 150 with the touch screen. It's much the same as any other VisiCalc except that you can move directly to any cell just by touching the screen. All the softkeys along the bottom of the screen are configured for VisiCalc. The only problem I had was that one touch resolution is not fine enough to reach the required cell straight away. I found the best method was to drag my finger across the screen and then pull it away when the cursor reached the desired cell.

The graphics are very good. The output is very sharp due to the high screen resolution. Using the graphics programs bar charts, line charts, pie charts and text in any combination of nine fonts and eight sizes can be created. The only problem is that the graphics programs are supplied on no less than five different disks (somehow I always managed to lose the one I wanted).

Memomaker is an excellent little word processor. As its name implies it is not designed for 'heavy' word processing (this is better left to WordStar) but is simple to use and easy to learn.

All the necessary functions are displayed on the softkeys so you don't have to remember any complicated command structures. Also, the files produced are fully compatible with WordStar, so documents can be exchanged between them.

Two good features of Memomaker are that standard memo formats can be saved on disk and then recalled later, and emphasised printing, such as bold, is displayed on the screen.

Basic is a great let-down. In order to try to keep the machine standard, HP has used standard Microsoft Basic on the 150 which is totally out of keeping with the rest of the machine. It isn't interfaced to the touch screen — you have to use the keyboard! To write a Basic program to access the touch screen, unfriendly escape sequences must be used which detract from the readability of the programs.

Documentation

The documentation is very good. Six manuals were supplied with the review machine — a computer users' guide, a terminal users' guide and one manual for each of the applications. All were supplied in boxed, ring-bound folders with inserts to show where each section started. All were properly typeset and printed rather than the photocopied manuals I normally receive.

The manuals are well written: a brief list of all important points is printed at the start of each section followed by more detailed examination of each point. They're easy to read and informative.

Prices

The entry level machine with twin 3.5in disks and 256k of RAM will set you back $5739 including sales tax. The internal printer costs an extra $709. Extra RAM costs $1,450 for 256k.

The 150 is not cheap but then HP doesn't go in for cut-price machines. Its main competitors are the likes of the Apple Macintosh and the IBM PC and both these machines are less expensive than the 150.

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Vision-80 128K Ramcard	$395	$345
16K ramcard	$ 90	$ 80
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Wildcard, Snapshot or Replay, ea:	$ 90	$ 80
Clockcard	$125	$110
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Joystick	$ 45	$ 45
Koala Pad graphics entry tablet inc software	$180	$160
Game Port Extender (2 socket)	$ 35	$ 35
Game Port Extender (2 socket + Vision80/Zardax mod)	$ 50	$ 50
RF Modulator	$ 40	$ 34
Apple Mouse Keyboard function extender for II+	$ 79	$ 79
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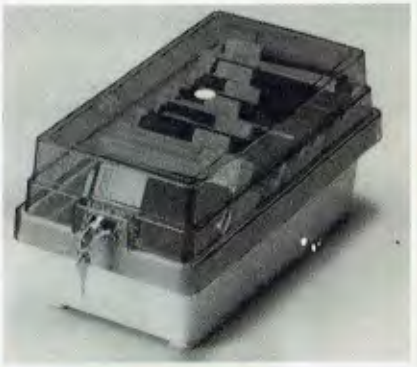

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Conclusions

When I first saw the 150 I thought the touch screen was a gimmick—just HP's way of getting on the 'friendly' micro bandwagon. HP has a reputation for being a counter-punching company: it waits to see what other companies are doing and then brings out a product based on those ideas. In general terms this is what HP has done with the 150: it has seen the likes of Apple producing easy to use micros and has come up with a 'friendly' product of its own. However, the touch screen sets this machine apart from the rest of the micro crowd.

The touch screen is vastly superior to the mice that are breeding in the rest of the micro world. The problem with using a mouse is that you need to keep a portion of your desk clear so that it can roam freely, and it needs a special surface so that it doesn't slip.

The touch screen means no messing around on the desk trying to get the cursor to go where you want it to — just point and go. The only drawback is that it isn't as accurate as the mouse, so the screen can't be used to draw such detailed pictures.

At first sight, the 150 looks overpriced. It's major competitor is the Apple Macintosh at more than $2,000 less, but a look at the way the 150 is put together reveals where the extra money went —it's one of the best engineered micros I have ever seen.

Benchmarks

BM1	1.4
BM2	4.3
BM3	8.7
BM4	7.5
BM5	10.3
BM6	18.4
BM7	28.1
BM8	26.7

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

All in all, the 150 is a well-built, easy to use micro. Whether you include it on your shopping list depends on whether you consider that the quality justifies the extra cost. I think it does.

END

Technical Specifications

CPU	Intel 8088 running at 8MHz
RAM	256k user RAM expandable to 640k
	60k alpha system RAM
	32k graphics system RAM
	256 x 4 bits battery-backed CMOS RAM
ROM	160k
I/O	Two x RS232 Serial ports, one HPIB (IEEE 488) port
Screen	9in green monitor with 23 x 40 LED touch sensors

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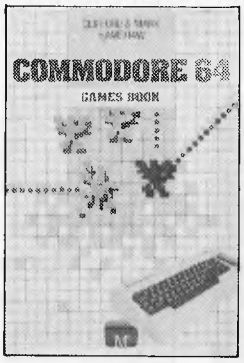

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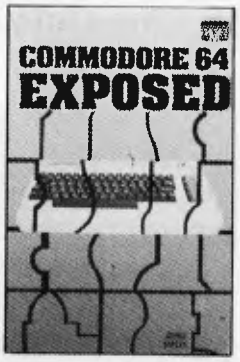

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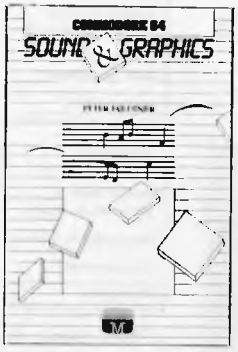

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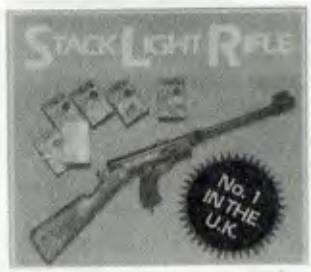

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Floating commands	★★★★	★★★	★★★★★	★★★★	★★★★	★★★★
Misc screen commands	★★★★	★★★	★★★★★	★★★★	★★★	★★★★
Sprite set-up	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★
Sprite programming	★★★★	★★★½	★★★★★	★★★★	★★	★★★★
Keyboard input	★★★★	★★	★★★★★	★★★	★★★★	★★★
Misc input/output functions	★★★★★	★★★★★	★★★★★	★★	★	★★★★★
Sound set up	★★★★★	★★★★★	★★★★★	★★★★	★★★★	★★★★★
Sound programming	★★★	★★★★	★★★★★	★★	★★★	★★★
String commands	★★★★	★★★★	★★★★★	★★★	★★★★	★
Arithmetic commands	★★★★	★★★★	★★★★★	★★	★★★	★★
Structured programming	★★★★	★★★★★	★★★★★	★★★★	★★★★★	★★★★★
Programmer aids	none	none	none	★★★★	★★	★★★
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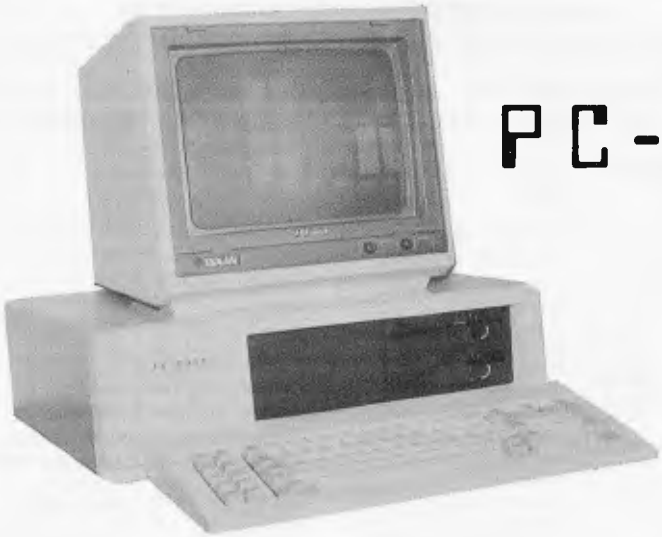

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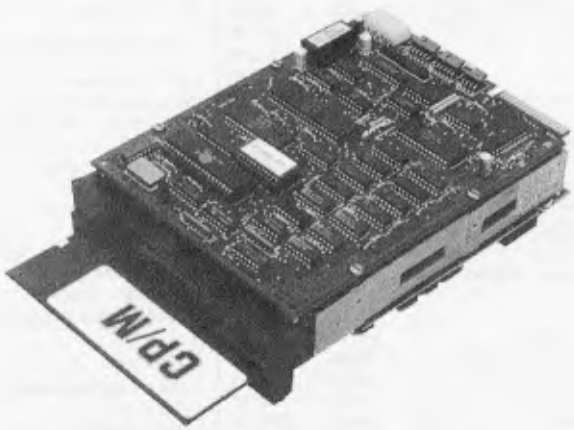

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Challenger 1

The entire computer industry has been eagerly awaiting the arrival of Dick Smith's IBM compatible machine, the Challenger. Most remember the technical success of his System 80 and wonder if he has done it again with the Challenger. Half the price of an IBM PC, but how compatible?

I had been awaiting the arrival of the Challenger for review with baited breath, mainly because I had a personal interest — if it shaped up as well as the System 80 did to the TRS-80, I would be running down to the nearest Dick Smith store with cash in hand. After a brief look at the Second *Australian Personal Computer* Show, it appeared as though the Challenger was going to be everything everybody hoped it would be — namely an IBM PC (less the labels) at half the price.

The Criteria

The main criterion of success for the Challenger is its IBM compatibility. Without compatibility, the Challenger is just another 16-bit machine, but with compatibility, it is transformed into an exciting product capable of running over 3000 software packages with many more state of the art additions appearing every week. So first a word about compatibility.

Many vendors express their compatibility as a percentage, "our machine is 95% IBM compatible!" This type of sales claim should be totally ignored, as it has absolutely no meaning. Other vendors simply claim their machine to be "compatible". This is even more preposterous, as it implies that their machine is functionally equivalent to the IBM in every way.

Quite simply, a machine that is "100% IBM compatible" has breached copyright, and the manufacturer and vendor can expect litigation from IBM. For an IBM "clone" to be legal, it has to be different at certain levels, and these differences make the machines . . . well, umm . . . *different*. The ability for a machine to run MS-DOS does *not* make it IBM compatible.

At the recent Second *Australian Personal Computer* Show in Sydney, the number of 8088 or 8086 based machines running MS-DOS and claiming IBM compatibility was staggering. I toured the stands on the first day and was told by twelve vendors that their machine was IBM compatible. I returned on the second day with a PC-DOS diskette and an unmodified copy of Lotus 1-2-3 to put them to the test. Upon seeing the diskette, all except six vendors backed down, saying "Oh no . . . we didn't say that . . . we just meant that we have some optional hardware/software that lets us read IBM disk format". Of the six remaining, only four got off first base, these being the Sperry, Sigma Data, Corona and the Challenger. This illustrates the extent to which the fuzzy term "compatibility" is being exploited by the marketeers.

What determines the extent of compatibility? Figure one shows the way the IBM operating environment is constructed. The application program makes calls to the Disk Operating System, requesting it to perform actions for it, such as read a disk/block, rename a file or display some text on the screen. DOS is kept in RAM, and can actually change its position in memory, depending on its configuration options, so the calls are made via software interrupts, which are then trans-lated by DOS into the actual addresses of its routines. DOS, in turn, calls the BIOS to communicate with the hardware. Whereas the application program talks to DOS in terms of files and file blocks, DOS talks to the BIOS in terms of tracks, sectors and seeks. Although the BIOS is kept in ROM, its routines are also accessed through software interrupts which are translated into the actual addresses of the BIOS routines. The BIOS then acts upon the DOS requests by communicating directly to the hardware controllers attached to the I/O ports.

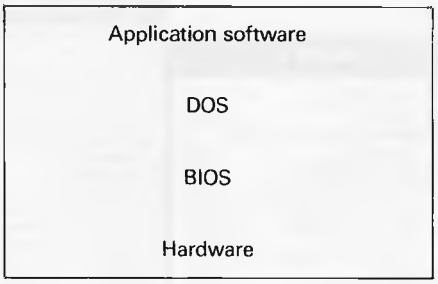

Figure One: The IBM operating environment

The interfaces between these various levels of operation are all well documented in the IBM manuals, and it is not a breach of copyright to create some other product which has the same interfaces, but which is an original development and goes about its work slightly differently within the constraints of providing an identical interface.

Ideally, all application software should work only through DOS, using the defined interrupts, and if all application software did this, there would not be the compatibility problem which exists today. In reality, most high performance software is obliged to skip DOS for certain functions and call the BIOS interrupts. For example, the DOS routines provide no graphics ability, but BIOS routines do. Similarly, the DOS routines to display text to the screen do not provide the ability to position the cur-

sor or utilize the various video attributes available.

Again, if all applications software were limited to the DOS and BIOS software interrupts, there would not be a problem, but not all functionality is provided by these routines, and very often they are just too slow or inflexible to be used. Hence much of the high performance software available today controls the hardware directly, and this is where the problems begin. Even worse, some software developers may be foolish enough to call BIOS routines directly, using their addresses rather than working through the well defined interrupt interfaces. This is where the problems escalate to mammoth proportions.

Where do the problems lie? Firstly, it is not difficult to design hardware which performs the same as IBM hardware. Most of the boards are based around one or more VLSI chips which perform most of the work and provide the hardware interfaces to the other circuitry. These chips are readily available to all manufacturers, and so it is a simple matter to design equivalent hardware based on identical chippery, but with slightly different support circuits. Similarly, the DOS is no real problem, as Microsoft is free to sell MS-DOS to other manufacturers. While it is true that IBM runs PC-DOS, the two are so close it really does not matter. PC-DOS is just MS-DOS configured slightly differently for IBM, with some of its commands renamed. The problem is the BIOS, as this is copyright to IBM. Although an equivalent BIOS can

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be written with the same interfaces, it is the BIOS that the application programmers tend to leap into with wild abandon.

Surprisingly, it is not in the BIOS that the Challenger tends to fall down.

The Challenger

Dick's machine consists of two components: the system unit ($995), and the expansion unit ($1995), which provides disk drives and expansion slots. I consider the minimum useful configuration to be the combination of both units, as the system unit on its own does not provide access to the mountain of disk based software available for the IBM, and hence defeats the purpose of the machine.

The Challenger (henceforth considered to be both the system and expansion units) provides 128k of RAM, 64k of ROM, cassette interface, game ports, parallel port, serial port, two half height IBM format dual sided disk drives (actually Shugarts), 3 IBM format expansion slots and 2 sixteen bit expansion slots. Display output is provided by what the IBM world knows as a "colour/graphics adapter", supplying video output of RGB, composite and UHF modulated. It runs an 8086 at 4.77 Mhz. which is a sixteen bit version of the IBM's 8088 running at the same speed. These two chips are identical internally, the only difference is that the 8088 retrieves data from memory eight bits at a time, whereas the 8086 works sixteen bits at a time. This makes the Challenger a noticeably faster machine, as shown in the Benchmark timings. Space is provided on the system board for the 8087 maths co-processor. The Challenger has a lower chip count than the IBM, mainly due to nine ULAs (uncommitted logic arrays). It is manufactured in Britain by Ferranti, a well respected name, under the title of the "Advance 86".

The Challenger is packaged as two separate units which bind together in a highly complicated manner, indeed our photography people were unable to get the Challenger to pieces for its internal shots. These two packages result in a large black box wider than an IBM and about twice the height. The Challenger actually weighs less than an IBM, due to the absence of almost any metal in its chassis and case. The first thing a regular IBM user will notice is that the Challenger is much quieter than the IBM due to the fact that it does not have a cooling fan. The fan can presumably be dispensed with due to the much larger space inside the Challenger cases, thereby allowing passive flow-through cooling. After many hours of use, there appeared to be no heat build up within the unit and this, to my mind, is a real plus. Although the IBM fan is not noticeable in an average office environment, it is certainly noticeable at home.

Sensible design has resulted in a keyboard which plugs into the front of the unit rather than the back, thereby allowing the keyboard to be moved much greater distances away from the screen. The keyboard can also be stored *inside* the system unit for transportation — but more on the keyboard later.

Memory is expandable to 256k internally without the need for costly memory expansion boards. Like the IBM PC, the memory is parity checked, which is surprising, as one would have expected Ferranti to cut as many corners as possible. The on-board memory is implemented in 64 kilobit 4164 DRAMS, and the Challenger appears to require faster chips than the IBM, as a set of 4164-3s I tried resulted in consistent "parity check" errors. Dick Smith Electronics recommends the use of 150ns chips, and can supply these as an option.

Expansion boards fitted into the slot require the user to "pop-out" plastic coverings on the rear of the chassis. This design philosophy is present throughout the entire machine — even the manual states that connecting the system and expansion units together requires that certain strategic bits of plastic be snapped off. The machine feels cheap and "plastic-y" and generally the packaging is not well thought out, except for the positioning of the keyboard socket.

The keyboard, quite simply, is not acceptable. Apart from a slight rearrangement of keys, which one would expect and can live with without any problems, the keyboard had had too many corners cut. The keys have no definite

The Challenger's look-alike (but not so nice) keyboard

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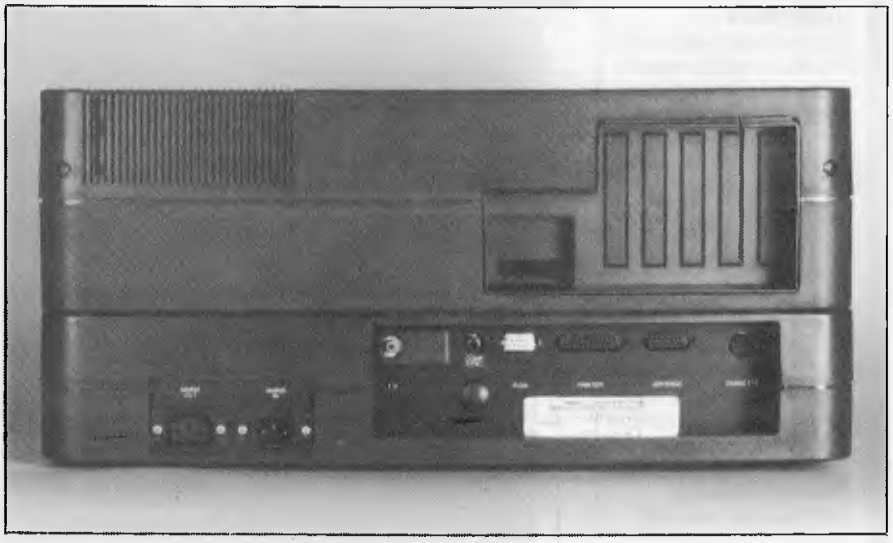
tactile feedback, and the amount of pressure required to activate a given key varies depending on the exact angle of your fingers. Even in normal typing, it requires a different amount of pressure depending on which direction your finger is coming from. It is the most unusable keyboard I have struck since the old membranes on the ZX-80, except that the Challenger keys also stick and jam. It is not suitable for word processing, or any application requiring reasonable quantities of keyboard usage. Additionally, if the keyboard is laid flat, such as on your lap, key bounce comes into effect and a single character results in a sequence of up to a dozen characters, including escapes and returns. On the plus side, I was able to plug an IBM keyboard into the Challenger, and was therefore able to use the machine without suffering the frustrations of the keyboard. It could be argued that the unit we had on review has probably been around and seen quite a bit of action, but all this means is that the Challenger you see demonstrated in a store will not exhibit the keyboard bounce problems, but the one you buy and take home *will* probably develop the problem after six months. If you are planning to buy a Challenger, plan an extra few hundred dollars for an IBM or compatible keyboard. It's that bad.

Software

The Challenger is sold with "Advance 86 DOS" (MS-DOS) and three appli-cations packages worth some $1800.

The DOS is actually MS-DOS 2.11, and is not bad. It provides none of the fixed disk utilities (FDISK, BACKUP, RESTORE), and does not include the Basic demos supplied with the IBM PC-DOS. The utility programs such as LINK and DEBUG are provided. In place of the PC-DOS MODE command, the Challenger supplies SET40 and SET80 to select the number of columns per screen. This provides just two of the functions of the MODE command, as MODE also allows you to switch between displays, configure serial ports, reassign printers and centre your display. Interestingly, the Challenger DOS provides a DISKCOPY, but no DISKCOMP. It does, however, replace the PC-DOS file comparison utility, COMP, with a much improved version called FC. Among other things, FC allows you to compare files of different sizes, binary files, can do case control, and can provide useful output. Importantly, IBM's PC-DOS runs happily on the Challenger, as does the Challenger's MS-DOS on the IBM, indicating that the standard BIOS interfaces have been faithfully reproduced.

The applications software provided is Perfectwriter, Perfectcalc and Perfectfiler, being a word processor, spreadsheet and file manager, respectively. I will not attempt to go into any detail on these products, as they are certainly well known packages and not just peculiar to the Challenger. They all do what they are designed to do adequately, but they are no Multimate, Lotus 1-2-3 and PC/FOCUS, respectively — but then what do you expect for free? Unless you have your heart set on running the current vogue software packages, I am sure that these three will meet your needs.



Most slots are located in the lower portion

Documentation

The documentation is to be polite, sparse. The system unit manual describes the operation of the unit and the Basic, the expansion unit manual describes how to use the disk drives and DOS. Both manuals are far too brief, and I certainly would not like to try using them if I were not already familiar with the products being described. The DOS manual appears to be an adaption of something else, and in places the word XENIX appears in place of the word DOS. No index is provided and there is no use of a larger font to identify new sections. Typically, a topic covered by 3 or 4 pages in the IBM documentation is given about one quarter of a page in the Challenger manuals, and although all the vital information is covered in the topics presented, it does not take the time out to explain things in as much detail as the IBM manuals.

Whereas the IBM PC-DOS manual provides mountains of information crucial to anybody who wants to do anything original, the Challenger documentation omits topics such as file structures, disk structures, directory structures, DOS calls, load module handling, using serial ports, using device drives and a list of the character set.

Diagrams and examples are virtually non-existent, and the owner is given an interesting challenge if he plans to add extra hardware onto his system. There are several banks of option switches located throughout the machine which appear to be totally undocumented, and this would be acceptable if schematic circuit diagrams were provided, but alas, they are not.

The three applications packages are adequately documented in their own well presented manuals. No complaints there.

In general, if you are planning to run purely packaged software on your Challenger, the documentation is

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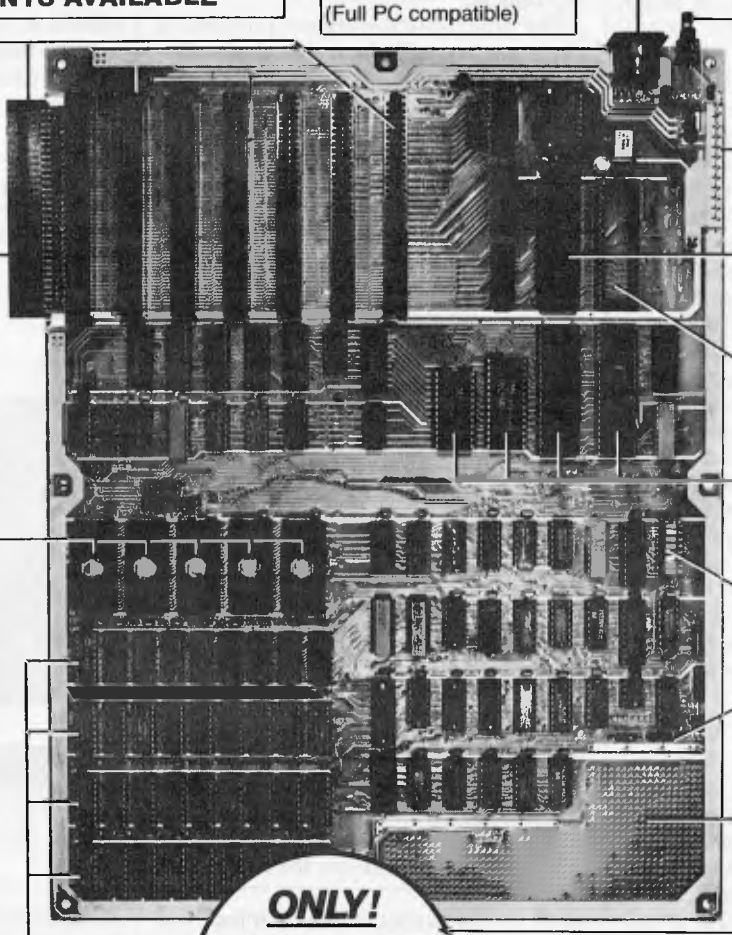

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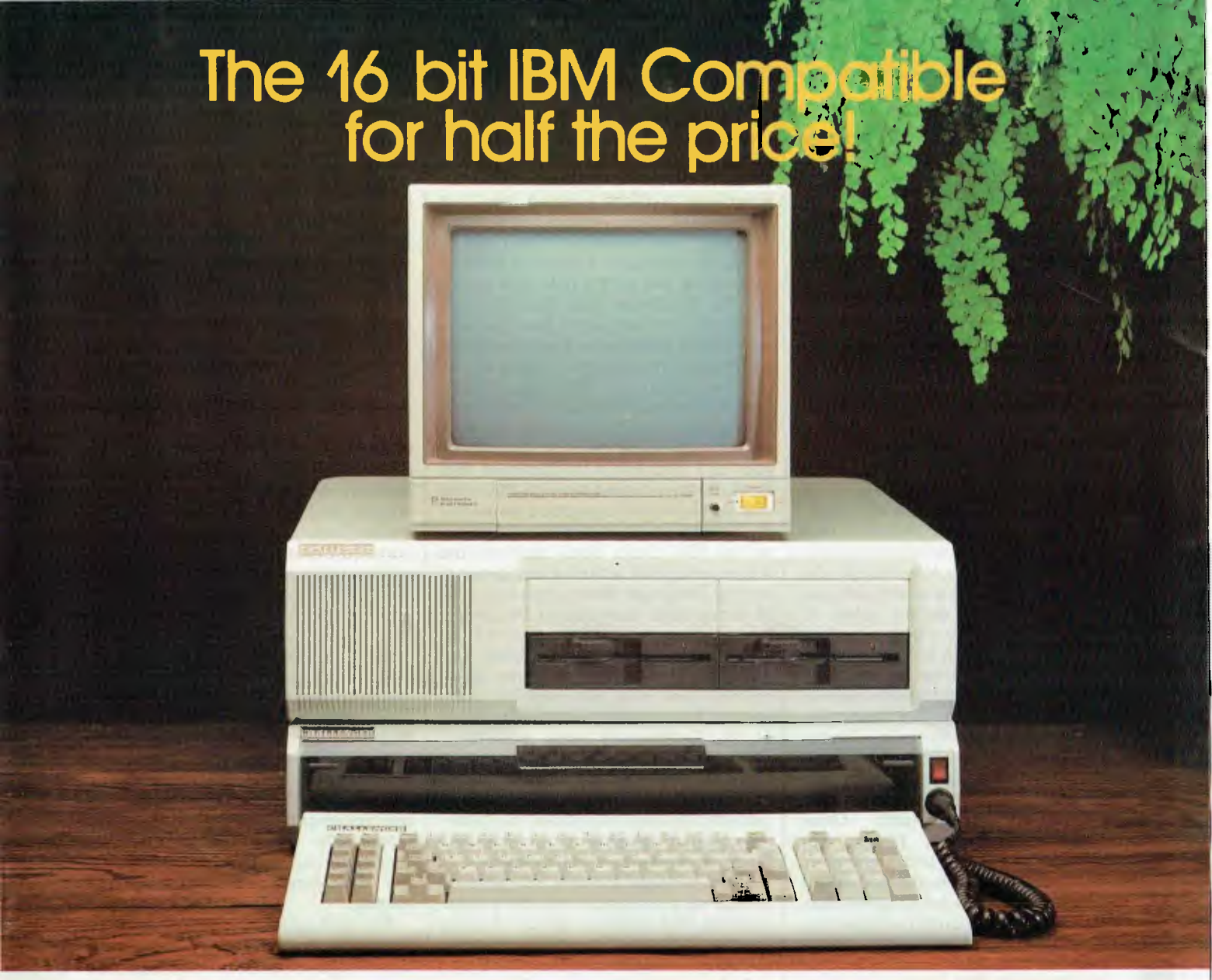

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adequate. If, however, you are planning to dig inside the machine or its operating system at all, then the IBM manuals become a necessity.

Compatibility

Now for the interesting bit. The following software was tried and worked: Lotus 1-2-3 & graphics, Peachtext 5000, PC-DOS, IBM's Microsoft Multiplan, dBaseII, Visiword, Visispell, Microsoft Flight Simulator, Wordstar, CPM 86, Condor, Norton Utilities, Wordplus, Micropro DataStar, Micropro ReportStar, IBM Basic Compiler, IBM Fortran Compiler, IBM Macro Assembler.

So much for the good news. Microstufs Crosstalk communications package works fine until you attempt to exit, at which time it hangs. Interestingly, the XDOS command works, which indicates that the problem occurs when it attempts to close the communications line. Microsoft Word and Decathalon actually ran, that is, they did not hang, but the letters appeared as little patches of fog instead of readable characters, indicating some incompatibility with the video display when driven in certain undocumented ways to reduce the traditional screen flicker. Thus Word and Decathalon were unusable. Other software which hung because of apparent hardware incompatibilities were Fastgraphs and Database Manager II. Unfortunately, we were not able to test some of the more popular packages due to the unavailability of additional memory at the time of review.

The standard IBM diagnostics were also run, and these detected problems in the system board, memory and serial port. Not surprising, as it would have been unreasonable to expect them to run cleanly.

The IBM Basics do not run on the Challenger, and this is easily explained, as the IBM Basics ,make heavy calls to absolute memory addresses of the Basic interpreter in ROM, jumping into it at hundreds of points without any address mapping. The Challenger ROM Basic is, of course, located in a different position from ROM, and so the IBM disk Basics fail. The Challenger disk Basic (actually GW Basic, but renamed to Basica in honour of IBM) is completely self-contained and does not make any ROM calls, and so can be run on the IBM. Since IBM's Basica is really GW Basic, I did not expect to find any difference between the two, but one difference became apparent as soon as I tried to run the standard IBM Basic demos supplied with PC-DOS. The problem is when the graphics statement PUT is used on a non-blank background, as the IBM Basic nicely overlays the shape being PUT onto the background, but the Challenger Basic erases the area of background surrounding the shape. Upon running some of the games from the PC-Blue library, this problem was found to exist in most programs which perform any sort of graphics using objects. This problem is certainly caused by the Challenger's Basic interpreter, rather than the hardware, as compiled versions of the same programs (compiled using the IBM compiler) worked perfectly. As described above, it is unfortunately not possible to run the IBM Basic interpreter on the Challenger.

The Challenger software also seemed to take up more space than the corresponding IBM software: about 1k more for the DOS, and about 3k more for the Basic.

As far as hardware compatibility goes, the Challenger and the IBM happily swapped keyboards without any complaints. The Challenger also ran the IBM monochrome display adapter and monochrome monitor without any problems, although is was necessary to use the MODE command from the IBM DOS to cause the Challenger to actually display on the monochrome screen. It is possible to write a five line program to produce the same effect as the MODE MONO command, but this information is contained in the IBM documentation.

It seems that the Challenger should run most IBM and third party expansion boards, although the purchaser should make sure that any memory boards are populated with chips of adequate speed (150ns or less) The Shugart disk drives provided on the Challenger appear to be about the same speed as the IBM disk drives.

The only real area of hardware incompatibility discovered was in the display adapter, and this was so gross that I had trouble believing that I had not made some sort of mistake. Quite simply, the colour coding is different. A colour code of zero which produces black on the IBM produces bright white on the Challenger. In fact, all sixteen colour codes produce totally different colours on the Challenger — even the colours in the two medium resolution palettes are different. This was tested using an IBM RGB monitor and, according to the documentation, the pin connections are identical. According to the substitution of colours, it is impossible for any rearrangement of pin connections to be responsible for the result. The Challenger also lost its vertical hold of the IBM monitor in certain display modes.

The modulated video output from the Challenger was excellent, providing a clear image on a normal domestic television — even in eighty column mode. Once again, however, it blew the vertical hold in certain screen modes and not in others, and I was not able to produce any colour through the modulated output in medium resolution mode. Composite output into a black and white monitor produces no problems with vertical hold.

Benchmark Timings

Benchmark	IBM running IBM Basica	IBM running Challenger Basic	Challenger running Challenger Basic	Increased speed of Challenger Basic	Increased speed of Challenger hardware	Combined increase
		seconds			percent	
1	1.6	1.4	1.1	13	21	31
2	5.2	4.8	3.5	8	27	33
3	12.2	10.4	7.7	15	26	37
4	12.6	10.7	7.8	15	27	38
5	13.7	11.6	8.4	15	28	39
6	23.9	20.7	15.1	13	27	37
7	37.9	31.7	23.5	16	26	38
8	31.4	34.3	26.2	-9	24	17
average				**9%**	**26%**	**33%**

Conclusion

Back to compatibility — there is no such thing as legal 100% compatibility. If you are thinking of an IBM compatible, you must look at where the differences lie and decide whether it is *sufficiently compatible* for your uses. In the Challenger, the problem seems to be the display, with additional worries being the documentation and the keyboard.

The Challenger is certainly close, and is neither the best nor the worst in terms of compatibility, but is certainly the cheapest. It is *not* an IBM PC, and whether or not it is close enough is up to you.

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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 operation 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 AWA Computers.

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.

When plugging in the 8087, 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 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 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 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. The problem with

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   *
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.ID
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.ID=''
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
```

most of them, 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 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. I was told 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 than 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 quite 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

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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.

I was asked not to categorise the product because it was suggested 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 about $1400 (depending on the number of units purchased) 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.

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Concurrent CP/M

The battle to attract 16-bit applications packages continues and Digital Research again enters the fray with Concurrent CP/M version 3.1. This powerful operating system allows up to four applications to be run simultaneously and support PC-DOS applications. Peter Bright reports.

How often have you tried to compose a letter on your micro and found that the information you want is sitting in another file somewhere else in the system? Rant and rage no more, Concurrent CP/M is here!

Most single-user micro operating systems can only handle one job at a time. So, in the above example you would have to close down the word processor, load the file, find the information, reload the word processor and carry on with your letter — all very long-winded and very slow.

Concurrent CP/M overcomes this problem by allowing different programs to run at the same time, while providing the opportunity to switch between them virtually instantaneously. The switching is achieved by the use of 'virtual consoles': for example, I am writing this article on an ICL machine running Concurrent 3.1. If I want information from a spreadsheet, I hit function 1 and the WordStar display is replaced by a display showing the CP/M 'A>' prompt. I then load the spreadsheet, receive information and hit function 0; and the display returns to WordStar.

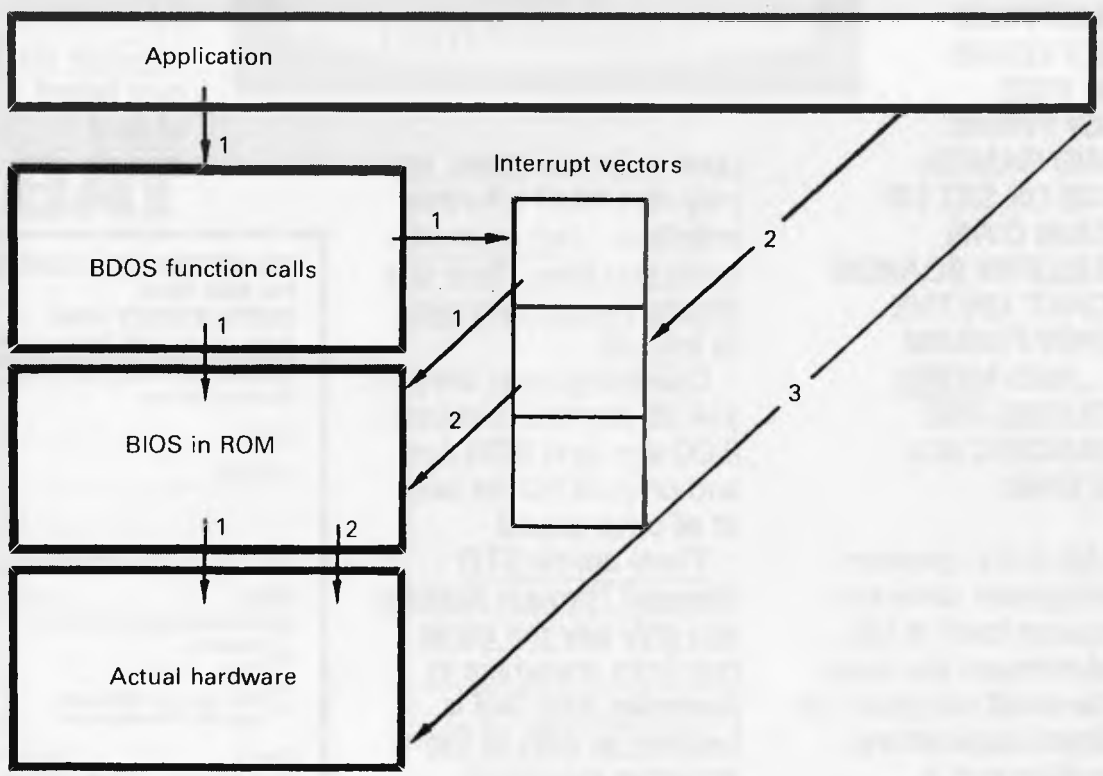

Fig 1 PC-DOS works at four main levels

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I have disc drive ☐ Yes ☐ No

I have a modem ☐ Yes ☐ No

Model: _____

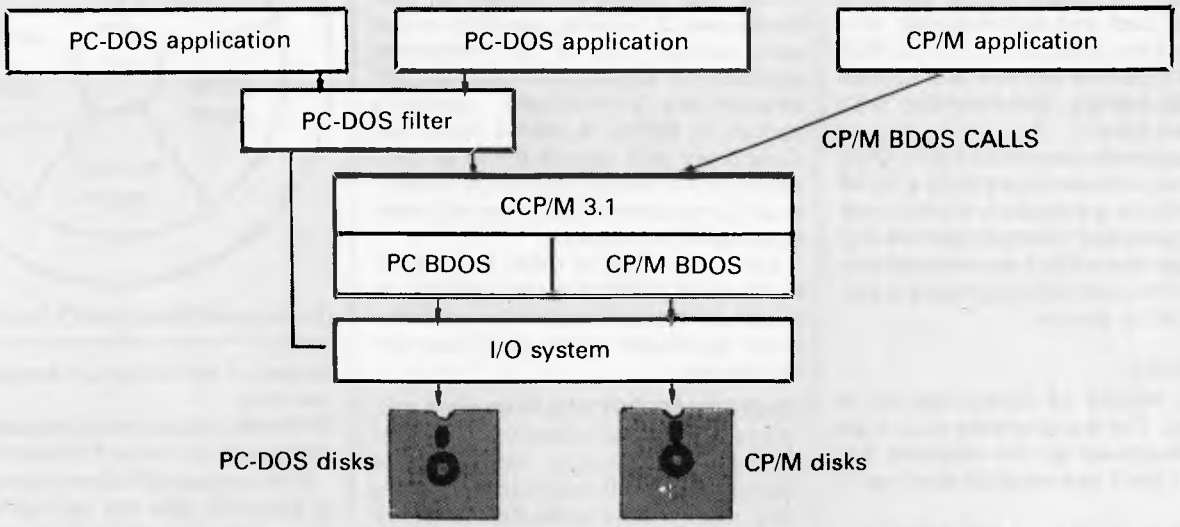


Fig 2 Position of the PC-DOS filter

It's important to remember that when you switch out of one virtual console the program you are running keeps going — you just can't see it. This is the multi-tasking element of Concurrent — up to four programs running at the same time.

To handle these jobs the machine must have some method of dividing processor time between each job. A combination of two methods is used: time slicing and I/O. If all the programs are processor-dependent then the system will give each job an equal time slice. However, most programs spend a great deal of time waiting for I/O to the screen, keyboard or disks. If one job is performing I/O, the system will allow the next job to jump in to use the processor.

As the processor has to run up to four programs instead of one, each program will obviously run slower than if it had been run as a single task. The extent of the speed overhead depends on the programs that are running. If you are running four processor-dependent jobs, they will run slower by a factor of four: this is an extreme case, usually the overhead won't be that high.

Features

In addition to running more than one program at once, version 3.1 is able to emulate PC-DOS, act as a multi-user system, run a windowing facility and interface to a local area network.

One of the most interesting features of Concurrent 3.1 is its ability to run programs designed to run under version 1.1 of PC-DOS on the IBM PC. Concurrent can't fully cope with version 2 of PC-DOS yet because of the hierarchical directories it employs.

This is the first time CP/M users have (in theory) been able to run PC programs; it potentially opens up a wide range of software for their use.

PC mode is not implemented on the ICL so I tried it out on an IBM PC. The thought of an IBM PC running Concurrent CP/M and emulating its own native operating system seems rather strange, but this is where Digital research (DR) is hoping to sell most units.

To understand how PC mode works it's useful to look at the workings of PC-DOS. Fig 1 shows the four main levels: at the top there's the applications program; below that is the BDOS and below that the ROS. The ROS is the ROM-based BIOS that gives the IBM-lookalike makers' problems, as they are not allowed to directly copy the ROS ROM and have to write their own versions. The lowest level is the actual hardware.

Applications programs access the system in different ways. 'Well-behaved' programs make all their system calls via the BDOS. However, very few applications programs rely solely on the BDOS as it's faster and more efficient to use ROS interrupt calls for devices like the keyboard and video. These can be called 'fairly well-behaved' programs. The third group is badly-behaved and makes calls direct to the hardware: for example, direct screen addressing.

PC mode handles all well-behaved programs and also the majority of fairly well-behaved programs that rely on the most commonly used ROS interrupt vectors. In the case of direct hardware calls, problems usually arise if a 'not quite IBM-compatible' machine is used.

DR says that PC mode will run 90-95 per cent of IBM software when running on an IBM machine. In the case of IBM-lookalikes, the figure is around 70 per cent depending on the hardware and what has been done to the ROS. In non-IBM-compatible machines running MS-DOS, DR quotes 30-70 per cent.

When Concurrent is run with PC

mode it's perfectly possible to have one virtual console running a PC-DOS program and another console running a standard 16-bit CP/M program.

PC mode can be broken down into two parts: the back end and the front end. The back end automatically tells the difference between CP/M, PC-DOS and MS-DOS disk formats and adjusts itself accordingly. Reformatting isn't necessary here.

The front end is known as the PC-DOS filter and is invoked every time a .COM or an .EXE file is executed: it intercepts PC-DOS calls and tries to do something useful with them. Fig 2 shows that it sits between the applications program and the rest of the system.

Windows

Another feature of Concurrent 3.1 is windows. The world seems to be mad about windows at the moment but frankly I can't see what all the fuss is about.

For those of you who've been in a Tibetan monastery for the last year, windows allow the output of more than one program to be displayed on the screen at the same time. Usually this is done by reserving a different area of the screen for each program so that you can see what's going on in each cell.

Concurrent's version of windows is better than most because each window acts as a port hole to one of the virtual terminals: you can have up to four different programs running in different windows at the same time. This is not true of products such as Microsoft's windows where only the current foreground program is actually running. The background programs just sit on the screen looking pretty.

Concurrent windows can either be under program control or used interactively with a utility called window manager. Using the manager you can set the colour, expand or contract window size, move windows, and so on. You can also scroll left and right or up and down within a window. One very useful feature is that you can save the contents of a window to a disk file. A particular spreadsheet area can be saved and then incorporated into a document on your word processor. This is useful, because although Concurrent CP/M has structures available for inter-process communication, the applications programs have to be written with this in mind. Saving a window to disk is the only way to communicate data if the applications haven't been designed to talk to each other.

In theory, PC Mode and windows can be run at the same time to allow normal PC applications to be run in a window environment. However, if the application uses direct screen addressing you could end up with some very strange effects!

The ICL machine I used to test Concurrent 3.1 makes use of the multi-user option. This is an interesting addition to Concurrent because DR already has a multi-user operating system in MP/M. It seems likely that Concurrent will replace MP/M as DR's preferred multi-user operating system, and it's not clear where this will leave existing MP/M users.

Let's now look at other features of Concurrent CP/M that are available on single-user machines but are probably more applicable to the multi-user environment.

RE-ENTRANT CODING. With most micro operating systems each user has his own area of memory into which he loads his applications programs. There may come a time when two users are both running the same program in their own user areas. Obviously it would be ideal if both users could share the same code, and this is where shared code comes in.

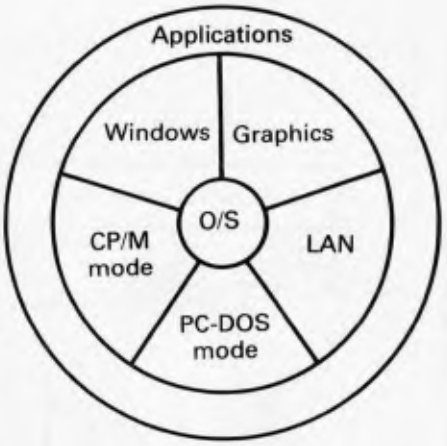
The problem is that the original program must be written with this in mind: this is known as re-entrant programming. Although Concurrent CP/M has the facilities to support re-entrant programming, few applications have yet been written to take advantage of it. This will change if Concurrent takes off and software houses produce programs for it.

RECORD LOCKING. Record locking is an important part of any multi-user/multi-tasking system. Whenever more than one job is running at the same time it's conceivable that two applications will try to access the same record or file simultaneously. Concurrent CP/M supports both record and file locking.

So much for Concurrent 3.1's general applications. What does it look like when in use? In general terms, Concurrent is very like CP/M Plus which in turn is quite like good old CP/M 2.2. Anyone who has worked with CP/M will soon see that a great many favourite utilities have been dusted off, updated and included in this package.

The first thing you notice when the machine is switched on is the status line at the bottom of the display. This usually says something like 'CONSOLE=0 DYNAMIC WS A PRINTER=0'. You always know it's CP/M when you can't understand the messages!

CONSOLE=0: you are currently using virtual console 0. If you move to console 1 the indicator changes to tell you this.



Overview of Concurrent 3.1 system

DYNAMIC: each virtual console can be either in Dynamic or Buffered mode.

If the console is in Dynamic mode and is switched into the background any output that would have gone to the screen is written to a special area in RAM. If the memory fills up, old data is lost and new data is written in: important data can therefore be easily lost.

If the console is in Buffered mode and switched into the background then screen data is written out to a temporary disk file. If the temporary file becomes full, the program is suspended until the console is switched back into the foreground. The data is then retrieved from the disk and written to the screen.

The console mode is set by using the VCMODE utility which also sets the maximum file size for buffered files.

WS: indicates the name of the program or utility currently in use.

PRINTER=0: some micros support more than one printer. In this case, a different printer can be assigned to each console using the PRINTER command. An interesting omission from Concurrent 3.1 is a print spooler. Only one process at a time can use a given printer so other processes must wait. This is not too much trouble with a single-user machine but is a problem on multi-user machines.

Unusual utilities

In addition to the usual CP/M utilities (PIP *et al*), Concurrent has its own specialised utilities. I have already looked at VCMODE and PRINTER: the other main ones are ABORT, CHSET and SET.

ABORT: allows programs that are running in the background to be stopped. A good example is debugging a wild program that refuses to let itself be stopped: move into another screen and

type ABORT WILDPROG.

CHSET: allows parameters to be set in the header record of a command file. These parameters are: SHARED on or off, 8087 on, off or optional and SUSPEND on or off. The SHARED parameter sets the option for the program to support shared (re-entrant) code or not.

The 8087 parameter allows CMD programs to make use of the Intel 8087 maths co-processor if it's included on your hardware. If the 8087 is specified as optional the program will use the chip if present, but if not the program will emulate it. The SUSPEND option specifies whether or not the program will stop if it's switched to background mode.

SET: CP/M Plus users will be used to SET. Its main use is to change such things as file or disk attributes, passwords, protection.

Conclusions

I've been waiting a long time for DR's response to the success of PC-DOS and MS-DOS. Now we have the answer: 'If you can't beat 'em, join 'em.'

If DR wants to stay in the 16-bit software race it has to get its system into the IBM market and onto PCs in large volumes. PC mode is obviously the tool it intends to use to do this and it works well enough; but PC mode on its own will not convince PC owners to change operating systems. The main pull will come from the Concurrent processing ability.

When I first heard about Concurrent I thought it a good idea but of no immediate use to me. I was wrong. It's only when you use Concurrent that you see how useful it can be. The ability to switch between screens at will means that different applications can be loaded up and the user can switch between them at will.

If there is any justice, IBM owners wil be queueing up for their copies of Concurrent 3.1. It's certainly the most useful of all the major single-user micro operating systems available today. Microsoft has made a big mistake in allowing itself to be sidetracked by mice, ikons, *et al* and not bringing out a Concurrent operating system of its own. END

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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 group had recently visited a summer school 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 debugging 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 group 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 priest 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 a 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 Harrison

Multiple errors

May I comment on Surya's reply to S. Gibson on page 22 of January's issue.

In the discussion on the DIM(ension) command Surya states: "The format is DIM VARIABLE-NAME (number of elements +1). Thus, if we wanted to store 50 names in an array called NAMES we would put the following line into our program: DIMA$(51)."

There are two mistakes here. The size to be dimensioned may be one LESS than the number of elements required, for the computer starts numbering from 0, not 1. Dimensioning more than are necessary will work but is wasteful. The other mistake concerns the name of the array used in his example. The example should read DIM NAMES$(49).

May I also comment on

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```
1000    REM SUBROUTINE TO PRINT AN ARRAY OF NAMES IN COLUMN ORDER
1010    REM N$(m) IS THE ARRAY CONTAINING THE NAMES
1020    REM ASSUME THAT THE NAMES ARE ALREADY SORTED.
1030    INPUT "HOW MANY COLUMNS"; C
1040    INPUT "HOW MANY NAMES"; N
1050    W% = N / C + 1 :REM CALCULATE THE NUMBER OF ROWS.
1060    FOR X = 1 TO W% :REM ROW LOOP
1070    FOR Y = 0 TO C - 1 :REM COLUMN LOOP
1080    Z=X+Y*W% :REM CALCULATE NAME POSITION
1090    IF Z ) N THEN 1110 :REM SKIP IF PAST END OF ARRAY
1100    PRINT TAB(Y*20); N$(Z);
1110    NEXT Y: LPRINT: REM GENERATE A LINE FEED FOR NEW LINE
1120    NEXT Z
1130    RETURN
```

the article "COLUMN SORT" on page 82 of the same issue. While the algorithm given is interesting it lacks the simplicity of the following basic subroutine.

This subroutine can be easily condensed, I have written it so that it is easily followed. If the names are already sorted in ascending order the subroutine does away with any need to resort the names, and hence is more efficient, in fact the subroutine could be condensed into two lines of code.

W Russell

Check digits

I read with interest Michael Grose's article on check digits in your January 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 Wild

Useful utility?

```
10  REM useful utility for
    APC readers
20  REM A NOBLE
50  REM
60  REM
70
80  total=0:last
    page=200: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>40%THEN
    REJOICE ELSE
    CANCEL SUBS AT
    NEWSAGENT
150 goto30000
160
170
180
190
200
30000PRINT"Go on . . .
      Publish and be
      damned!!"
30010END
```

Anon

Program listings problem

I can see the need for small print for long program listings.

I can see how a coloured background discourages photocopying.

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

(I do sympathise. Sorry things have been coming out small sometimes — watch out for an improvement. — Ed)

Metrification falls short?

Anyone who has developed programs will have recognised that our usual ways of formatting dates are not useful in the computer.

Neither the English (DD/MM/YY) nor the American (MM/DD/YY) formats give a sensible sort sequence. Both are awkward when trying to do arithmetic. Converting to YY/MM/DD gives a good sort field but still leaves the awkward arithmetic.

As an example ask yourself and your friends what is the date 2 months later than the 30th December 1983. It could be the 1st of March or the 29th of February; the 28th of February is also correct as it is the second last day of the month. (Most people know that 1984 is a leap year. It is interesting that many do not realise that because 2000 is divisible by 400 it will be a leap year.)

The less well-known Julian format (YYDDD) helps by removing months but still leaves the problem of deciding whether it is a leap year. Neither is it amenable to arithmetic if a change of year is included in the date range.

Up till now the manipulation of dates has been a problem only for business and DP people. As computers reach more homes the limitations of our current date formats will become more obvious and resistance to change will lessen. The pressure for change will increase as the end of the century looms and the limitations of a two digit year become clear to all.

The use of the 'year' is to be avoided — it is too long and imprecise as 'a year' often has to be adjusted for leap days and/or non-working days. (I suspect that more birthdays and anniversaries are celebrated on the nearest weekend than on the day itself.) The year has some meaning to those on the land as it suggests when the seasons come round. Even then the weather at the time is more relevant. Besides most of us work in offices where the weather has little relevance except at

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holiday time.

Whether you think of them as a twelfth of a year or as a bit over four weeks, the calendar months are a real menace as they vary without good reason between 28 and 31 days. They've gotta go even if only because 28, 29, 30, 31 all give recurring decimals on division. Months have some use as an approximate period but the problems start when they turn up in legislation, e.g. ". . . periods of leave which in aggregate exceed one month shall . . . to the extent that they exceed one month."

Do 10 days in December, 11 in January and 10 in March exceed one month? Yes they do because the organisation uses a pseudo month of 30 days and the other days in the year are forgotten.

The day is the unit of time by which we live and is therefore the best unit on which to base our dates. I propose that as we approach the year 2000 that we move towards the use of decimal dates — specifically holding and printing dates as 'days since 1900'. This gives easy arithmetic, handles the change in century and, as a bonus, gives an ideal field for sorting purposes.

There is nothing magic about using 1900; it is only that the earliest date we can use in our standard DD/MM/YY format is 1/1/1900. The dates now are in the 30 thousands which is well within the capacity of a 2-byte 'integer' field. For printing or display we can follow our usual decimal notation of placing a comma after the thousands, e.g. 30,681. In practice, the thousands can generally be suppressed in the same way as the year (and century!) is often omitted when expressing calendar dates.

Of course moving to a decimal calendar has some interesting side effects as it calls into question the concept of a 7 day week. If one moves further into a decimal calendar, the current idea of a weekend disappears. Instead I can see a three day 'weekend' every 10 days, i.e. a period I shall call a decaday. Add the concept of taking stock every hectaday (100 days) and you have a company reporting and tax period that is similar to the quarterly accounts needed in some countries.

Naturally there will be objections against my proposal so I shall try to defuse some of them.

(1) Why change something that people understand?

Try any question about adding to or subtracting from a Gregorian date and you will find that people don't understand.

(2) Why change now?

Because the year 2000 is less than 16 years away and our current methods will fail. It is a sobering thought that nearly all existing computer systems will need amending to survive.

(3) What about anniversaries?

They can be celebrated every 365 or 366 days (give or take a weekend) as now.

(4) What about public holidays like Xmas?

They already move around depending on the day of the week. The biggest argument in favour of scrapping the year is Easter where the date is set according to the stars and then the day of the week.

(5) What about the tax year?

The tax year varies between countries. The UK tax year used to end on Lady Day (March 25) when all debts for the previous year had to be settled. Then Pope Gregory got at the calendar and the 11 lost days made the year end on the 5th of April. The USA chose December 31 as being the middle of winter; Australia recognised the change in hemisphere and chose June 30. In fact most companies keep monthly accounts and so there can be little hardship in reporting every hectaday.

(6) What about laws, regulations, statutes etc?

If nothing else, even a suggestion of changing our date format will show just how many of these are couched in such a woolly manner. Even now most dates are adjusted to fall on the next working (or banking) day for convenience.

The Metrication Board never got round to the most important unit in our lives. Doesn't time deserve to be brought into the decimal age?

D Nowlan

Get it in one

I suggest an alternative to Clive Hood's (March *APC*) method of locating free tape space, which enables you to use both sides of the tape.

As soon as you have CSAVED a program, enter the monitor, clear the screen and type a short message such as "[Filename] saved last" or "Counter at NNN". Then SAVE SPACE NNNN nnnn (the screen location of your message). That's all.

Before saving a new program, fast forward to the approximate location and LOAD SPACE via monitor. On completion of loading, the tape will be located at the first available free space. The only RAM overwritten by the loaded data will be the text at the top of the screen, where your message is displayed. If you don't want a message you need only save one character.

There are arguments for and against eliminating ambiguity by varying the Filename (e.g. SPAC2, SPAC3 etc) or relying on the message to identify the space.

Ian Johnstone

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 thought 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 March 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, the Z80 is hanging from its last thread, and CP/M and the 6502 because of Commodore and Apple's obstinacy in not accepting new technology. The 6809 is virtually software-compatible up to

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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 Tandy Colors have been sold?

Could *APC* give more attention to today's technology rather than outdated microprocessors?
Paul Hills

(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 owners — Ed)

Faster APC

Having recently acquired an NEC APC I was disappointed to discover the relatively slow times for program execution using CP/M. With the recent publication of your Benchmark Summary I tested the benchmarks using the MS Basic Interpreter and MS Business Compiler with the resulting times (secs) listed here.

Benchmark	1	2	3	4	5	6	7	8	Average
MS Interpreter	2.0	5.3	9.8	10	12.5	24.5	37.2	28.5	16.2
MS Business Compiler	0.6	0.8	5.3	4.9	4.9	8.0	9.5	97.5	16.4
CP/M Compiler (APC)	2.3	2.3	13.7	17.6	17.8	32.0	34.8	37.1	19.7

As can be seen from the above results the Business Compiler is faster than any other times listed in your summary except for Benchmark 8 which involves log and sine function, possibly an area not considered by the developers as important for business applications. If the interpreter is used for Benchmark 8 then the average time is reduced to 7.8 secs, making it the fastest machine in the summary. These results have somewhat restored my faith in the 16-bit machines and I look forward to future improvements in MS-DOS to make it as useable as CP/M.
Dr V Rudenno

Atari

This month, Surya continues his analysis of each machine on the APC Convertor Chart with a look at graphics and sound capabilities on the Atari microcomputers.

The Atari is available in Australia in three forms: the 400, 800 and most recently, the 600XL. The three models are upward-compatible, and all have the same graphics capabilities.

The Atari supports nine different screen modes, numbered 0 to 8. Of these, the first three are text modes, the rest graphics. A summary of the modes is given in Fig 1.

The statement GRAPHICS x is used to select the desired mode, Mode 0 is the default.

Mode	Type	Resolution Full screen	Split screen	Colours	RAM required
0	Text	40x24	Not available	2	993
1	Text	20x24	20x20	5	513
2	Text	20x12	20x10	5	261
3	Graphics	40x24	40x20	4	273
4	Graphics	80x48	80x40	2	537
5	Graphics	80x48	80x40	4	1017
6	Graphics	160x96	160x80	2	2025
7	Graphics	160x96	160x90	4	3945
8	Graphics	320x192	320x160	1	7900

Fig 1. Atari screen modes

In Fig 1, I refer to full screen and split screen. Normally, in a graphics mode, the bottom lines of the screen are reserved for text. By adding 16 to the mode, this text window can be converted to graphics use. Thus, GRAPHICS 2+16, or GRAPHICS 18, selects mode 2 without a text window. In a graphics mode, PRINT prints to the text window, while PRINT#6, prints to the graphics area.

The Atari has a 'palette' of 16 colours, these being known as hues. The hues are numbered from 0 to 15:

0	grey	8	blue
1	gold	9	light-blue
2	orange	10	turquoise
3	red-orange	11	green-blue
4	pink	12	green
5	purple	13	yellow-green
6	purple-blue	14	orange-green
7	blue	15	light orange

Colour register

A maximum of five colours may be displayed at any one time, and this only in modes 1 and 2. Therefore, Atari gives us a 'working palette' of five colours from which to choose; these are known as the colour registers. The colour register defaults are shown in Fig 2.

To select one of these colours, the COLOUR statement is used. Thus COLOUR 0 will select orange as the current foreground colour. Colour settings apply only to graphics modes.

The default colour registers can be reset using the SETCOLOUR statement. SETCOLOUR takes the format: SETCOLOUR colour register to be reset, hue colour number and intensity. The intensity is an even number between 0 and 14: the higher the number the brighter the colour, so SETCOLOUR 1,4,5 sets colour register 1 to a moderately bright

Colour register	Default hue number	Physical colour
0	2	Orange
1	12	Green
2	9	Dark blue
3	4	Pink-red
4	0	Black

Fig 2. Colour register defaults

(5) and pink (4) from its default of bright green (1). Very bright colours (12 and 14) appear almost pure white.

All characters on the Atari are printed in upper case by default. The statement POKE 756,226 switches to lower case; POKE 756,224 goes back to upper case.

Once the business of selecting graphics modes and colours has been sorted out, there are then seven graphics statements supported: DRAWTO, PLOT, LOCATE, POSITION, PUT, GET, X10.

DRAWTO x,y draws a line in the current foreground colour from the last point visited to the specified coordinate. (0,0) is at the top left of the screen.

PLOT x,y plots a single point in the current foreground colour at the specified coordinate.

LOCATE x,y,var is similar to the Microsoft Basic POINT statement: it returns the colour of the specified coordinate. In the text modes, it returns a number between 0 and 255 indicating the ASCII code of the character plotted there, and places it into the specified variable.

POSITION x,y positions the graphics cursor at the specified coordinate without affecting the display.

PUT #6,z places the CHR$ of the specified ASCII code (z) at the current graphics cursor position in modes 0 through 2. In the graphics modes (3-8),

it plots the colour register (z) at the current graphics cursor position.

GET #6, var returns the ASCII code (text modes) or colour register (graphics modes) of the specified coordinate, placing it into the specified variable.

Note that PUT# and GET# statements only refer to the screen where the specified stream is 6; other values refer to other devices.

X10 18,#6,0,0,"S:" is a specialised use of the X10 (general-purpose input/output statement). It is used to paint a predefined area with a predefined colour. To use the statement, the bottom right-hand corner of the area to be filled is PLOTted. Next, a DRAWTO the top right-hand corner is executed. Thirdly, the cursor is POSITIONed at the bottom left-hand corner, and address 765 is POKEd with the colour register of the desired colour. Finally, the X10 18,#6,0,0,"S:"§ is executed.

How is the text colour set in modes 0 through 2? Why this can't be something as straightforward as COLOUR x, I don't know. The method of achieving this modest task is very strange and absurdly complex, involving referral to two separate tables and not a little arithmetic. It involves setting SETCOLOUR to some unlikely-looking value, but my advice is just choose a text colour which looks pretty on the machine you're converting to.

Sound

Sound is handled with a statement called (wait for it) SOUND. SOUND has four parameters which, for want of anything more original, we'll call a,b,c and d.

Parameter a specifies the voice (channel) in the range 0-3; b is the pitch (0-255); c the distortion (0-14, 10 giving a pure note, any other channel being filtered through one of the 13 fixed envelopes); d is the volume, from 1 (barely audible) to 15 (audible).

Middle C is pitch 121, each semi-tone is either 6 or 7 steps.

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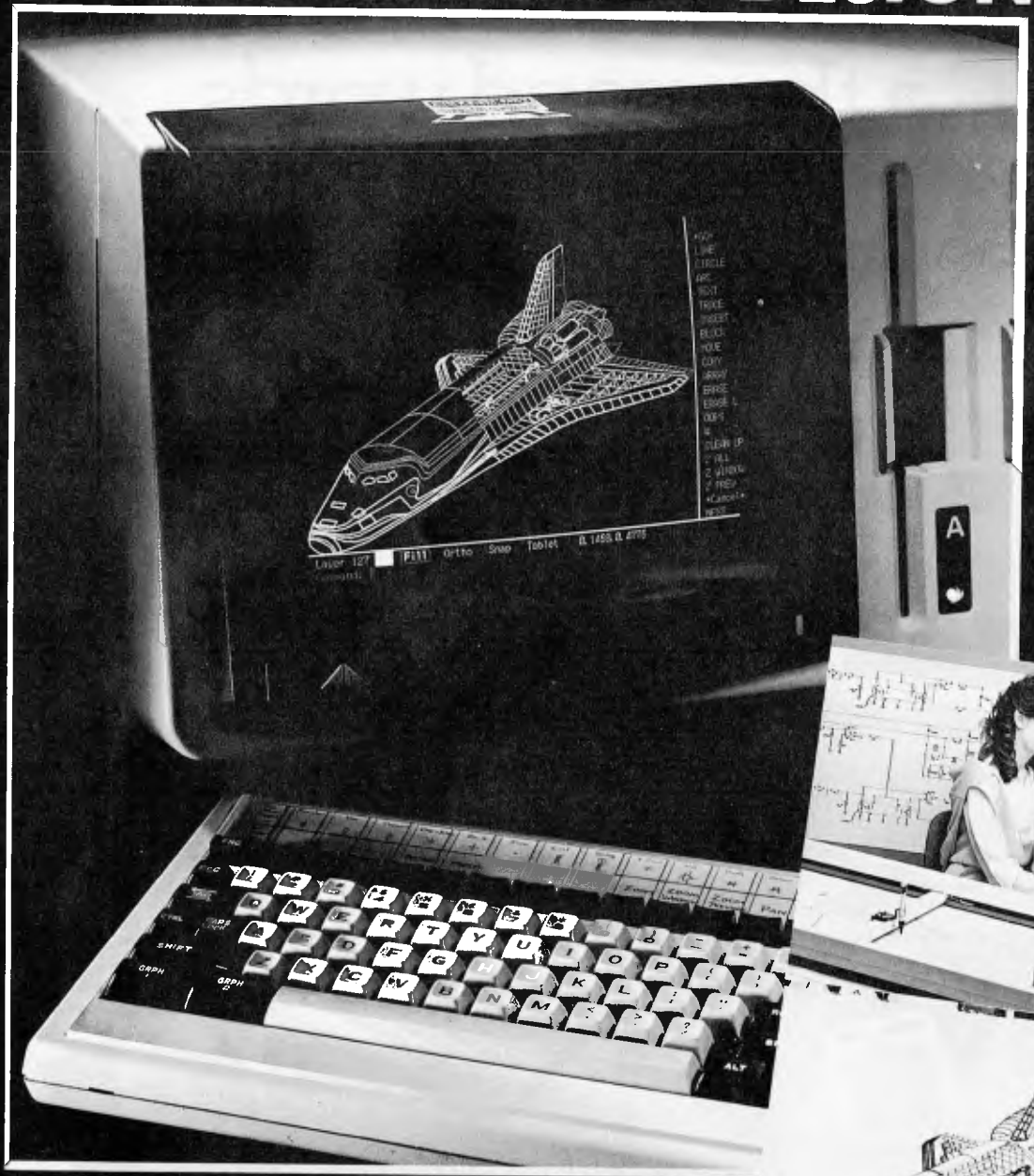

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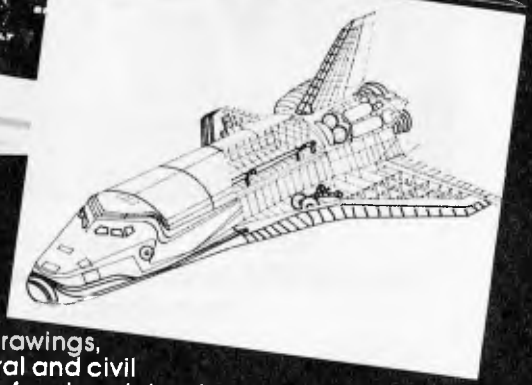

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LOOKING TO THE STARS

Kathy Lang looks at the new WordStar options — StarBurst and StarIndex.

MicroPro's word-processing package WordStar is the market leader in its field: it already has options for handling repeated text (through the Mail/Merge program), and for spelling checking (through SpellStar).

The latest WordStar releases are an option called StarIndex, which allows the automatic production of indexes, tables of contents and so on, and StarBurst, a program which allows computer professionals or experienced users to construct a complete system of menus to cushion operators from the awkwardness of micro operating systems. In view of the popularity of the WordStar, we decided to examine them in detail.

StarBurst

StarBurst has two main aspects: its use by system builders for constructing systems for users, and its subsequent use by operators. System builders may be micro dealers and software houses, supplying customised systems for clients, or experienced users responsible for providing a helpful image to less experienced users within their own organisation.

At present, StarBurst is available only on the IBM PC, but you should be able to buy it for CP/M and MS-DOS systems soon. As a tool for system builders, StarBurst allows the construction of what it calls a menu-tree (an example is shown in Fig 1). This menu-tree has three levels, and consists of the main menu (MAINMENU), two subsidiary menus (CUSTMENU and HSKMENU), for tasks (COPYTASK, ENTTASK, SAVTASK and RESTASK), and two 'Help' screens (MAP and ENTHELP).

StarBurst allows a maximum of twenty levels, consisting of menus, tasks and 'Help' screens. A sub-menu can only be invoked from one superior menu option, while a task may be invoked from several different menu options. Both the building and the use of a menu-tree can be protected by passwords, so that the menu-tree can't be changed except by authorised people (who may be a different group from those who will use the menu-tree to carry out tasks).

Each menu consists of a number of options, each activated by a prompt; the exact form of the prompt is up to the system builder. Menu option lines may not exceed 79 characters, but menus may span more than one screen. You can specify a default option when building a menu, and can also (whether building a system or using one built with StarBurst) use the ESC key to get back to the preceding menu level, but you can't get directly back up to the main StarBurst building menu, nor could we find any way for a system builder to provide this facility for users.

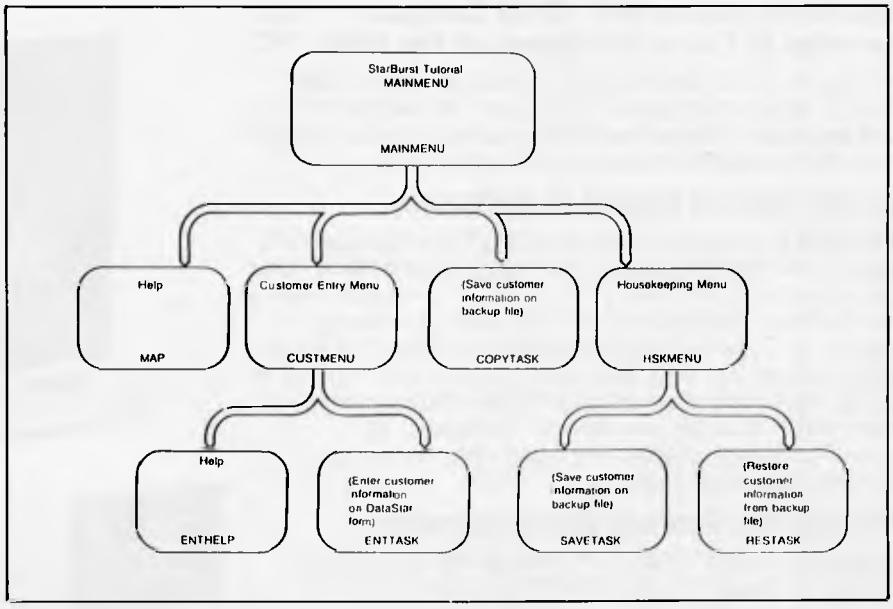

Fig 1: Menu Tree

A task is one or more activities carried out when invoking a particular menu option. These activities are invoked by statements displaying a message to the user, telling the operating system to copy a file or to run a program such as an invoicing program, and so on. A list of the commands which system builders can include in tasks is shown in Fig 2. You will see that the list includes some commands for repeating commands and for testing results. These facilities are not extensive: they are more like those found in the 'Job Control Language' on many mainframes than those in a programming language, but should be quite adequate for the purpose.

Help screens (called, rather confusingly 'Help Menus' by StarBurst) may be provided anywhere — indeed, since they are 'the end of the line', they are more like tasks than menus. (You could of course, construct a tree-structure of help if you wanted to, by calling the upper levels of help 'menus' in StarBurst terminology). They consist simply of a screen of information which the user can read to give more information about the current level of activity.

We used StarBurst on an IBM PC with a colour monitor, and, in those circumstances, the package is presented to the system builder in glorious technicolour. The colour is used quite effectively to aid the system builder in delineating the various parts of the screen, and in showing up options. Fig 3 shows a black-and-white version of the main system building screen, giving 'Help' (which can, in the usual 'Star' package manner, be turned off if you wish), and context information. The commands available to the builder show that StarBurst follows the practice of its predecessors in being driven by commands invoked from control keys.

The excellent use of colour in showing StarBurst to the system builder does not extend to allowing him or her to use colour when designing screens for the user, and all the user screens we tried had just background and foreground (appearing blue and white on our monitor). This seems rather a shame, and quite unnecessary — it would be child's play to devise some convention such as the 'bracketing' conventions used in WordStar to indicate emboldening or underlining, so that the system builder could give the benefits of colour display

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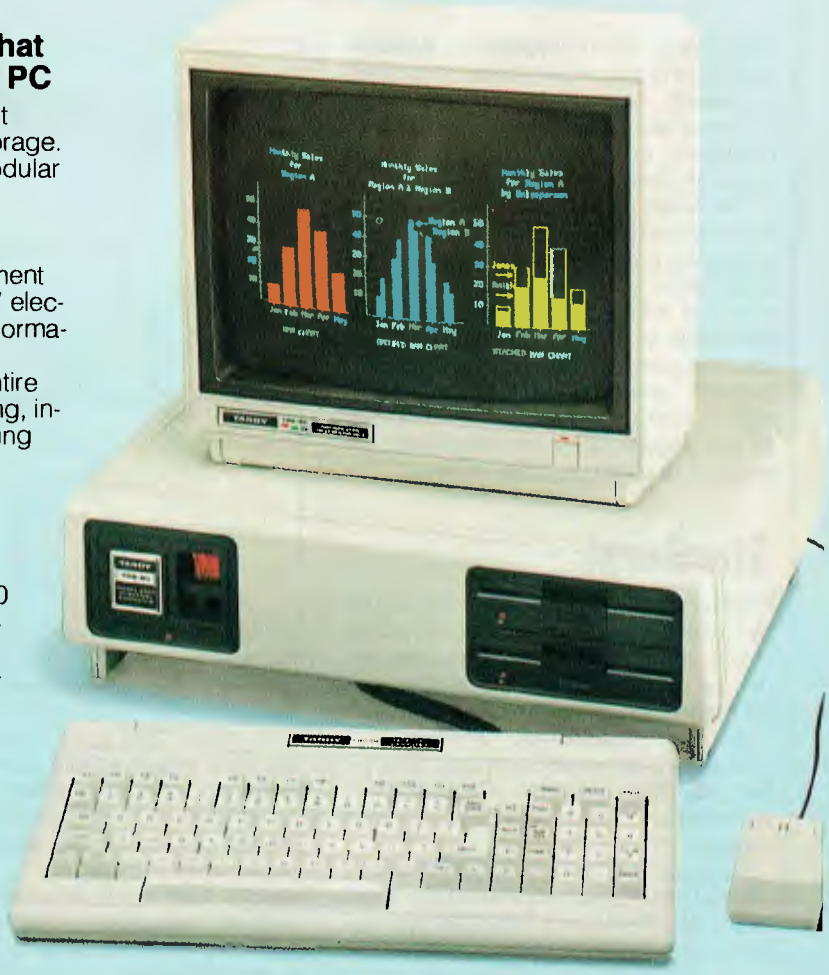

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Monochrome Monitor	$349	$644
Display/Printer Adapter	Included	$516
128K RAM (Total)	Included	$251
RS-232	Included	$188
MS-DOS 2.0	Included	$115
Total Cost*	$4799	$5964
Feature Description	**Tandy Model 2000**	**IBM Personal Computer**
Internal Memory	128K Standard	64K Standard
Disk Capacity per Drive	720K	160K or 320K (Optional)
Microprocessor Clock Speed	8 MHz	4.7 MHz
True 16-Bit Microprocessor	Yes (80186) 16-bit/16-bit data path	No (8088) 16-bit/8-bit data path
User-Available Expansion Slots*	4	2
Graphics Options		
Color Resolution	640 x 400	320 x 200
Number of Colors	8	4
Monochrome Resolution	640 x 400	640 x 200

*Comparable IBM configuration with monochrome adapter and display, communications adapter, two 320K disk drives and 128K RAM. †Manufacturer's pricing as of 1/9/83.

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ASK	Request information (from the operator) for a variable in the task.
CHECK	Make sure a file is on proper drive. This statement assigns a new value to the system variable, SBCODE.
CLEAR	Clear the terminal screen.
COPY	Make a copy of a file.
DELETE	Delete (erase) a file.
DISPLAY	Give a message to the operator.
EXIT	Stop the task.
LIST	Show each statement to the operator before the action is performed.
MOUNT	Make sure a disk is on the proper drive.
NOLIST	Stop the showing of statements to the operator (see LIST).
PAUSE	Temporarily stop the task until the operator presses RETURN.
PROMPT	Give a message to the operator before an ASK statement.
REMARK	Display a builder's comment within the task.
RENAME	Change the name of a file.
RESET	Perform a disk reset (used only for CP/M operating systems).
RUN	Start a program.
SET	Change the logged drive.
SETSBCODE	Give a value to the system variable, SBCODE.

Logic Statements

IF
ELSE
ENDIF
	Perform the statement following the IF statement only when a specific condition is true. If the condition is not true, perform the statement following the ELSE statement. The condition specified in the IF statement must reference the value of the system variable, SBCODE. Always end a group of IF-ELSE statements with the statement ENDIF.

REPEAT STOPREPEAT ENDREPEAT	Perform the statements following the REPEAT statement until a STOPREPEAT statement is encountered. Always end a group of statements to be repeated with an ENDREPEAT statement.

Fig 2: Task List

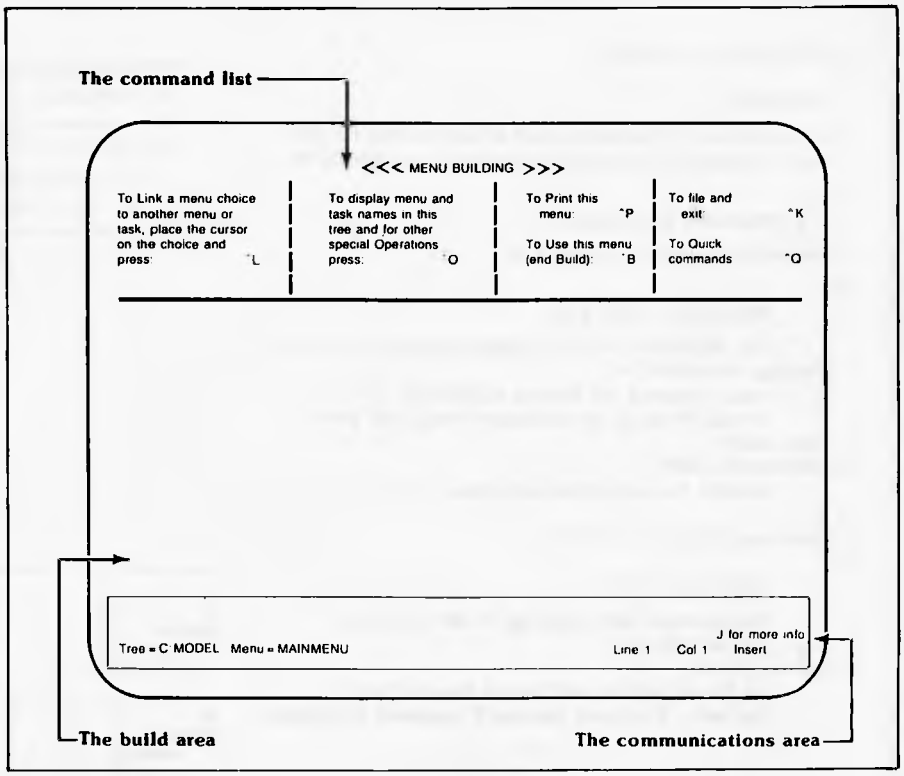


Fig 3: Builder

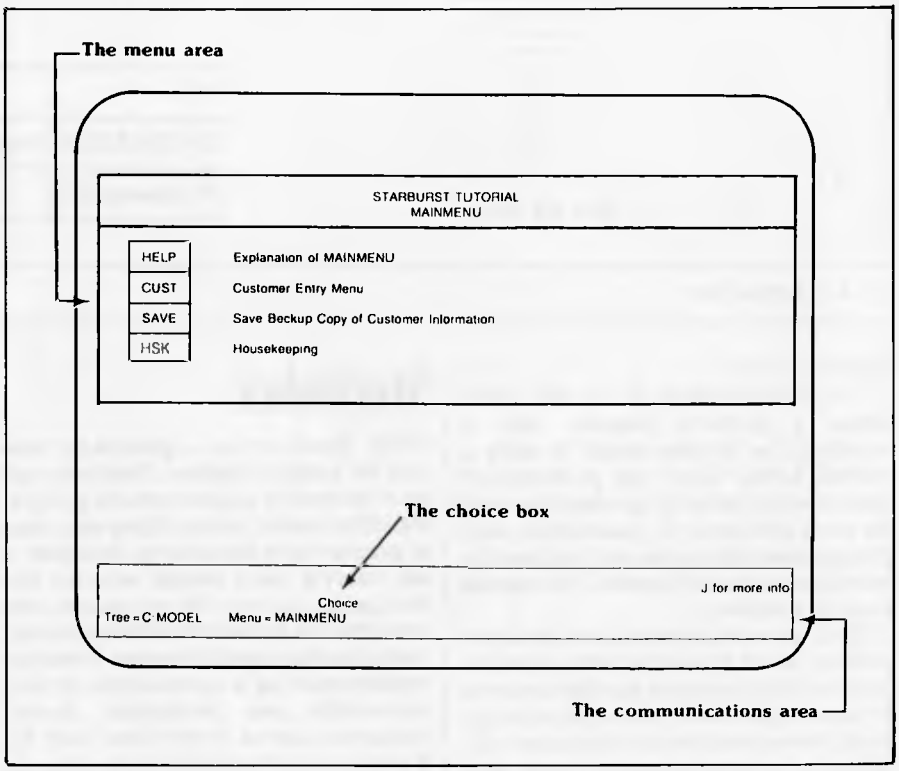
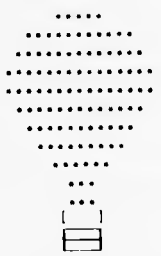


Fig 4: Menu

to StarBurst users.

The exact appearance of the screen to the StarBurst user depends almost entirely on the specification of the system builder. Fig 4 shows how the main menu of the menu-tree shown in Fig 1 might appear on the user's screen. Users of WordStar will recognise most of the basic commands which StarBurst provides for cursor movement. An exception is B, which allows the system builder to switch between building the menu-tree and using it for test purposes. StarBurst can tell whether you have previously carried out building work in this session, and therefore asks you for the building password only if you are entering the build phase for the first time in the

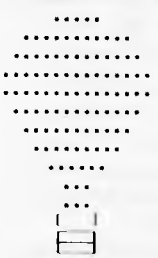
```
.IA
PEOPLE AND MACHINES
.IB
   Introduction

   We, as thinkers and creators, have always reached for new
   ways to extend our capabilities, to improve and elevate the ...

.IC
      Extensions of Our Bodies

.II Inventions, 10000 B.C. - 1500 A.D.

.ID
         10000 B.C. - 1500 A.D.

         The ^Kbow and arrow^K, early extensions of neolithic
.II Hunting, inventions for
         arms, enhanced our hunting capabilities. The
         ^Pwheel^P led to the building of roads and gave us
.II Trade, early
.IM Exploration, early
         mobility for exploration and trade. The use of ...

.pa
.II Inventions, 1500 A.D. - 1880's
.ID
         1500 A.D. - 1880's

         The obsession with flight led to the creation of
.II Flight, hot-air balloon
.II Balloon, hot air
         the hot-air balloon and fantasy became reality.
         The early ^Phorseless carriage^P increased our speed ...
```



```
.IE
```

Hot Air Balloon

```
                                    TEXT

1. PEOPLE AND MACHINES

   1.1. Introduction

   We, as thinkers and creators, have always reached for new ways.....
   open new paths into the future

      1.1.1. Extensions of Our Bodies

         1.1.1.1. 10000 B.C. - 1500 A.D.

         The bow and arrow, early extensions of neolithic
         .....
```



```
                    Fig. 1-1: Hot Air Balloon

                                    INDEX

B
Balloon
   hot-air, 2
Bow and arrow, 1
.....

E
Energy
   steam, 3
   wind, 1
Exploration
   early, 1
.....
```

^KD

A> STARINDX inputfile outputfile formatfile

P filename.TOC	P filename.SI	P filename.IDX

Fig 5: Example Text

current session.

The documentation is in two main parts: a builder's manual, and a workbook for builders which is really a tutorial guide. Given the problems of documenting (something which can only be used effectively in association with programs whose names and natures the manual writers can't predict), the manual is quite effective.

StarBurst is an attractive and powerful system, which should be quite a help to people putting together turnkey systems for less expert users. It is an advance on most previous systems of this type in its provision of several levels of menu, and its ability to carry out several operations within a single task. Most similar systems do not provide an easy way to allow for the first feature, and only permit the second through the use of operating system's 'batch' facility (SUBMIT in CP/M, .BAT in MS-DOS). However, it is more expensive than most of its competitors, at $295.

StarIndex

While StarBurst is a general-purpose tool for system builders, StarIndex will be of interest to a quite specific group of WordStar users, namely those who need to process long documents. However, it will interest many people who fall into that group, but who do not need to produce indexes to their documents, since it contains other useful features. These are implemented by a combination of 'dot' commands and embedded control characters, just as in WordStar itself. Fig 6 shows a list of the available commands and control characters, while Fig 5 shows on the left some sample text including commands and on the right the way in which parts of the text would be printed.

StarIndex allows the user to exercise overall control over the numbering and printing of chapter and section headings (up to four levels deep) and the numbering of figures and tables, but to cope with the details automatically. So if you number section headings successively — using, say 1, for the first level, 1.1 for the second and so on, you can include 'directives' to StarIndex to indicate the level required, and let StarIndex control the actual numbering. Then if a section is inserted between two others at the same level, you don't have to go through and renumber all the subsequent sections.

The indexing facilities are simple but highly effective. Any index entry may be a master entry or a general entry, with the difference being indicated by emboldening the page number of the master entry. Either type of entry may be a main entry, just a one line entry on its own, such as 'Bow and arrow', or a sub-entry, such as 'Exploration, early', which would be printed with the word 'early' on a new line and indented. Whatever the format of the printed result, the indexed word or phrase may either be embedded in the body of the text, as in the example 'horse-

less carriage', or what StarIndex calls a 'supplied entry', that is some text which is a paraphrase of the text referred to rather than being actually included in the text — as in such phrases as 'Hunting, inventions for'.

The manual is quite helpful, and should pose no problems. The typographical conventions used to printout the table of contents, index and lists of figures and tables are under the control of the user. StarIndex starts with default styles for these, such as emboldening of the page number of a master entry in the index, but you can change these conventions by using the STYLE option to set up format descriptions of your own, thus StarIndex provides some powerful features for building tables of contents and indexes, and should be very useful for WordStar users who need more extensive facilities for processing long documents.

StarIndex is available on all the systems for which WordStar is provided and costs $295. Both StarBurst and StarIndex are distributed by Imagineering.

END

Identify Chapter and Section Headings:

.IA*Level 1 Headings (chapters)
.IB Level 2 Headings (sections)
.IC Level 3 Headings (subsections)
.ID Level 4 Headings (secondary subsections)

* See print and format options

Identify Figures and Tables:

.IE Figures
.IT Tables

Idéntify Index Entries:

.IM Master Supplied Entry
.II General Supplied Entry
^P^Ktext^P^K Master Embedded Entry
^P^Ptext^P^P General Embedded Entry

Fig 6: Available Commands

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SQUEEZING YOUR DATA

Compacting your data gives you more storage space and so more processing power — Len Keighly shows you how, using Commodore's Basic as an example.

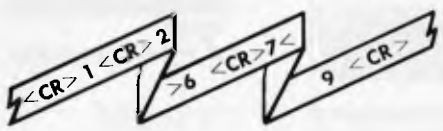
One of a micro's biggest drawbacks is the lack of off-line storage space, especially for those among us who cannot afford disk drives. There is however, a technique by which this problem can be reduced — data compaction.

For the user with two tape drives, part of the benefits gained by this technique will already have been acquired — faster access to data, reduction in memory usage (only single tape users), less physical tape usage for data.

The main benefits for both one and two drive users is in reduced tape usage for non-data and faster retrieval. Using the technique described here a quantity of data will take less physical space than the conventional method when using the full length of a pre-defined field. It will also result in a shorter time to read/write. In percentage terms, if we take as an example a file of five, 10 character data fields (fully used) per record, the technique will give a saving of eight per cent.

In character terms, on a file of 1,000 records, the saving would be 4,000 characters out of a total of 55,000. All this reduction is achieved by the concatenation of the individual data fields into a record. Faster access to data is gained by reducing the number of read/writes required for a given quantity of data. Also, because more data is 'packed' into a 'block', more data is read in less time.

If we now use an example of nine single character fields, the data would previously have looked like this:



Using the technique the data would now be written like this:

Because we know each field is only one character long, there is no need for separators.

Reduction in memory usage is gained by reducing the number of data fields that need to be dimensioned. Only stored records themselves need to be dimensioned, all the individual fields need only a single definition. This also reduces the number of characters required to reference a variable in the program, and this again reduces memory usage. In the example below, 12 characters are saved on definition alone. Although extra coding is required to convert R(25) to its constituent parts A/B/C, every reference of these fields will save three or four characters, or even more if a variable is used in place of a value.

```
DIM A(25),B(25),C(25)
DIM R(25)
```

Reduction in physical tape usage is achieved by using more of the wasted space consumed when data is written. On the Commodore CBM 4032 for example, at least one carriage return is written for every PRINT command used, regardless of the length of the field, so by eliminating these characters the usage is reduced.

From this it can be seen that a one-character field will require two characters of tape space in which to be written. Using this technique 80 single character fields can be written in 81 characters of tape space. By the normal method this would require 160 tape characters, a saving in this case of approximately 50 per cent:

Before	1	C_R	2	C_R	3	C_R	4	C_R	5	C_R	6	C_R
After	1	2	3	4	5	6	C_R					

The concept behind the technique is simple. All data can be stored in alphanumeric fields or variables. Integer and decimal fields can be converted to alphanumeric format by use of the STR$ command (decimal points will automatically be inserted as a 'period'). Following on from this, all alphanumeric fields can be concatenated by using the '+' action — the result is a record containing a number of fields. To recreate the individual data fields the string handling and numeric conversion commands can be used, and these are LEFT$, RIGHT$, MID$, and VAL(), which can be seen in the examples.

To use the string handling commands, it is necessary to know the length and start position of the field within the record. It is obvious now that the method just outlined will not be completely adequate, as all fields have different lengths and all numeric fields also vary. Now it can be seen that the first action to be taken after the decision to use the record technique, is to decide on the length and start location parameters for each field. In some cases it is not always required to have a start location, as we will see later in the examples.

Let's begin by using a traditional example to demonstrate the technique, an invoice. The individual fields will be:

C%	Customer No.	Range 1—9999	Numeric
N$	Customer Name	Max length 25	A/Numeric
I	Invoice value	Range 0.01-9999.99	Numeric

(Note that when using decimal fields, one should be added to the maximum length of the field to allow for the decimal point.)

There are two methods within the technique by which the data can now be concatenated into a record.

O Convert the numeric fields to alphanumeric; concatenate the three fields together; remove space from the front of converted numeric data; insert special characters in between data fields.

O Convert the numeric fields to alphanumeric; remove space from the front of converted numeric data; expand each individual field to its maximum length with special characters; concatenate the three fields together.

Below is a representation of how both methods would appear. The '*' is used to denote the special character.

DATA—C%=9876 I=12.34 N$=A.N.OTHER

Method one: Before: $9876C_R12.34C_RA.N.OTHERC_R$
After: $9876*12.34*A.N.OTHER*C_R$

Method two: Before: $9876C_R12.34C_RA.N.OTHERC_R$
After: 987612.34***A.N.OTHERC_R

The advantages of one over two are:

O The records written in one are shorter than in two.

O The extraction of the data fields is simpler in one than two, this will be seen in the coding examples.

O There is no need to remove the special characters, inserted to pad the field to its length, to enable reconstitution of alpha-numeric to their original form. For original numeric fields this does not pose a problem, as the VAL command will ignore them.

O Care must be taken in method two, that the data fields do not exceed their stated values or lengths. This does not occur with method one.

Unfortunately, although method one does have these advantages over two, it does not give the tape usage reduction

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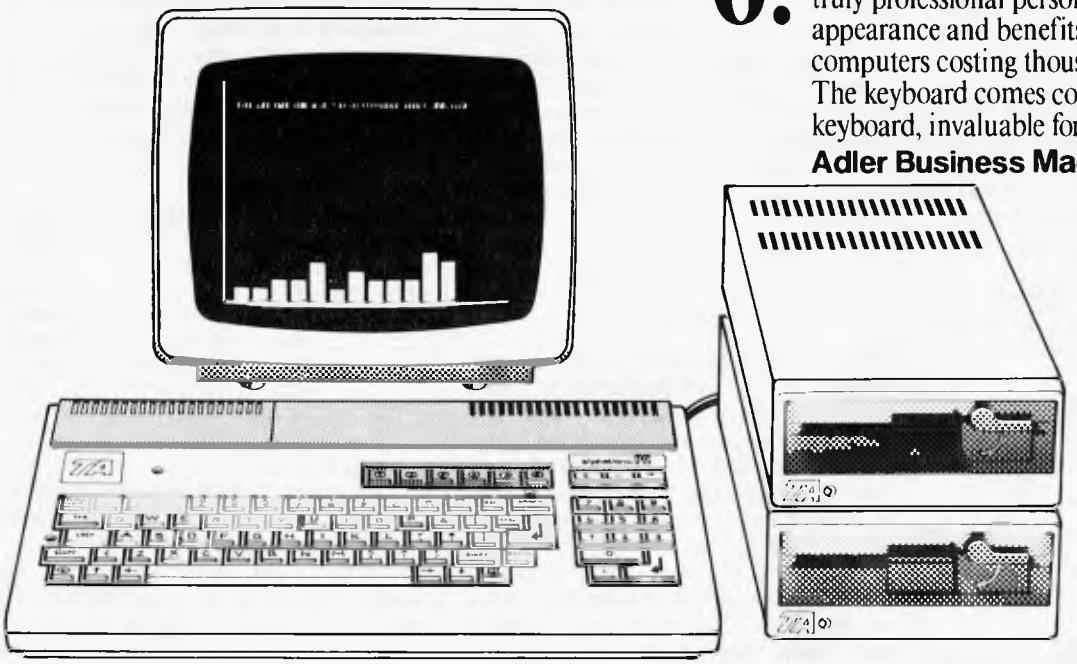

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```
100 X1$=STR$(C%)
110 X2$=STR$(I)
120 R$=X1$+"▒"+X2$+"▒"+N$+"▒"
130 PRINT#1,R$
```

Fig 1: "Record create" routine for method one.

```
200 INPUT#2,R$:X2=1:X1=0
210 FORX=1TOLEN(R$)
220 IFMID$(R$,X,1)="▒"THENGOSUB250
230 NEXTX
240 GOTO500
250 X1=X1+1
260 ONX1GOTO280,290,300
270 PRINT"FIELDS ERROR":STOP
280 C%=VAL(MID$(R$,X2,X-1)):GOTO310
290 I=VAL(MID$(R$,X2,X-X2)):GOTO310
300 N$=MID$(R$,X2,X-X2)
310 X2=X+1
320 RETURN
```

Fig 2: "Field extraction" routine for method one.

```
100 R$=""
110 X1$=STR$(C%)
120 X2=4:GOSUB170:R$=R$+X1$
130 X1$=STR$(I)
140 X2=7:GOSUB170:R$=R$+X1$
150 R$=R$+N$
160 PRINT#1,R$:GOTO63999
170 IFLEFT$(X1$,1)=" "THENX1$=RIGHT$(X1$,LEN(X1$)-1)
180 IFLEN(X1$)=X2THEN230
190 IFLEN(X1$)>X2THENPRINT"DATA FIELD ERROR":STOP
200 FORX=LEN(X1$)+1TOX2
210 X1$=X1$+"▒"
220 NEXTX
230 RETURN
```

Fig 3: "Record create" routine for method two.

```
100 INPUT#2,R$
110 C%=VAL(LEFT$(R$,4))
120 I=VAL(MID$(R$,5,7))
130 X1$=RIGHT$(R$,LEN(R$)-11)
140 GOSUB170
150 N$=X2$
160 GOTO230
170 X2$=""
180 FORX=1TOLEN(X1$)
190 IFMID$(X1$,X,1)="▒"THEN210
200 X2$=X2$+MID$(X1$,X,1)
210 NEXTX
220 RETURN
```

Fig 4: "Field extraction" routine for method two.

benefit. As can be seen in the example, the carriage return has only been replaced by an asterisk. However, the faster access and core usage reduction are still present.

If the data fields to be used are always the same field length, then method two will give the most benefits. Note here that the maximum field lengths should be used when calculating the number of possible fields in a record. If one record is not adequate for all the fields, any number may be used, however, a record type code will be required to identify which record has just been read, to the program. The coding for this type of data is more complex than that in the examples, but the principle remains the same.

Optimum record sizing is an important action in this technique and must be carried out for each program. Each machine will use a different 'buffer' size, and the number of records within the buffer will differ in each program. On the Commodore CBM 4032, for example, the buffer is 191 characters long — so using 80 character records would leave 31 characters after each two writes. On the next write the machine will have to output the buffer area to tape and may write those 31 characters as blanks. Therefore, the record sizing should leave as little space in the buffer as possible.

Program coding examples

The details of each example follows:
Method one: Record Create (see Fig 1)
Field Extraction (see Fig 2)
Variables R$ Record field.
X Character field.
X1 Field no.
X1$ Temporary field.
X2 Field start character position.
X2$ Temporary field.
Method two: Record Create (see Fig 3)
Field extraction (see Fig 4)
Variables R$ Record field
X Character no. within field
X1$ Expand/Contract input field.
X2 Field maximum length.
X2$ Contract output field.

It is necessary to identify the end of file to the program, and using this technique it is quite simple. The literal EOF should be written as the last record output on a file. On reading the file this can be checked for, before the reconstruct routine is called, and the appropriate end of file programming actioned. The methods and routines given here are for general record usage, but with individual parameters added by the programmer. It is possible to make the technique even more general by writing those parameters as the first record on the file. On re-reading they can be used to define the field lengths, and so on.

An additional program is required to create the data file originally, with the parameter record written to it, but this could use the coding given in this article, and of course one program would create all files. So as you can see, this is just a first step along the road to record handling.

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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.

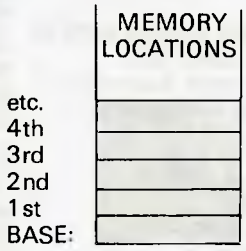
In the case of *relative addressing*, instead of an address we give a displacement to be added to the value already in the program counter. Such displacements are restricted on 8-bit micros because they have to be specified with one byte.

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:



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 1% = 1 TO 9: PRINT X(1%):NEXT 1%. When 1% = 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

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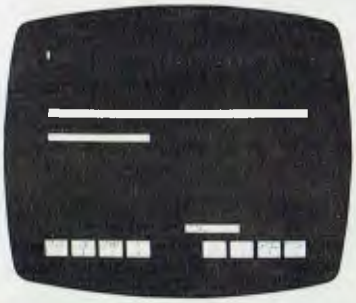

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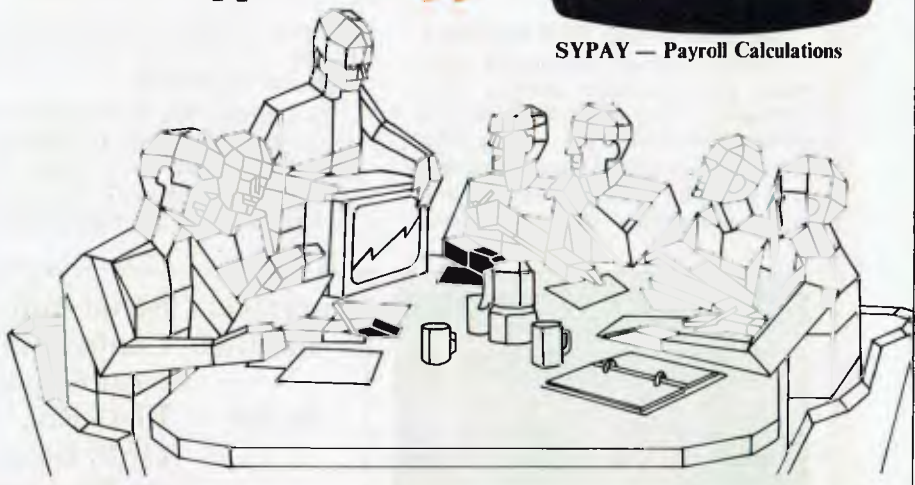

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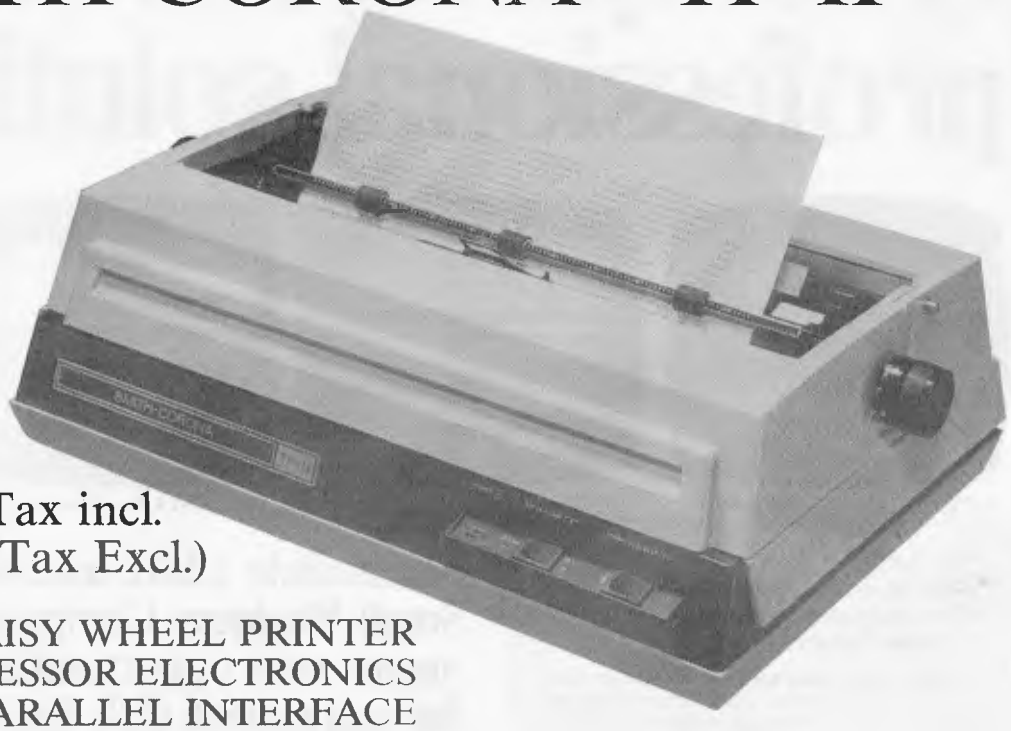

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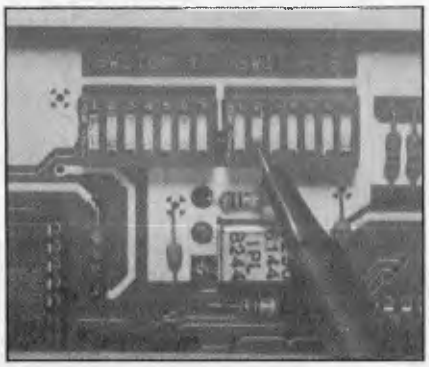

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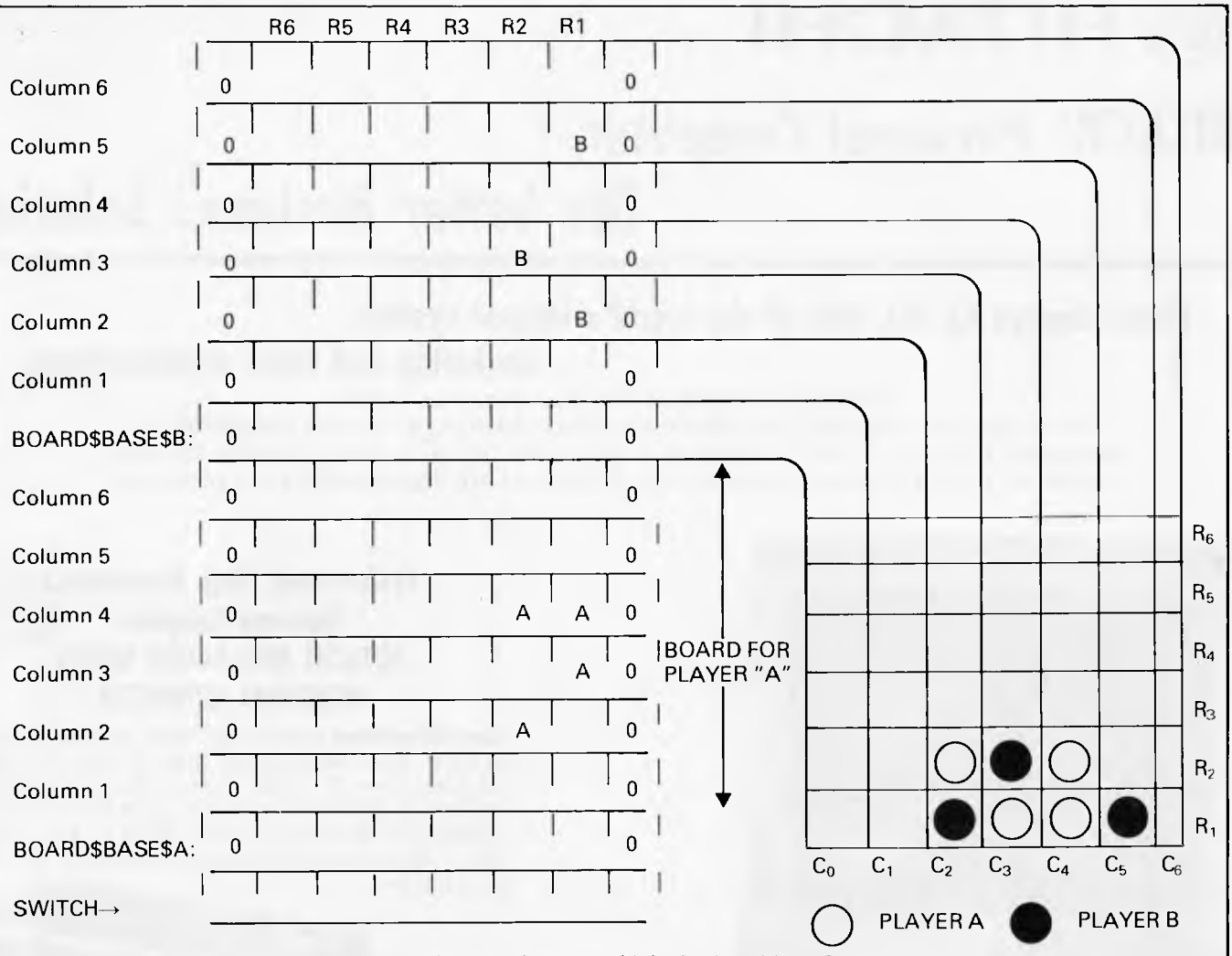

Fig 1 How layout of boards in memory relates to the normal 'playing' position of boards in practice.

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 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 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

```
        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

```
        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

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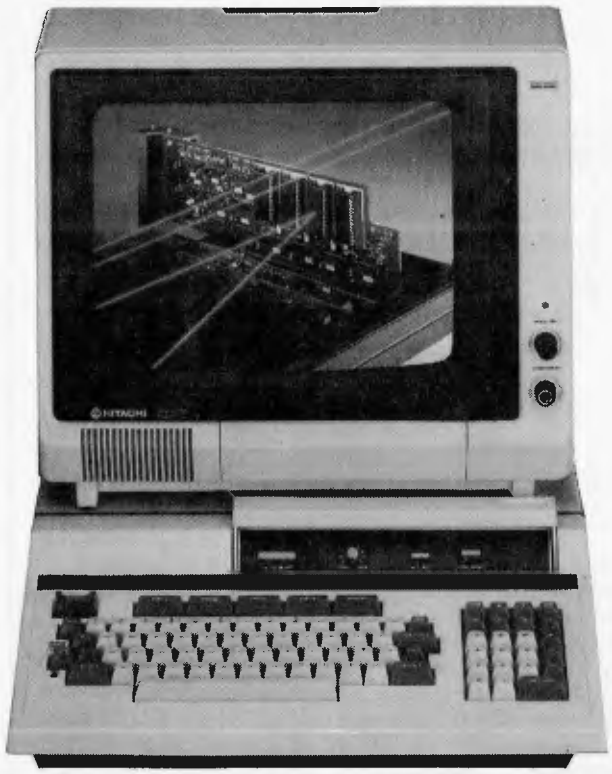

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NSA

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

```
        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

```
        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

```
        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

ACCUMULATOR	00111001	<——— ASCII "9"
OTHER BYTE	00001111	<——— "MASK"
RESULT	00001001	<——— REAL "9"

Fig 8 Effect on the ASCII code for the number 9

in mind that because we don't branch back once the index register has become zero, we must initialise the base location separately.

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.

Clear memory subroutine — Z80/8080

Indexing on the Z80 is implemented somewhat differently to the 6502. The 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.

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).

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 successive locations in memory. The mnemonic INX represents an 8080 register pair increment instruction. 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. 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 accom-

```
        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

```
            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

```
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

plished 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: bit 7 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 bit 7 of our switch byte, to place bit 7 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 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.

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 sub-routine — 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:

```
0 0 0 0 0 0 0 1 ←—— initial value of accumulator
0 0 0 0 0 0 1 0 ←—— accumulator after one ASL instruction
0 0 0 0 0 1 0 0 ←—— 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 bit 7 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 bit 7. 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.

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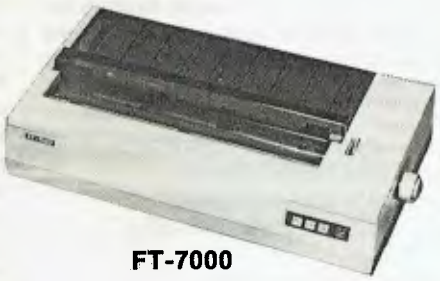

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Print Size (Character/line)	Normal; 80 Enlarged; 40 Condensed; 136 Elite; 96 Elite-Enlarged; 48	Normal; 156 Enlarged; 78 Condensed; 265 Elite; 187 Elite-Enlarged; 93
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Paper Width	Fanfold; 5" to 10" Cut sheet; 5" to 10"	Fanfold; 5" to 17" Cut sheet; 5" to 17"
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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.

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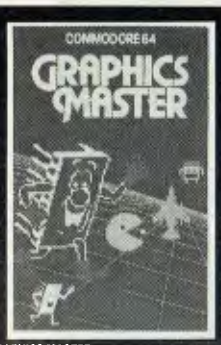

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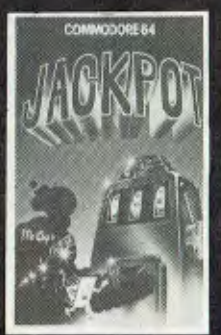

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SLALOM Manoeuvre through the gates as quickly as possible, if you go through a gate you will hear a 'ping'. If you miss one or two gates your time will be penalised. If you miss three you will be disqualified. Maximum score three hundred points.
DOWNHILL Avoid the hazards using the same controls as on the Slalom. Also jump the obstacles by pressing the fire button or space bar. You cannot change direction whilst in the air. Beware of dead ends and learn the course. You cannot jump over trees. Maximum score 500 points.
SKI JUMP Accelerate by pressing the fire button or space-bar rapidly whilst your skier is on the 45° ramp. At the end of the ramp push the joystick up to jump and pull down to land. Note that you will travel further, the longer you keep the joystick up after you have jumped. If you do not land parallel to the slope, your score will be penalised. Maximum score 200.

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The story so far: The magical firestone of the dwarfs has been lost for many years. The owners have finally tracked it down to a mountain in the land called Thargon, where it is guarded by a large and ill-tempered dragon. Despite their attempts to retrieve their property the dwarfs have had to admit defeat. They have, therefore sent out word that they are looking for an intrepid adventurer to take on the dragon and retrieve their stone. They have received many replies and of all the courageous souls they have chosen you, Merravid, son of Aranord. As a measure of protection they will not allow you to enter the dragon's lair without being fully armoured. There lies the snag. Only one full set of armour exists in Thargon, but over the years it has been scattered to the four winds. You must therefore collect the pieces as you find them, before doing battle with the dragon which is easier said than done!

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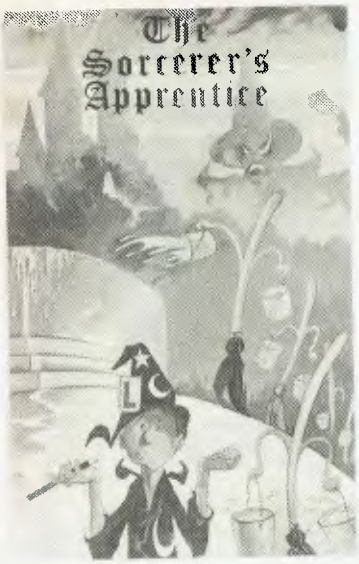
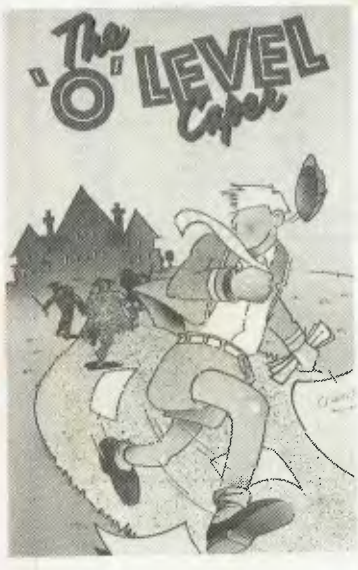
SOFTWARE INSPECTION



THE SORCERER'S APPRENTICE

ADVENTURE NOTES

- Having temporarily quelled the brooms in the action game, you must travel through the Wizard's Kingdom to find the Throne of all Knowledge.
- To input a command, you must type in one or two words on the 'command' line when prompted: e.g. Command? – Look painting. This can be abbreviated to e.g. to pa. If you type in more than two words, only the first and last will be accepted.
- Whenever you enter a new room or 'look', the following information is displayed: a) at the top of the screen the room you have entered; b) further information about your surroundings including possible and obvious exits; c) viewable objects and spells; d) the Command line where you input your commands.
- There are many spells but you may only hold one at a time. To use the spells you must enter them into the Spell Book which will also leave you free to collect another spell. The command for entering spells into the Spell Book is 'in book'. To use a spell you must enter either: 'use spell' (and you will then be asked for the number) or: 'spell 17' (i.e. spell and number).
- Usually, you are limited to carrying 10 objects at any time but this can vary according to circumstances.
- You are advised to draw a map to keep track of where you are as there is a total of 74 rooms. During your travels you will encounter many strange creatures and occurrences. You must use your wits and the clues obtained from the action game to successfully overcome all challenges. It is worth looking at your spells as each one has a clue to the type of magic it can wield. Please note also that a cursory knowledge of Roman mythology could be useful.
- Vocabulary: Movements – N, S, E, W, U, D, for North, South, East, West, Up, Down, Go, Jump, Run.
Verbs: Drop, Get, Give, Jump, Kill, Open, Read, Run, Say, Sit, Spell, Take, Throw, Use, Drink, Look, Load, Save, Inventory (I).
- Please note: DO NOT 'GO' AN OBJECT



THE 'O' LEVEL CAPER

For the VIC 20 with 16K Ram.

THE PLOT

You wake up this morning expecting to sit your first 'O' level examination this afternoon. Naturally you are a little nervous. Have you done enough revision? Will your get a mental block? How hard will the questions be?
Just as you are about to leave home, the telephone rings. Apparently, the wicked teachers in collusion with an unknown Oxford professor, have stolen the 'O' Level papers and replaced them with ones so difficult that . . . EVERYONE WILL FAIL IN EVERY SUBJECT!!!
You must fight your way through the evil teachers to Oxford University. Once you get there, the adventure begins: you must find the original papers and substitute them for the fake ones. Will you be a Grade A hero?

THE ACTION

- When loaded, you must collect all the blue books (in any order), avoiding the teacher's balls. When this is achieved, you will reach the end of Skill Level 1. After 7 more such skill levels, you will go into phase 2 of the Action where you must jump over walls and shoot at the teachers.
N.B. Beware of overhead rockets!

THE ADVENTURE

- You will then be asked for the power code and must decide which of the clues is the power code.
- General words to be used: TAKE, GET, LOOK, EXAMINE, DROP, INVENTORY, GO.
There are other words but you must discover what they are.
- Directions to be used: North, South, East, West, Up, Down. (N,S,E,W,U,D)
- REMEMBER: Your task is to swap the 'O' Level papers!!!

ATTACK ON WINDSCALE

For the CBM 64.

THE PLOT

We in Britain, A.D. 1983, rely heavily on atomic power to meet our energy needs. At Windscale, the scientists are forever coming up with new ways to develop our dhimishic capabilities.
Our 21st Century intergalactic enemies, having been foiled by you and Captain Phoenix in the past (and future), realise that their only chance of defeating us lies in their ability to defeat us in the present. Consequently, they have to set up a sonic transmitter somewhere in the surrounding countryside which is causing the atomic core at Windscale to go critical.
You and Captain Pheonix must defend the Windscale research centre's atomic core and then find the sonic transmitter before the devasting nuclear explosion rips out the heart of the English countryside.

THE ACTION

- Avoiding the bombs from the 2 flying saucers, you must destroy 40 aliens to get to the next skill level. The alien's speed increases with every level reached. The flying saucers will only drop bombs on the gun turret when they are in the immediate vicinity of the turret.

THE ADVENTURE

- You will be asked for the running code. THE ONLY WAY TO DISCOVER THE RUNNING CODE is to get to the end of Skill Level 4 of the action game.
- Having defeated the aliens in battle, you must firstly protect the reactor from going critical by finding a quartz prism to deflect the pulses of the aliens' sonic transmitter. You will have only 2 hours to accomplish this. Now you must leave Windscale and find a jet to take you to Part 2 of the adventure wherein you must find the actual transmitter and, using prisms from Part 1 of the adventure, destroy it.

DODGE CITY

For the 48K Spectrum

THE PLOT

In the Wild West, men were men, horses where horses and women knew their place. The gunfighter walked tall and men had to do what men had to do. The Pony Express riders, the men who delivered the mail had to do more than most - especially if they worked in or around Dodge City.
Now's your chance to see if you measure up to their standards. Can you get to Dodge City? You'll have to avoid all sorts of critters not to mention Indian braves, Mexican banditos and Southern Confederate renegades – the kind of men who'll shoot you just to check if their guns are working.
Once you arrive in Dodge City, you'll mosey along to the saloon . . . but wait, there's a surprise for you, pardner. The sheriff's deputy is lying in a pool of blood and the sheriff thinks you know something about it.

THE ACTION

- Using the joystick or keyboard, you must pick up the mail, shooting the baddies who are pursuing you and avoiding the cactus in front of you. When you have collected enough mail you will have reached the end of a skill level.

THE ADVENTURE

- You will then be asked for the running code. THE ONLY WAY TO DISCOVER THE RUNNING CODE is to get to the end of Skill Level 12 of the action game.
- When you think you have enough clues to prove your innocence press key CAPS SHIFT F.
- Alter 'i' for inventory press and key to continue.
- During treasure pick up routine press '.' to return to adventure.

QUEST FOR THE GARDEN OF EDEN

For the CBM 64K

THE PLOT

Your quest is to go back in time in order to find The Garden of Eden, and when you find it your must stop Adam from eating THAT APPLE.

THE ACTION

- You have to go from one side of the bridge to the other, avoiding the spider by jumping over it (you must time your jumps exactly) also watch out for the fish in the water below because it keeps spitting at you. Having reached the other side you must release the joystick and press the fire button. This will pick up two of the rocks piled up against the right hand exit. You must then move left and releasing the joystick again you must press the fire button to drop the rocks (they only drop one at a time. So in order to avoid the spider you may have to carry one rock with you while jumping the spider). When you drop the rocks you must try to hit the fish for a bonus score. If you hit the Bee at the first level you will also get a bonus score but the bee will attack you.
- Once you have cleared all the rocks you will pass on to the next skill level.
- Only when you have been defeated by the game will you be given the clues for all the skill levels you have been through.
- Remember you need these clues to solve the adventure.

THE ADVENTURE

- Type in the running code that you have got from the action game.
- You will find yourself back in the middle ages and you must work your way back to the Gerden and stop Adam from eating that Apple.

JOKERS WILD

For the 16 or 48K Spectrum.

THE PLOT

The year is 1972, our intergalactic enemies are posing as a funfair and are travelling the world to capture people's souls. They place hypnotic playing cards in 'bunko booths' and invite the public the play. You and Captain Phoenix are summoned back from the future to lock the hypnotic cards in a lead lined security box. From there you must then find the time vortex that is holding our enemies in the space time continuum of Earth 1972.
That is the adventure that is the mission. For the sake of all of us (and our childhood's), let's hope you succeed.

THE ACTION

- Using the joystick or keyboard, exit from the central security box, pick up a black key to enter a 'bunko booth' to collect a playing card. Then deposit the card, carefully avoiding the red knaves, in your security box. When all 4 cards are safely deposited, you will have reached the end of a skill level. However, beware, the knaves increase at the next skill level.

THE ADVENTURE

- You will then be asked for the running code. THE ONLY WAY TO DISCOVER THE RUNNING CODE is to get to the end of the 4th skill level of the action game.
- General Verbs to use: GET, DROP, INV (for a list of what you hold), LOOK, SAVE (to save current position within adventure on tape), LOAD (load a previously saved adventure position), QUIT (restarts the adventure), RECOGNISE (typing this will result in the computer giving the prompt '?', and then waiting for input. Any word typed in next (verb or noun) will either be 'recognised' by the computer or not. EXAMINE (take a closer look at an object).
- Directions to be used: North, South, East, West, Up, Down. (N, S, E, W, U, D.)
- Special verbs which can only be used in a specific context – possibly only with particular noun (see RECOGNISE above). READ, ENTER, INSERT, MOVE, TURN, WEAR, PRESS, FIRE, DIG, POINT, THROW, PICK, BRIBE, FEED, SET, SWITCH, FOLLOW, DEPRESS, UNLOCK, GIVE, LIFT, EAT, OPEN.

FOUR GATES TO FREEDOM

For the VIC 20

THE PLOT

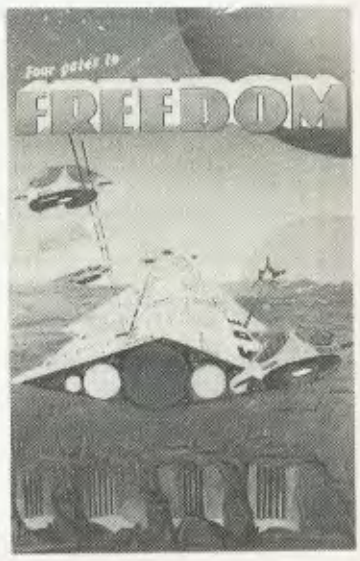
In the year 3112, a star cruisor exploring the planet system of Vega in a galaxy 2,000,000 light years from Earth, is captured by the Warrior Ants of Xznos.
All of the ship's crew and the 20 scientists on board are drugged and then preserved in suspended animation in the catacombs on Xznos to feed the future generations of Warrior Ants.
It is up to you and Captain Phoenix to destroy the 4 gates which bar your entry to the catacombs.
Once you've done that, you must rescue the scientists and crew. It is a tricky mission. But then you and Captain Pheonix are a match for anyone . . . even the Warrior Ants of Xznos!

THE ACTION

- Press Play on tape.
- When loaded, using the joystick, you must destroy the red wall to break through to the blue wall in order to hit first one gate (end of skill level one), then two gates (end of skill level 2), then three gates (end of skill level 3), and finally four gates (end of skill level 4).
Each time you complete a Skill Level, you receive an extra life. However, during Skill Levels 2, 3, 4 the blue wall is renewed each time you hit a gate.

THE ADVENTURE

- You will then be asked for the running code. THE ONLY WAY TO DISCOVER THE RUNNING CODE is to get to the end of skill level 4 in the action game.
- Verbs to be used: GO, TAKE, USE, DROP, BLOW, SHOOT, REMOVE, INSERT, GET, ACTIVATE, RE-ANIMATE.
- Directions to be used: NORTH, SOUTH, EAST, WEST, N, S, NOT Up, Down or Across.



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SNAKE BITE – Very colourful snake game.
BLITZ – Bomb the city, 5 levels, machine code.

REVERSI 48K – Entertaining board game, 10 levels of play, machine code, easy to learn, hard to master.

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BIBLIOFILE

Linnet Evans takes over the keyboard this month with a selection featuring database management and Penguin's 'Computing Book'.

Database Management for the Apple

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 IIe 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 $20.95 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.

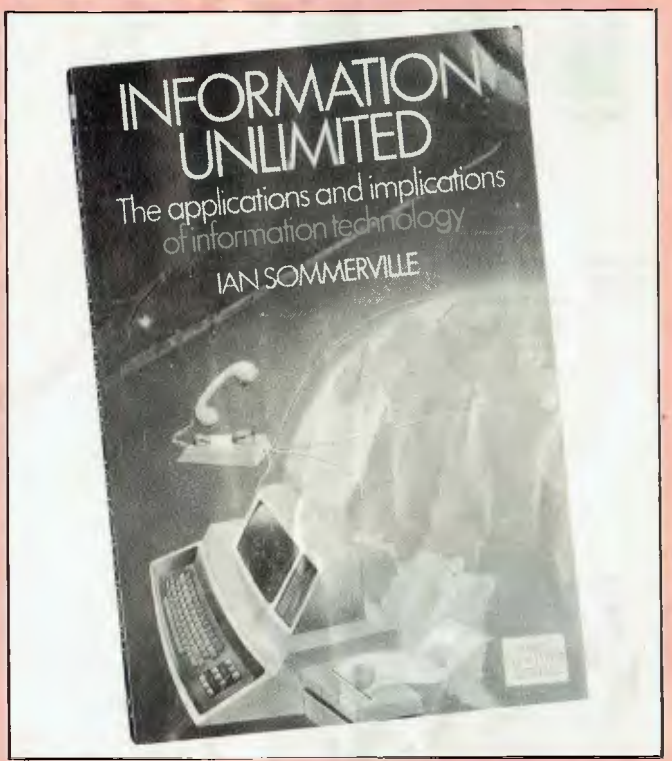
That apart, *Database Management* is an entirely accurate title. Nat Wadsworth writes a pithy, punchy and personalised intro into the subject of using *your* computer to organise and manipulate information. Enough is offered on file structures, soft/search routines and the like to give the operation 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: $20.95
Thanks to the Technical Bookshop for the loan of the book.



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 the home. His main concern lies with applications, even more so with implications: the market forces that really enable computerised medical sys-

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BIBLIOFILE

tems, 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. At the end of each chapter the author even provides a summary. It's a nice gesture, even if smacking of those H.S.C. 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 Australian public, particularly when hitting a target such as the cashless society. Fifty per cent of adults in Australia 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 12pm 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.

Information Unlimited

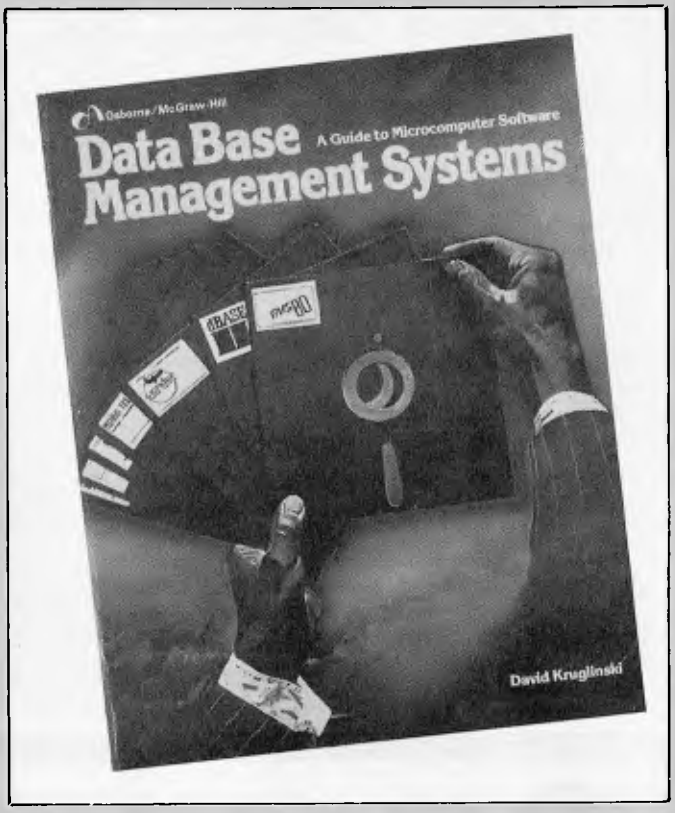
Author: Ian Sommerville
Publisher: Addison-Wesley
Price: $9.95
Thanks to the Technical Bookshop for the loan of the book.

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 above). You would then find yourself with a slightly fatter volume and 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 (yep!) before the first Medicare 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 business computing mags. Omitted altogether is Perfect Filer, now making inroads in this country. 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 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: $28.85
Thanks to McGills for the loan of the book.

BIBLIOFILE

The Penguin Computing Book

Penguin's forays into computing have been brief and brusque, a notable contrast to the publishing group's excursions into, for instance, the next-door-neighbours of maths or sociology. And then, just like the small Renault popping up with 'Le Car' emblazoned cheerfully among its go-faster stripes, enter *The Penguin Computing Book*, or *PCB* for short. It's almost the size of a circuit board, and its 400-plus pages of closely-packed text make for a lot of words. Computer literacy, indeed.

The backdrop is in information processing: 'data' occurs more often than any other word. The firmware in your washing machine or the Donkey Kong in your Christmas stocking (r.i.p.) have to be strictly peripheral. Bias is towards what's relevant in small business systems: the TRS-80 and a 6502-based training machine, the EMMA, are examined in terms of architecture, system software and potential application.

This is a thorough overlap with the kind of material covered more explicitly in the books reviewed above, and the 'hobbyist' shouldn't feel at all short-changed. Big-machine processing is, however, deftly (and reasonably) side-stepped, with an honourable mention of certain trendy or unsung applications such as atmospheric modelling.

Coverage tries hard to be even. I looked up bar coding, a subject which is of course currently popular, coming back to you with every can of beans. It got one minor entry and one miniscule one (assuming the index is OK which it appears to be), which is more or less in proportion to the importance of bar coding at the sharp edge of technology. Light pens, by contrast, rightly have more space to say their bit, which is actually very good proof of the strength of this book as a dictionary.

However, I also searched for hand-held computers, and searched in vain.

Hardware, in general, and communications, in particular, are well handled. By contrast, historical background is patchy, and the present structure of the industry — it's a hornet's nest, but so what — is shirked altogether.

Yet when all's said and done, *The Penguin Computing Book* is a sterling piece of work, well written, sensibly ordered and neatly balanced. Value for money is an understatement: well worth the wait.

The Penguin Computing Book

Author: Susan Curran and Ray Curnow
Publisher: Penguin/Allan Lane
Price: (Penguin paperback) $14.95, (Allan/Lane hardback) $24.95.
No thanks to Penguin for the non-supply of a copy for photography.

CHECKOUT

Modem Mobility

Geof Wheelwright enjoys the flexibility of the Sendata/Tandy modem.

Built-in modems are the big difference between North American portables and the versions of them that reach our shores. Consequently, the effectiveness of portable machines 'in the field' is considerably reduced and the great advantages of portable computing cannot be exploited to their full. There are any number of reasons why Australian editions of portable computers don't come with the built-in modems — not least of which is an allegedly slow modem approval system by Telecom that would unduly delay the introduction of new machines in this country.

The long and short of it is that if you want a portable with a modem in Australia you'll have to buy a modem yourself. And if you want to maintain the idea of total portability in your choice of modem, you'll probably consider either the Tandy TRS-80 or Sendata 700B acoustic coupler.

These two modems are battery-operated by built-in rechargeable nickel cadmium batteries, and can run up to ten hours on one charge. They are similar enough to be treated as one modem because they are manufactured by the same company — Tandy buys them from Sendata and puts on its own 'badge'.

First impressions

The modem comes in a two-piece styrofoam box and is wrapped in plastic. It consists of two 'cups' bridged by an accordian-like bit of flexible plastic and features two lights and an answer/originate switch at one end. As the batteries are rechargeable, they don't need to be removed from the machine — just plug the modem into the mains overnight and it'll be fully charged in the morning.

The modem is only slightly larger than a telephone handset and will fit over any business phone and most home sets — although slimline phones could prove difficult to use with the machine.

Documentation

If you know how to use your communications package (you do need one to make the most of this modem), you shouldn't have any problem hooking up the modem and getting it going. This being the case, little documentation is needed, which is lucky as little is provided.

This boils down to the following, which covers the main problems you're likely to come up against:

- Remembering to leave the modem on Originate when you're dialling up a bulletin board or machine;
- Putting the mouthpiece in the hole that says 'mouthpiece';
- Plugging the RS232 cable into the computer the right way up.

Features

Flexibility is provided by the articulated section between the cups that allows you to get a snug fit between phone and modem. The portable nature of the modem means that you can even download information over the phone at a phone box (although the pip-pip-pip sound on trunk calls may cause problems with data transmission).

In use

I tested the modem with a wide variety of computers and mailboxes, and found it to be reliable and effective with all of them. The cups cut out the kind of sound interference that often garbles signals through acoustic couplers.

I used the modem most with the NEC 8201A portable computer and found that it really did give the machine that one measure of portability that was missing from it. I called various places in Australia and even overseas with no problems, and obtained consistent performance from both these modems.

I also tried using both the Tandy and Sendata modems together to allow communication between two micros over the phone line, and they were easy-to-use and a good deal of fun.

Verdict

I thoroughly enjoyed these and would recommend them to anyone who wants a reliable and portable 300/300 baud modem. The only hesitation I might have is on price — but the superior design, inclusion of the built-in nicad batteries and portability scotches that hesitation with the assurance that, as always, you get what you pay for.

The Tandy TRS-80 is priced at $229.00 at the time of publication, and the Sendata 700B is priced at $249.00 excluding sales tax.

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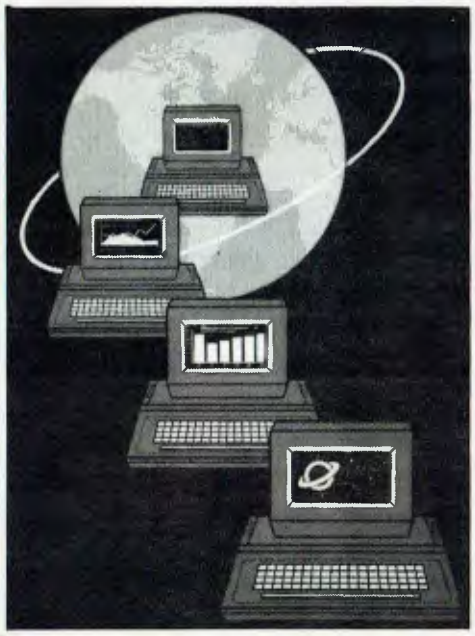

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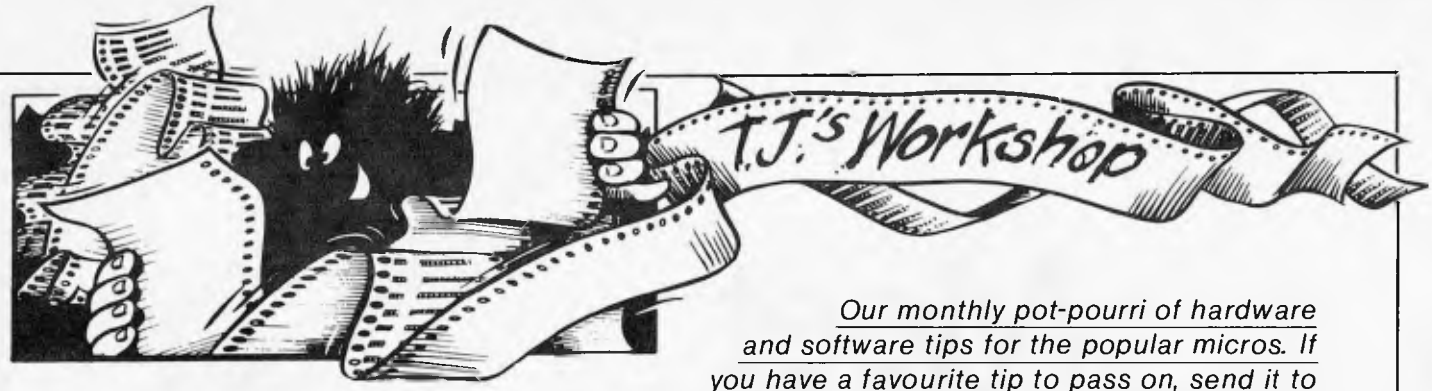

Our monthly pot-pourri of hardware and software tips for the popular micros. If you have a favourite tip to pass on, send it to 'TJ's Workshop', 77 Glenhuntly Road, Elwood, Victoria 3184. Please keep your contributions as concise as possible. We will pay $10—$30 for any tips we publish. APC can accept no responsibility for any damage caused by using these tips, and readers should be advised that any hardware modifications may render the maker's guarantee invalid.

Hit those Commodore keys

Many Commodore 64 programs include a 'hit any key to continue' section, i.e. a line that waits for the user to press any key before the program continues.

This is normally achieved using a 'GET' or 'WAIT' statement. The disadvantage of these is that they won't detect the following keys: CTRL, SHIFT, CMB RUN/STOP (the latter may even stop the program).

The machine code routine here solves these problems. A simple call of SYS 848 waits until a key is depressed.

D Gristwood

```
10 REM 'HIT ANY KEY' DEMO
30 GOSUB 100:REM SET UP THE M/C ROUTINE
40 PRINT"HIT ANY KEY TO CONTINUE"
50 SYS 848:REM WAIT
60 PRINT"* OK *":GOTO 40
100 REM MACHINE CODE ROUTINE
110 RESTORE
120 FOR T=848 TO 881
130 :READ A:POKE T,A
140 NEXT T
150 POKE 788,52:REM DISABLE RUN/STOP
160 DATA 234,76,85,3,96,165,197,201,64,
    208,249,173,141,2,208,244,165,145
170 DATA201,127,208,8,169,0,133,145,76,
    84,3,234,76,85,3,0
180 RETURN
```

Making some Sharp points

The following are all statements and commands which receive no mention in the Sharp MZ700 manual:
TRON and TROFF — trace commands which cover the screen with the number of the line currently being executed.
CLS — clears the screen.
BOOT — this appears to boot the Sharp in the vitals, it clears the Basic program and returns you to the monitor. It appears to be identical to BYE.
AND OR and EOR are all reserved words but are not implemented. Thus while you cannot let OR=10, neither can you 'IF (A<=0) OR (A=>0) THEN BOOT'. The logical operands are *, + and —for AND OR and EOR respectively.
JOY — is the keyword for reading the joysticks.

A number of people have given the impression that the MZ700 has no typewriter mode, i.e. shift for capitals. There are at least three ways of doing this:
Press shift and ALPHA together to toggle typewriter mode on and off.
Press CTRL and E together to turn the mode on and CTRL and F to turn it off.
PRINT CHR$(5) and PRINT CHR$(6) respectively.

In all these cases the cursor is solid for lower case and shaded for upper case.

K Ollett

Typing on the Atari window

On the Atari 800, if you type GRAPHICS 2 or any other GRAPHICS mode as a direct command and then fill the text window up twice with any character and press Return, you will be able to type in the graphics window.

L Staveley

Error read

When developing programs that use disk files you soon need to read the disk error channel. Below is a small Basic program that loads a machine language program into the cassette buffer. After you have run this all you do to display the error channel is type 'SYS828'.

S Jones

```
10 PRINT"
20 PRINT"          PLEASE WAIT....
30 FORI=828TO926
40 READ A
50 POKE I,A
60 NEXT I
70 PRINT:PRINT:PRINT"                    ERROR READ
80 PRINT:PRINT"          WRITTEN BY: SIMON JONES"
90 PRINT"  TO READ THE ERROR CHANNEL TYPE"
100 PRINT"'SYS828'."
105 END
110 DATA  169 , 1 , 133 , 204 , 169 , 15 , 32 , 195 , 255 , 169 , 15
120 DATA  162 , 8 , 160 , 15 , 32 , 186 , 255 , 169 , 0 , 162 , 60
130 DATA  160 , 3 , 32 , 189 , 255 , 32 , 192 , 255 , 169 , 64 , 32
140 DATA  144 , 255 , 162 , 15 , 32 , 198 , 255 , 32 , 144 , 255 , 162
150 DATA  0 , 32 , 207 , 255 , 157 , 0 , 192 , 189 , 0 , 32 , 183
160 DATA  255 , 201 , 0 , 208 , 4 , 232 , 76 , 105 , 3 , 142 , 255
170 DATA  3 , 162 , 0 , 189 , 0 , 192 , 32 , 210 , 255 , 232 , 236
180 DATA  255 , 3 , 208 , 244 , 169 , 13 , 32 , 210 , 255 , 169 , 15
190 DATA  32 , 195 , 255 , 32 , 204 , 255 , 169 , 204 , 133 , 178 , 96
```

Routine to POKE at Spectrum listings

The standard Spectrum does not come with a list option function (like LISTO on the BBC) so I have written a machine code version of this function. The routine will indent all FOR-NEXT loops. It can be placed anywhere in available RAM. Location 23728 may be POKED with the number of spaces wanted between the line number and the line code. For example POKE 23728,2 will leave 2 spaces. POKE 23728,32 leaves a whole line blank, in between the program lines — producing

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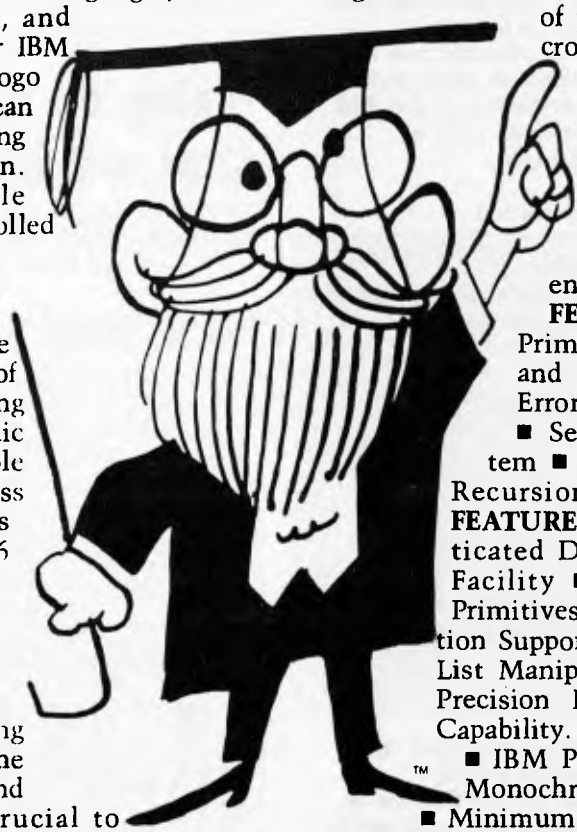

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an easy-to-read listing.

As there is no printer option, it is possible to type OPEN#2,"P" to send everything to the printer and CLOSE#2 to stop the printer.

J Patterson

```
10 CLEAR 31999
20 FOR a=32000 TO 32076
30 READ d:POKE a,d
40 NEXT a
50 DATA 62,2,205,1,22,42,83,92,237,91,
   75,92,235,167,237,82,200,216,
   235,205,40,26,62,32,215,17,176,92,
   26,254,0,40,8,245,62,32,215,241,
   61,24,244,35,35,35,126,254,235,
   32,4,235,52,52,235,126,254,243,
   32,4,235,53,53,235,205,182,24,205,
   55,25,126,254,13,32,226,35,24,188,
   187
60 POKE 23728,2
70 RANDOMISE USR 32000
90 REM try the routine on other
   programs that use multiple FOR-NEXT
   loops.
```

Trouble-free saving

Ever lost several hours work because you couldn't be bothered typing in a 'SAVE' and 'VERIFY' command before RUNning a program you were working on? It seems to be a pretty common problem. There's a neat way to keep copies of programs up to date without too much trouble. There are other reasons for using the 'RUN 60000' routine as well. More of them later. The lines shown are appended to the bottom of a program while it is being worked on. In order to SAVE and VERIFY all you have to do is type 'RUN 60000'. The program scratches the copy already on disk, then SAVES and VERIFIES the new version. To be doubly sure that you don't lose all that hard work two copies can be kept on disk at all times. The power could go off in those tricky minutes when the old file is scratched and the new one not saved — programmers need to be a bit paranoid at times. Simply change the filename in line 60000 as soon as you load up. Something like '0prog' and '1prog', alternated each time, will ensure that you always have a fairly recent version safe in case the last one crashes spectacularly.

Now for the 'other reasons'. '64 users with disk drives will occasionally have found that a nice big program of say 10k bytes suddenly transforms itself on disk, to some little two-liner or, worse, the last directory listing. Not always but often enough the fault lies more with the CBM DOS than with the programmer. There is a fault in the '@0:' command that saves and replaces a file without scratching. The fault only seems to appear where large changes have been made to an original program and then a SAVE"@0: " is attempted. The directory gets all mixed up and the programmer earns some more years in hell. I have not had the fault occur with small changes and, therefore I infer that it might be tied up with increasing the number of sectors in the file. A convenient and crash-proof way of getting over the problem is to have all programs that you are going to be working on carry the '60000' subroutine.

I put the subroutine at line 60000 because that's about as high as you can go with an easily typed number. There is nothing magic about the number.
line 6000 sets the file name — more about that anon.
lines 60001 on do the dirty work using crashproof commands like "save" and "scratch".

Notice that the error channel is read after each action and further action aborted on error detection. Three day's work on a program is too much to lose because a fly flies by and upsets a ROM.

The last command, LIST 6000, is where the 'anon' comes in. It prints the filename after all the messages and makes it easy to change it on the spot. You see, programmer's paranoia strikes again. How do you think Adam got to be where he is (was?).

I've become so addicted to 'run 60000' on disk that I have a version for tape. This one is merely a 'SAVE' routine, but it does make the typing simpler. It's 'RUN 61000' (again, there's nothing magic about the number) and it goes something like:

```
61000 rem *** save to tape
      ***
61001 print "check that
      tape is positioned
      correctly"
61002 print "then press
      any key"
61003 wait 198,1
61004 save "filename", 1
```

L Zolin

CBM screen gets the jitters

The following short program for the Commodore 64 is a useful routine to add to any game requiring a special effect for an explosion. By using the X and Y pixel scroll registers and altering them to random values, the screen is rapidly shaken in all directions. This, combined with other effects such as a flashing screen and sound effects will produce a realistic 'hit'. By adjusting the FOR loop in line 130, the effect can be shortened or extended.

D Gristwood

```
100 REM 'HIT EFFECT' BY D GRISTWOOD
110 Z1=53265:Z2=53270
120 Z3=PEEK(Z1):Z4=PEEK(Z2)
130 FOR Z5=1 TO 20
140 Z6=INT(RND(TI)*8)
150 POKE Z1,(PEEK(Z1)AND248)ORZ6
160 POKE Z2,(PEEK(Z2)AND248)ORZ6
170 REM PUT ANY OTHER EFFECTS HERE
180 FOR Z7=1 TO Z6*3:NEXT Z7
190 NEXT Z5
200 POKE Z1,Z3:POKE Z2,Z4
```

Commodore 64 loses its voice

Here is a machine code routine for the Commodore 64 that turns off the sound chip. Once the machine code poker program has been run, whenever the routine needs to be called, type: SYS 49152 as a direct command or otherwise. This routine is most useful in long programs dealing with the sound side of the CBM 64. When called, all the sound

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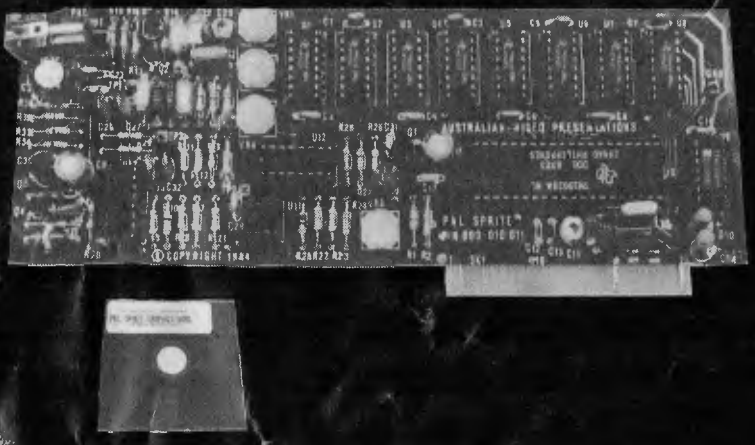

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registers are set to zero (all 20 of them) instantly, and even the machine code contains less data to be poked than the customary:

```
FOR X=1 TO 20:POKE
   X+S,0:NEXT X
```

where s is set to point to the start of the sound chip. The process I usually use is:

```
10 OFF=49152
```

and to cut the sound off use:

```
100SYS OFF
```

D Rossiter

```
10 REM * MACHINE CODE ROUTINE TO CUT OFF
ALL THE SOUND REGISTERS *
30 SA=49152:C=0
40 DATA
164,0,153,0,212,200,196,0,240,3,76,2,192
,96,0
50 READ D:POKE SA+C,D
60 C=C+1
70 IF SA+C=49167 THEN 100
80 GOTO 50
100 PRINT"FINISHED, PLEASE TYPE SYS
49152 TO CALL THE ROUTINE"
110 END
```

Protect software by fooling the drive

Here is a tip for all CBM 64 and 1541 disk drive owners. Run the following program:

```
100PEN 3,8,3,"0:PEEK,S,W"
20FOR P=0 TO 23020
30PRINTP;"-";PEEK(P),
40PRINT#3,P,PEEK(P)
50NEXT P
60CLOSE 3
70 END
```

When the program has finished, the red error light on the drive should flash. Type the following:

```
OPEN 15,8,15
PRINT#15, "S0:PEEK"
CLOSE 15
```

Load the directory with:

```
LOAD"$",8
```

When it is listed you'll see there are no blocks left for writing. The DOS thinks the disk is full.

No programs or files can now be saved onto this disk and only programs which were originally on it will remain. The only way to bring the disk back to normal is to re-format it, destroying all the contents. Readers may find this useful when selling their software products on disk.

K McCorry

Larger letters on the VIC 20

On the VIC 20 I found that:

```
POKE 646,8:POKE 36879,
   120
```

will give larger characters on the screen. Any background colour can be used, as long as the border is black. This is because half the characters are black and the other half are the same colour as the border.

PK Hardysoe

Text-only wins

Mike Gerrard argues the merits of text-only adventures versus adventures with graphics.

Many people are asking if the new breed of graphics adventures are killing off the traditional text-only quest. If the latter weren't quite ready for burial just yet, they were at least in the Intensive Care Unit with little hope of recovery.

I don't want to make a simple biased statement for the opposite view, but while it's true that the new graphics adventures are holding centre-stage at the moment, I believe that the text adventure could be on the verge of, and I choose the words carefully, a quantum leap, thanks in part to some of the techniques developed in getting the likes of The Hobbit to the screen.

The Hobbit in particular must be praised for the way it made use of a type of artificial intelligence so that the characters are able to act independently of the player. While I admire this technique it is of course nothing to do specifically with the graphics elements, but could be used equally to enhance text-only programs.

To some extent this is already being done in the Dungeons and Dragons style of game, where the character set up at the beginning has an influence on the likely outcome of certain events, and although this is nothing in comparison to the characters wandering round at will in The Hobbit, to the bewilderment of all concerned. I'm sure this is one way in which text-only adventures will develop, unhindered by the additional problems facing games with graphics.

Those graphics pages are great consumers of two items that most adventures can little spare: memory and time. Waiting for the picture to be drawn is all very well the first time, but no matter how impressive it may be, do you really want to sit and watch a particular location being drawn for the fiftieth time when you're aching to pass through en route to somewhere else? And is a picture really worth a thousand words? Well, it needs to be in terms of the memory it consumes, but for me a few dozen well-chosen words are worth any of the pictures in recent graphics adventures.

Take The Hobbit, for example, which opens with 'You are in a comfortable tunnel like hall. To the east there is the round green door.' Apart from the fact that it should have a hyphen in tunnel-like, the description is mundane in the extreme and could have come out of a Janet and John book: 'Here is Bilbo. See Bilbo read the map.' Further on: 'You are in a hidden path with a trolls footprints,' which is as unatmospheric as you can get, and should read the trolls' footprints in any case.

Without pictures the text could draw much more on the words from the original book . . . Tolkein, after all, was a better writer than any programmer could hope to be, and with more room to concentrate on the text you could avoid silly responses, as happens when 'You are at the Great River. What now?' If you reply 'Swim River', the program answers 'I do not see the river here.'

Let me say that I am a great fan of graphics adventures, but much as I enjoy playing them, I can't see them becoming all-time classics, partly because the locations and descriptions are even sketchier than those in the Hobbit: 'You are in the mountains in Asgard', 'You are in an icy waste in hell', and 'You are in Hel's hall, which is in hell' being typical examples. How could anyone prefer adventures to develop in this way, after the descriptive traditions established in the original mainframe Adventure:

'You are in a splendid chamber in an east-west canyon. The walls are frozen rivers of orange stone and a carved pillar rises to the ceiling 30 feet above. The floor is formed from smooth marble slabs, and is slightly worn in the centre. There is a little bird here, singing merrily.' Or *'You are in the Hall of the Mountain Kings, a huge room decorated with majestic statues. The east wall is covered by trophies and the mounted heads of elves and monsters, with a carved granite throne standing beneath them. The hall is hung about with the tattered remains of rich tapestries and has large doorways on all sides. A huge green snake hisses fiercely at you.'*

And if anyone who has had their head stuck in The Hobbit for the last six months complains that it's unfair to compare something written on a mainframe with an adventure squeezed into the humble Spectrum, I'm quoting from the excellent Spectrum version from Level 9, which has squeezed the original into the Sinclair machine *and* added some locations to the final game.

Not everyone has the imagination and descriptive powers to conjure up the haunting atmosphere suggested in the above locations, but you don't need the Nobel prize for Literature to use words effectively. Level 9's latest text-only game, Lords of Time, is a clever Dr Who-style adventure where you can travel through time in a grandfather clock and wind up (if you'll forgive the pun, which is also an unsubtle clue) in any of nine different time zones, each with its own adventure.

When you de-clock you may find yourself 'on a flat rocky plain which stretches for miles. It is covered by fine grey dust. The night air is cold. Luminous walkways travel east and west,' or perhaps 'you are on a beach in a small bay surrounded by overhanging cliffs. Breakers roll in from the sea to the north, rocking the Viking longship drawn up on the sand north of you'. Even those simple descriptions couldn't be conveyed fully on any micro, no matter how good it's graphics capabilities.

Text and tasks are the two vital factors in an adventure, and it will be intriguing to see the software produced using some of the recent adventure-generating programs. People with imagination but insufficient programming ability will now be able to write their own adventures.

The managing director of a very successful software house said that he too thought the days of text-only adventures were numbered, and what the public wanted was graphics quests galore.

It's hard to argue with someone who has a first-class track record of spotting the kind of software people want, but in a way this kind of thinking has always gone on. The invention of photography, for instance, was said to signal the death

of painting, TV, the end of films and radio, and every new invention heralds the end of books.

Conversely, television has been described as radio with pictures, and the same could be said of graphics adventures: they're just text adventures with a few pictures stuck on, but because the pictures are what's new they're getting all the attention at the moment. Just as for many people the goggle-box will never replace the magic of listening to a good radio programme, where you use your mind to create pictures of the people and places, so graphics adventures won't replace text-only adventures.

A classic example of this was the radio comedy program, The Goon Show. An attempt to transfer the show to television with puppets was doomed to failure because no-one, however talented, could create puppets to match the unique pictures everyone held of what Eccles and Bluebottle looked like.

Another advantage in the latest graphics adventures is that no two games are ever played the same way. This is true, in a different way, of text-only adventures, as people would hardly play them for months on end otherwise, but in any case, do people stop reading books because the pages never change? The Hobbit is a book that people read over and over again without demanding a different outcome.

There's no doubt that graphics adventures are what's happening at the moment, Melbourne House is working on follow-ups that promise to be bigger and better. A software collection will be the poorer without the best of these, but the text-only type aren't going to disappear, they're going to improve dramatically.

Consider the memory soon to be available on micros with development in chip technology, and think what could be achieved by using memory for text alone, yet incorporating the artificial intelligence elements of the graphics adventure.

Soon you'll be able to take the central part in any book of your choice, from Winnie-the-Pooh to Confessions of a Window Cleaner. And who knows, by the end of the year you might even be able to rewrite George Orwell's 1984 . . .

CHECKOUT

MORE IN STORE

A new 64 1Mb drive gets a spin from Barry Miles.

The arrival of Commodore's SFD 1001 double-sided quadruple-density disk drive has brought 1 Mb of disk storage on-line for $900.

People wanting to use the Commodore 64 for serious work have been hampered in the past by the absence of a fast and reliable disk drive. The serial IEEE 1541 is extremely slow, and goes out of alignment notoriously quickly. Some DOS protected disks can also maltreat the operating system, and this aggravates the problem.

The death of the 40-40 disk drive (the ideal alternative, if a little short on capacity) worsened the problem. The only other choice was the 8250 2Mb drive which, although desirable, is prohibitively expensive.

First impressions

The SFD 1001, in its casing, is not much bigger than the 1541. Each disk holds 1 Mb of data (formatted), compared with about 170k on a 1541 disk. This increase in storage brings media costs down, but makes the risk of data loss greater, though this can be prevented by regular backing up. High density also means you spend less time changing disks and finding the one you want.

Setting up

The 1001 is a parallel IEEE device, which means that it's compatible with earlier Commodore computers like the PET and the 3032, 4032, 8032 and 8096 business machines. However, the 1001 is not directly compatible with the 64. Fortunately there is an interface to connect the 64 to one of the parallel drives — this is the IEEE 488 ($169 at Steve's Communciations, (062) 80 4339).

Documentation

One user reference manual covers the whole range of IEEE parallel drives, and explains that the 1001 is basically half an 8250 dual drive. The manual is thorough, though a little inconvenient to use because of the large number of devices covered together. Full details are given of both simple and advanced programming with the drives, and of the various disk formats. The commands for the 64 are given in an appendix since the manual assumes Basic 4 (the standard business Basic) is being used by your machine.

In use

The drive is much faster and more reliable to use than the standard 64 drive, the 1541, and the time taken to move from track to track is less than that taken by the 8050, or even the 8250. The time spent reading the data from disk or writing to it should be exactly the same as on the 8050 and 8250 drives, so the real extent of your gain will depend on the sort of work that you are doing. If you are only loading small amounts of data the track-to-track time improvement is not great, but if you are doing random access continuously — for example a database application, loading large programs or bringing in large files to a word processor or spreadsheet program — the speed improvement is dramatic.

A spelling checking program (giving access to 28 separate files) takes four and a half minutes to run on a 1541 drive, two and a half minutes to run on an 8050 drive and one and a half minutes on the 1001.

The most important feature of a new drive is its compatibility with existing models. The 1001 is incompatible with the 1541 but does have a read/write compatibility with disks formatted on the 8050. There is a slight problem with this: an error is generated the first time that an 8050 disk is used in the 1001 drive. After this first access there are no problems. This is not a serious problem unless you have software that accesses the disk — without sufficient error trapping this could easily crash.

Commodore can supply you with a short program that POKEs data into the RAM of the disk drive. This tells it that instead of being half an 8250, it is in fact an 8050. This program gives complete read write capability, but you can no longer use both sides of the disk.

If you already own an 8050 the program will give you a dual drive system, which means easy backing up and software compatibility. Whether or not you use it depends on whether you are prepared to sacrifice that much storage space.

The choice of disks can be controversial: there is some difference of opinion about whether a quad-density can rely on disks without a reinforcing ring. The latest information from ANSI is that quad-density drives should be used with disks without reinforcing rings. Commodore's manual says the same thing, but years of using an 8050 drive disks with and without the reinforcing ring have produced no problems. Against all probability the 1001 chewed up a top quality quad-density disk without a reinforcing ring, even though it was treated carefully.

A call to Commodore revealed that data is stored rather unconventionally by the 1001, with more on the outside of the disk than the inside, and the drive works best with double-density disks (rather than quad) with reinforcing rings. The latest version of the manual reinforces this by telling you to use the 1001 with reinforcing rings on its disks.

Verdict

The drive was completely reliable in use, and the access and retrieval times are extremely attractive. It is compact and efficient, and at $900 represents good value for someone who wants a more reliable and higher capacity drive than the 1541 for the 64.

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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.

Knowing the computer industry as well as we do 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 applictaion 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.

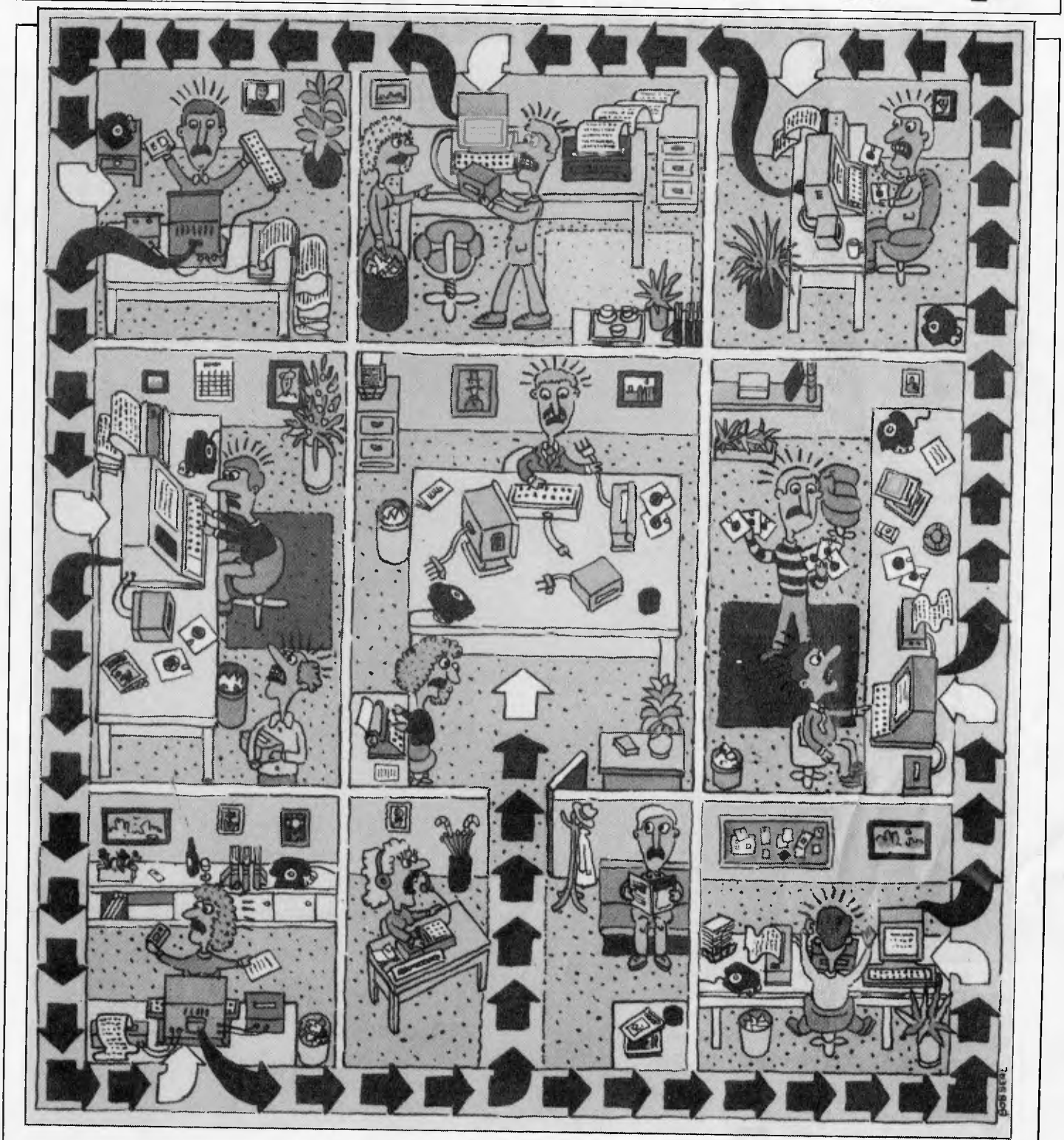
No longer will it be necessary for the user to ensure that a newly purchased applications program is written to a specific version number of a specific operating system, or whether the operating system, under which the selected application program label says it has been written, is the one specifically 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 that word again).

How will this miracle be achieved? Well, just 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-

STATEMENT



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.

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MICROCHESS

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.

Fortuntaly for SciSys, Hegener and Glaser ran into problems producing a working, bug-free version of the Mephisto III, and Fidelity dithered over the 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 $299, 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 to be on sale later this year) 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 of SciSys 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 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.

MicroChess — 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 programing, 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 slow as you want it.

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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 game 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:

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 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.

Fidelity Elite vs Mephisto Excalibur

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	

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	b 2xc3	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 13Be3xg5 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.

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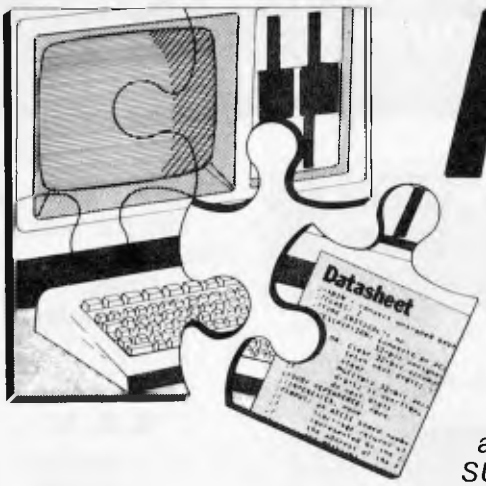

APC SUBSET

Alan Tootill and David Barrow present more useful assembler language subroutines. This is your chance to build a library of general-purpose routines, documented to the standard we have developed together in this series. You can contribute a Datasheet, improve or develop one already printed or translate the implementation of a good idea from one processor to another. APC will pay for those contributions that achieve Datasheet status. Contributions (for any of the popular processsors) should be sent to SUB SET, 77 Glenhuntly Road, Elwood, Vic 3184.

Z80 random numbers

Geoffrey Ticehurst has produced a two-byte register random number generator for the Z80. He has tested his routine, RANDOM, using a histogram producing program for the range 0 to 63. After 20,000 numbers had been generated, the biggest difference in occurrence between two numbers was about 15% and the average much less.

DATASHEET

```
;= RANDOM - Random Number Generator
;/ CLASS:  2  (Code not position independent because of
;/             absolute addressing of 3-byte RAM storage)
;/ TIME CRITICAL?:  No
;/ DESCRIPTION:  Call to SEED seeds a three-byte Random
:/               Number Store in RAM.
;/               Call to RANDOM generates new Random Number.
;/ ACTION:   SEED stores the contents of the R register in the
;/           three bytes of store.  RANDOM exclusive-ORs bit 3
;/           of the middle byte with bit 0 of the first byte.
;/           This bit is then rolled into bit 0 of the third
;/           byte and the other two bytes rolled up one bit.
;/           This action is repeated 16 times.
;/ SUBr DEPENDENCE:     None
;/ INTERFACES:  Three-byte store in RAM.
;/ INPUT:    None
;/ OUTPUT:   New Random Number in the 2nd and 3rd bytes of store.
;/ REGISTERS USED:  None
;/ STACK USE:  6
;/ LENGTH:     52
;/ PROCESSOR:  Z80
RANDER: DEFS 3          ;random number store.
SEED:   PUSH AF         ;save                          F5
        PUSH BC         ;registers                     C5
        PUSH HL         ;on stack.                     E5
        LD   HL,RANDER  ;get store address in HL.      21 YY YY
        LD   B,+3       ;fill the three                06 03
SEEDA:  LD   A,R        ;bytes                         ED 5F
        LD   (HL),A     ;with the                      77
        INC  HL         ;contents of                   23
        DJNZ SEEDA      ;the R register.               10 FA
        POP  HL         ;restore                       E1
        POP  BC         ;all                           C1
        POP  AF         ;registers,                    F1
        RET             ;and return.                   C9
RANDOM: PUSH AF         ;save                          F5
        PUSH BC         ;registers                     C5
        PUSH HL         ;on stack.                     E5
        LD   HL,RANDER  ;get store address in HL.      21 YY YY
        LD   B,+16      ;repeat 16 times:              06 10
```

```
RANDO:  LD   C,(HL)     ;first byte to the C reg.      4E
        INC  HL         ;second byte to                23
        LD   A,(HL)     ;the A register.               7E
        SRL  C          ;move bit 3 in '               CB 39
        SRL  C          ;the C register                CB 39
        SRL  C          ;to bit 0.                     CB 39
        XOR  C          ;form a new bit                A9
        INC  HL         ;C in the A                    23
        RRA             ;register.  Roll               1F
        RL   (HL)       ;it into the carry             CB 16
        DEC  HL          and roll the                  2B
        RL   (HL)        other two bytes up            CB 16
        DEC  HL         ;one bit to                    2B
        RL   (HL)       ;produce a                     CB 16
        DJNZ RANDO      ;new random number.            10 EA
        POP  HL         ;restore                       E1
        POP  BC         ;all                           C1
        POP  AF         ;registers                     F1
        RET             ;and return.                   C9
```

6502 bubble sort

ALSORT from Dennis May sorts a list of strings held continuously in memory into alphabetical order. A string bubble sort of this kind was last done in SubSet in November 1982. BSORT for the Z80 was, surprisingly, just as long as the 6502 ALSORT.

Bubble sorts have acquired the reputation of inefficiency. They are slow compared to other sorts such as the Shell sort or the 'Quicksort' (which is the slowest of the lot in its worst case). The bubble sort is, however, very easy to implement and if you are dealing with elements of different length then it's perhaps the only practical method. All the exchanges are between two consecutive elements and there are no problems of spacing. The Quicksort, for example, could involve different sized elements from the start and end of the list being exchanged, and this would require all the intermediate bytes to be shifted by the difference between the two exchanged elements.

ALSORT could be improved in efficiency but possibly at the cost of making it longer. On the first pass the largest string is 'bubbled' along to the end, so on the next pass the last string need not be tested. On each successive pass one less string can be disregarded. Also, instead of starting each pass at the start of the list, you could start at the string before the first exchange in the last pass. This would mean saving the address of the first string exchanged.

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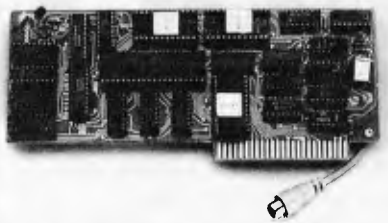

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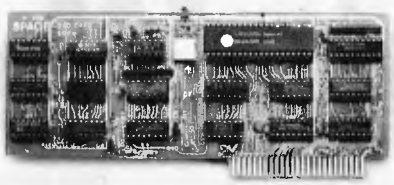

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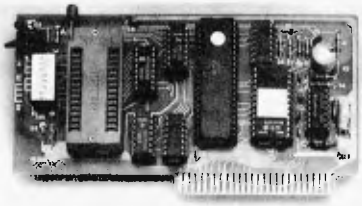

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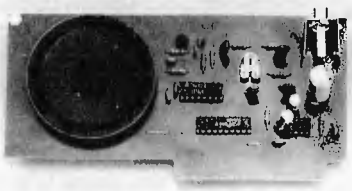

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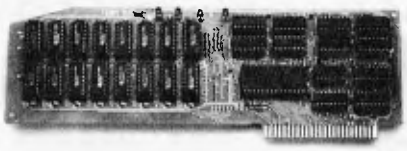

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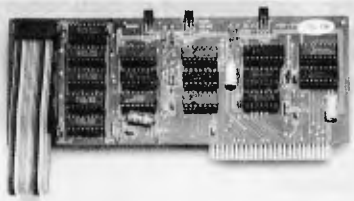

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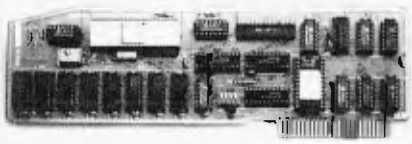

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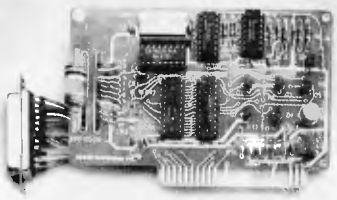

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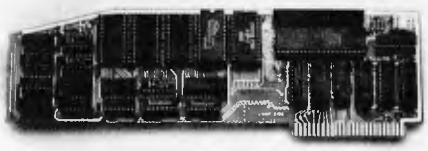

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the routine to rotate two consecutive blocks of memory (the 6502 version, RRL, was printed in SubSet in November 1983), you could do the exchange by a subroutine call and remove the need for temporary storage.

DATASHEET

```
;= ALSORT - Alphabetic sort of variable length strings.
;/ CLASS:  2
;/ TIME CRITICAL?:  No
;/ DESCRIPTION: Alphabetically orders a RAM held list of strings.
;/              Maximum 65535 strings.  Maximum length 255 bytes.
;/              Strings must end with Carriage Return ($0D).
;/ ACTION:  Clear exchange flag
;/          Do for no. of strings - 1
;/              Compare string with next string
;/               If unordered then exchange and set exchange flag
;/          Repeat if exchange flag is set.
;/ SUBr DEPENDENCE:  None
;/ INTERFACES:  RAM labelled TEMP able to hold longest string.
;/ INPUT:   M0,1 = list start address
;/          M2,3 = no. of strings in list
;/ OUTPUT:  List in alphabetical order.  M0 - 3 unchanged.
;/ REGs USED: P A X Y M0 to MA
;/            M0,1 is Input List Start Address (LSA)
;/            M2,3 is Input No. of Strings (INS)
;/            M4,5 is Next String Pointer (NSP)
;/            M6,7 is String Count (SC)
;/            M8,9 is Current String Pointer (CSP)
;/            MA   is Pass Exchange Flag (PXF)
;/ STACK USE:  7
;/ LENGTH:  161
;/ PROCESSOR:  6502
;

;test for more than one string. Exit if not.
ALSORT: LDX M2          ;INS lo-byte to X then A          A6 ZZ
        TXA             ;OR it with INS hi-byte to test   8A
        ORA M3          ;for zero strings. Exit if zero.  05 ZZ
        BNE ASB         ;continue test if not zero.       D0 01
ASA:    RTS             ;exit for less than two strings.  60
ASB:    DEX             ;decrement lo-byte to make it     CA
        TXA             ;zero if INS is one only.  Into   8A
        ORA M3          ;A for ORing with INS hi-byte     05 ZZ
        BEQ ASA         ;and exit if now zero.            F0 F9

;initialise SC, NSP and PXF for each pass.
ASC:    LDX M3          ;reset SC to INS                  A6 ZZ
        LDY M2          ;                                 A4 ZZ
        STX M7          ;                                 86 ZZ
        STY M6          ;                                 84 ZZ
        LDX M1          ;reset NSP to LSA                 A6 ZZ
        LDY M0          ;                                 A4 ZZ
        STX M5          ;                                 86 ZZ
        STY M4          ;                                 84 ZZ
        LDY #0          ;reset PXF to zero.               A0 00
        STY MA          ;                                 84 ZZ
;set CSP to next string from NSP.
ASD:    LDX M5          ;only if no exchange happened to  A6 ZZ

        LDA M4          ;last string pair does CSP get    A5 ZZ
        STX M9          ;next string address from NSP.    86 ZZ
        STA M8          ;else it is already there.        85 ZZ
;move NSP to next string along.
ASE:    LDY #-1         ;initialise index for loop        A0 FF
ASF:    INY             ;index next character, looping    C8
        LDA (M4),Y      ;until Y points to carriage       B1 ZZ
        CMP #$0D        ;return terminating character     C9 0D
        BNE ASF         ;then move the displacement into  D0 F9
        TYA             ;A for adding to NSP plus extra   98
        SEC             ;1 added with the carry so that   38
        ADC M4          ;NSP now points to start of       65 ZZ
        STA M4          ;next string.                     85 ZZ
        BCC ASG         ;allow for carry into NSP         90 02

        INC M5          ;hi-byte.                         E6 ZZ
;test for two strings in correct order or not.
ASG:    LDY #-1         ;loop from 1st bytes until strings A0 FF
ASH:    INY             ;do not match or until match      C8
        LDA (M4),Y      ;up to $0D terminator.            B1 ZZ
        CMP (M8),Y      ;Carry is set if strings match    D1 ZZ
        BNE ASI         ;or if string at NSP is greater   D0 04
        CMP #$0D        ;than string at CSP.  Carry       C9 0D
        BNE ASH         ;is reset if exchange is needed.  D0 F5
ASI:    BCS ASN         ;skip if pair are in order.       B0 34
;move string at CSP to temporary store at TEMP.
        LDY #-1         ;move from 1st byte up to and     A0 FF
ASJ:    INY             ;including $0D terminator byte    C8
        LDA (M8),Y      ;the string at CSP in to TEMP     B1 ZZ
        STA TEMP,Y      ;store as first part of exchange. 99 YY YY
        CMP #$0D        ;                                 C9 0D
        BNE ASJ         ;                                 D0 F6
;move string at NSP down to CSP. Point CSP past it.
        LDY #-1         ;from 1st byte to end including   A0 FF
ASK:    INY             ;$0D terminator, move string at   C8
        LDA (M4),Y      ;NSP down to start at CSP.        B1 ZZ
        STA (M8),Y      ;second part of exchange.         91 ZZ
        CMP #$0D        ;                                 C9 0D
        BNE ASK         ;                                 D0 F7
        TYA             ;now use displacement from Y      98
        SEC             ;plus 1 from Carry as length      38
        ADC M8          ;of shifted down string added     65 ZZ
        STA M8          ;to CSP to point it to area now   85 ZZ
        BCC ASL         ;free to receive string from TEMP. 90 02
        INC M9          ;add any carry to CSP hi-byte.    E6 ZZ
;replace stored string. Set PXF and Exchange done flag.
ASL:    LDY #-1         ;from 1st byte to $0D terminator  A0 FF
ASM:    INY             ;move stored string back as 2nd   C8
        LDA TEMP,Y      ;of the pair.  Third and last     B9 YY YY
        STA (M8),Y      ;part of exchange.                91 ZZ
        CMP #$0D        ;comparison leaves Carry flag     C9 0D
        BNE ASM         ;set on loop exit for use in      D0 F6
        ROR MA          ;setting PXF (bit 7). Set also    66 ZZ
        LDA #$FF        ;current exchange done flag for   A9 FF
        PHA             ;correct pointer movements.       48
        BMI ASO         ;skip to end of pass test.        30 03
;clear current exchange flag if no exchange done.
ASN:    LDA #0          ;necessary to ensure CSP will     A9 00
        PHA             ;get address from NSP.            48
;SC countdown. Pass ends when one string left.
ASO:    LDX M6          ;decrement SC.  Testing if lo-byte A6 ZZ
        BNE ASP         ;is zero when hi-byte also needs  D0 02
        DEC M7          ;decrementing.                    C6 ZZ
ASP:    DEC M6          ;dec lo-byte of SC.               C6 ZZ
        LDX M6          ;do OR of lo-byte minus 1 with    A6 ZZ
        DEX             ;hi-byte to give zero result      CA
        TXA             ;if SC = 1.                       8A
        ORA M7          ;if SC = 1 then pass ended so     05 ZZ
        BEQ ASQ         ;skip out of loop.                F0 05
;loop differently on state of current exchange flag.
        PLA             ;if flag set then exchange occurred 68
        BNE ASE         ;and CSP is already okay.  Else   D0 94
        BEQ ASD         ;loop to move NSP to CSP.         F0 BA
;another pass if any exchanges occurred else end.
ASQ:    PLA             ;tidy up stack.                   68
        BIT MA          ;test PXF (bit 7) and if reset    24 ZZ
        BPL ASR         ;get out of loop and end.         10 03
        JMP ASC         ;else do another pass.            4C YY YY
ASR:    RTS             ;exit for sorted list.            60
;end of ALSORT.
```

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NEWCOMERS START HERE

This is our unique quick-reference guide, reprinted every month, to help our readers pick their way through the most important pieces of (necessary) jargon found in APC. While it's in no way totally comprehensive, we trust you'll find it a useful introduction. Happy microcomputing!

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 *APC*.

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'.

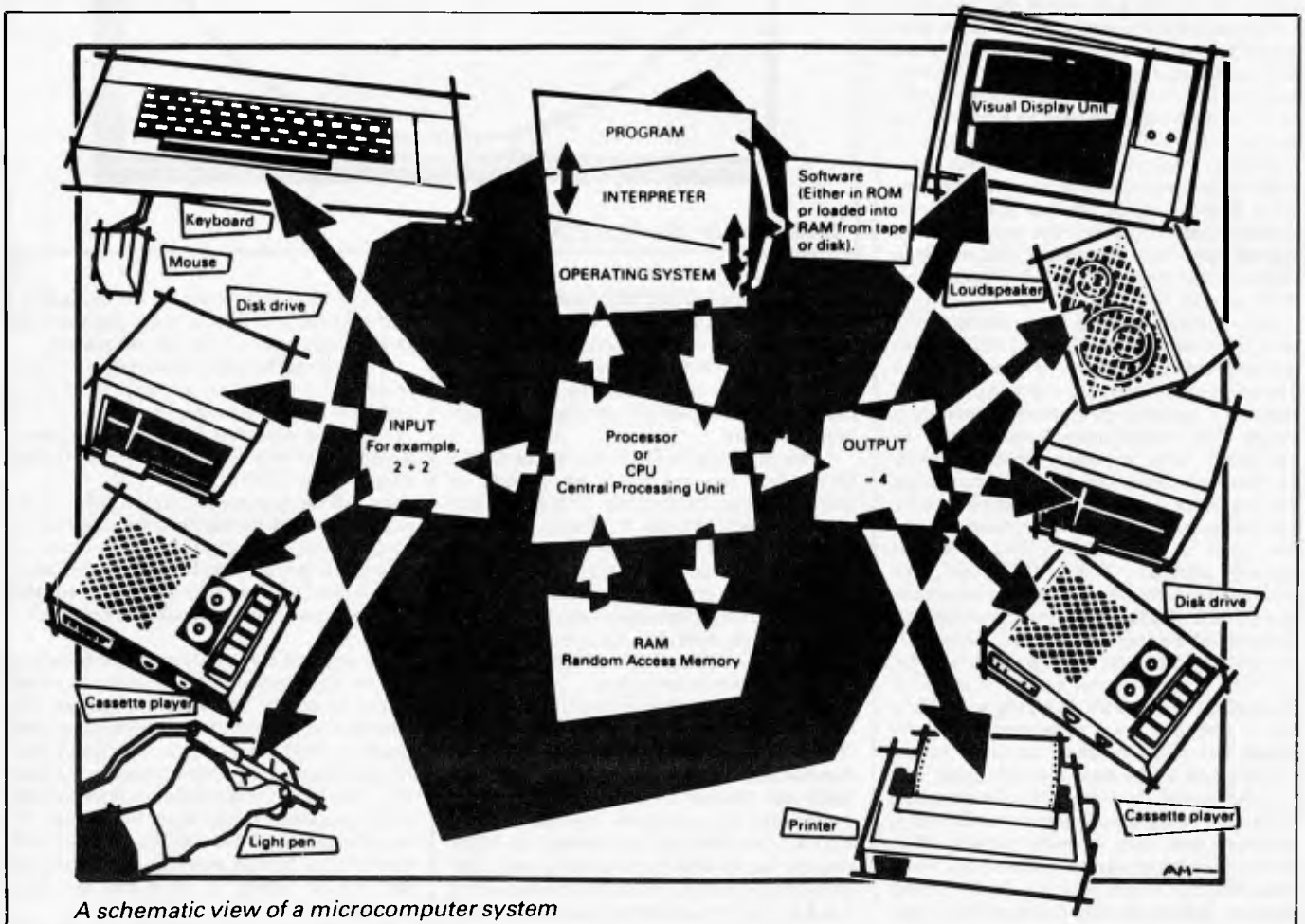
Programs must be written in a form the micro can recognise and act on — this is achieved by writing the instructions in a *code* known as a *computer language.* There are literally hundreds of different languages around, the most popular of these being *Basic.* Basic is an acronym of *B*eginners' *A*ll-purpose *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 *APC* 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 *APC* 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 types of processors available, the *Z80, 6502, 6800* 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



A schematic view of a microcomputer system

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 American Standard Code for Information Interchange, *ASCII.* This system assigns each character to 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 (extxremely 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 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 contents 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.

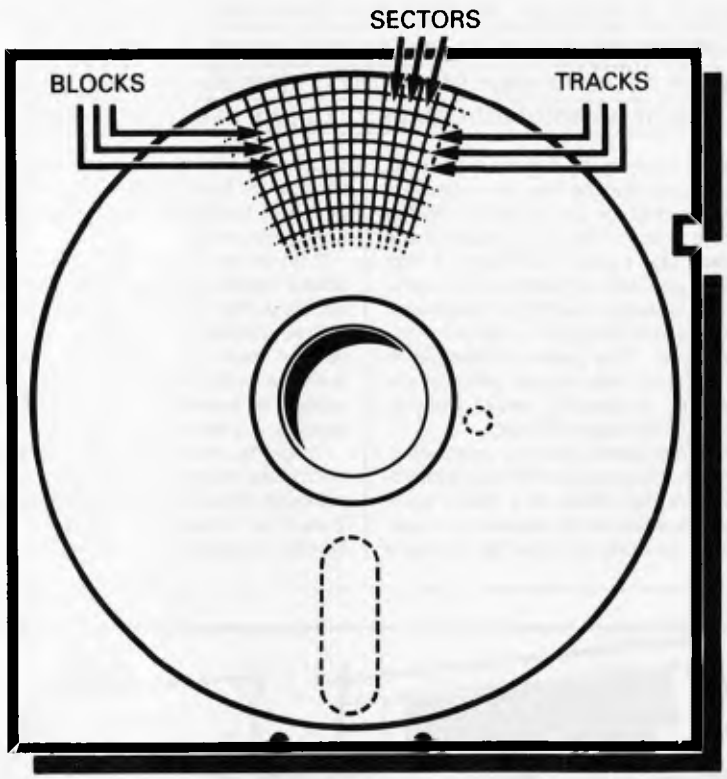
ROM is used to store *firmware,* the name given to software permanently available on the machine. An interpreter is a typical example of firmware (stick with it: it gets easier!).

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. It is usually powered by small ni-cad batteries so that programs and data are retained even when the main power is switched off. CMOS RAM is extremely expensive and is not likely to be used in desktop machines for a little while yet. (CMOS stands for Complementary Metal Oxide Semiconductor).

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, incidently, 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.



Cross-section of a floppy disk

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

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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 *(APC,* February 1984, pp 59-60), you'll see some 8-bit machines beating their 16-bit rivals — even in processor-bound operations like the *APC* 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 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 *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* (Control Program for Micros), *MS-DOS* (Microsoft Disk Operating System) and *PC-DOS* (Personal Computer Disk Operating System). 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 chose 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.

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 be separate, conencted 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 I/O, 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 standard 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.

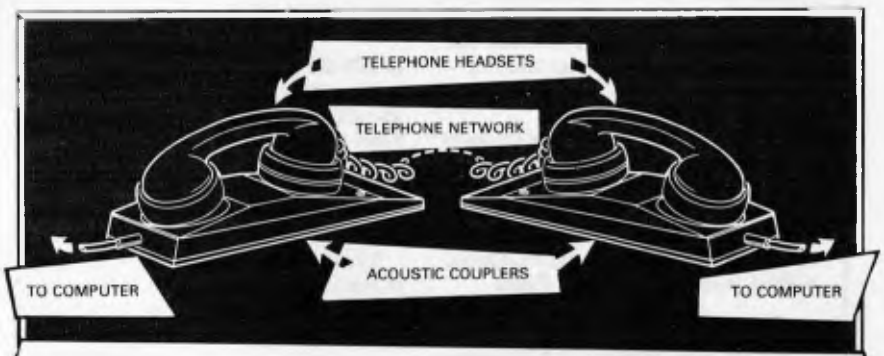
The alternative method is to use a *modem*. Unlike an acoustic coupler, a modem is wired into the telephone system and you should get permission for this from Telecom.

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.

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 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.



Computer-to-computer communications using acoustic couplers.

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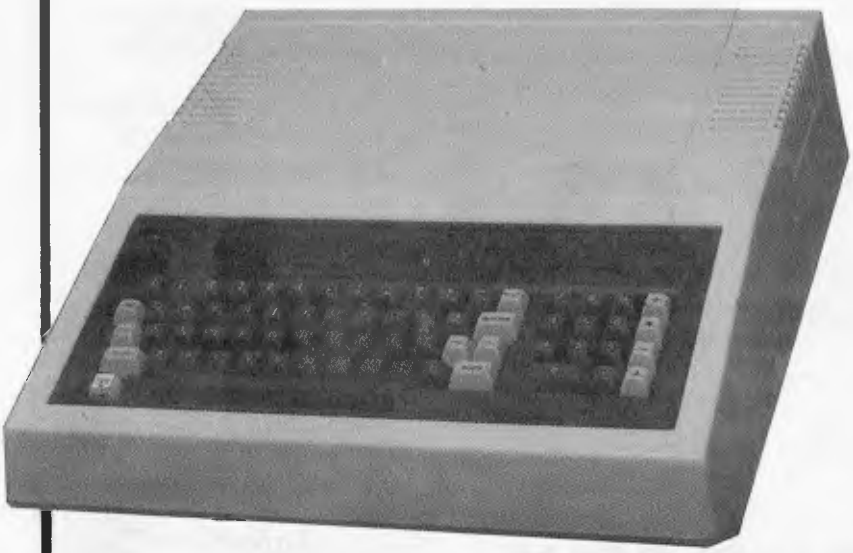

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Repunits

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 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, 3333333333333333333 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 will be awarded to the 'best' entry received by 15 June 1984. Please address all entries to Mr MR Mudge, C/- *APC*, 77 Glenhuntly Road, Elwood, Victoria 3184.

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

The Persistence of an Integer Review — December 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 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.

Alan used Basic on his Sharp 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.

YANKEE DOODLES

David Ahl is an eminent figure in microcomputing. In 1974 he founded one of the leading US micro magazines, 'Creative Computing'. He has worked for AT&T and Digital Equipment and has written extensively about micros, especially regarding their use in education.

Random rumours

As a result of a shortfall in sales of the Adam, Coleco has laid off 50 of its headquarters staff . . . Tandy has introduced a disk drive and video interface for its Model 100 notebook portable computer: not mentioned is the fact that the disk has sequential access (like a cassette tape) rather than random access (like a standard floppy disk) . . . Mattel has left the electronics business completely with the sale of marketing rights to its game system to Intellivision Inc . . . Victor Computer, maker of the Sirius 1, filed for protection from creditors under Chapter 11 of the federal bankruptcy laws.

★★★★★★★★

Amiga to use 68000

Amiga has been most secretive about its Lorraine home computer. Although it had a huge stand at the Consumer Electronics Show last year, the computer was hidden in a closet and shown only to selected customers.

Amiga has now disclosed that the machine will use the 16-bit 68000 microprocessor (the same as in the Apple Lisa and Macintosh) and will include 128k of RAM and a 320k disk drive. With a projected retail price of US$600-$700, the Lorraine will be the least expensive 68000-based machine on the market. It is claimed to have optional IBM PC compatibility, making it even more attractive.

Amiga currently markets joysticks, a foot control platform and video games for home computers and Atari game systems, but it expects the computer to be its major product in 1984.

★★★★★★★★

Cool reception for IBM PC Junior

When it was announced last fall, the IBM PC Junior had the entire industry talking about IBM's impending dominance of the home market. But it hasn't come to pass.

Everyone admits the PC Junior is reliable and, with expanded memory, is able to run most IBM PC software, but that's about the end of the praise. The major minus appears to be the keyboard. Many users complain that the little rectangular keys are too far apart for touch typing and that the labels above the keys are difficult to read. Others feel that it's far too expensive for a home computer but not powerful enough for most business applications.

Still, most dealers say they are waiting to see how it fares in the months ahead, particularly against the Apple IIe, a well-established product at about the same price. Many people feel that for the money, the Apple offers a great deal more, both in the hardware as well as third party software and peripherals. Portable and expanded versions of the Apple expected later this year will add even more to its appeal.

Nevertheless, the PC Junior has three invaluable assets: the letters I, B and M.

★★★★★★★★

Timex abandons computer market

Timex, Sinclair's US partner, recently quit the computer market. The privately held firm disclosed that it had over $100 million of losses in 1983 and, anticipating further price erosion and margin decay, decided to get out altogether.

Many observers fault Timex for not introducing the Model 1000 (equivalent to a 2k ZX81) for nine months after it was available in the UK. Also, Timex redesigned the Spectrum slightly, called it the Model 2068, and again delayed its introduction by nearly a year. Moreover, the redesign made it unable to run Spectrum software, making the machine less attractive because of the substantially reduced availability of third party software.

The exit of Timex is believed to open the way for Sinclair to re-enter the US market if it chooses to do so. An informal poll among readers of *SYNC* magazine (the major Sinclair magazine in the US) indicates strong support for the re-entry of Sinclair.

Ironically Timex plans to continue manufacturing computers for Sinclair in Scotland under an OEM agreement even though, for cost advantages, Timex was making the 2068 in Korea.

★★★★★★★★

Computers coming home

An 'Intent To Buy' survey was recently conducted among households representative of the US population. In future spending plans, telephones are at the top of the list, perhaps a natural outcome after the recent anti-trust breakup of the Bell Telephone System.

Personal computers are in the spending plans of 9% of all households; this represents a 17% increase from the previous quarter. Moreover, peripherals and software ranked high in consumer spending plans: packaged software was listed by 7.7% of all households, printers 5.8%, blank disks 4.5%, disk drives 3.6%, additional memory 2.5%, monitors 2.2% and modems 2.1%.

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YANKEE DOODLES

February 1984. For many vendors and visitors, it will be their last.

On the final day of the show, the *Softcon Show Daily* reported: 'After a slow start, Softcon got rolling yesterday with attendance figures comfortably above management forecasts'. If that were true, the management forecasts must have been revised downward several times. Last October the show organisers forecast attendance over 25,000; by January the figure had shrunk to 10,000.

Although members of the press loved the show because there was plenty of time to see products and talk to software designers, the exhibitors were less enthusiastic. I spoke to many who were happy to show off their wares, but lamented that their audience was largely other exhibitors and magazine representatives. Although some thought they would give the show another try (after all, Comdex took several years to really get going), many felt it was a waste of time and money, and indicated they wouldn't be back.

★ ★ ★ ★ ★ ★ ★ ★

Bookstores increase software sales

Walk into any bookstore in a major US metropolitan area and you are greeted with shelves and tables of computer books. At a New York B Dalton store (one of the largest US bookstore chains) the front tables, previously reserved for best-selling novels and seasonal books, are now devoted to computer titles. Moreover, many of these books include a disk of software.

Prentice-Hall is now distributing a series of books, *'The Power of:'*, produced by Management Information Source. Each of these $28.95 books focuses on a subject such as Multiplan, Lotus 1-2-3 or financial calculations with VisiCalc and includes a disk of software. Prentice-Hall is the first major publisher to distribute such books, but many smaller publishers have one or more titles available.

The bookstores are not totally committed to the software market yet. They complain that much software comes wrapped in packages that cannot be opened so customers cannot browse through the text material. Ronald Jaffe, software marketing manager for the Waldenbooks chain says: 'We need software that can sell itself, similar to books.' And a spokesman for B Dalton agrees that the software industry still doesn't have the kind of packaging preferred by bookstores.

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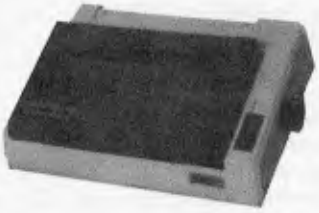

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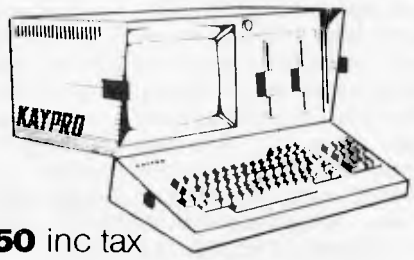

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BENCHTEST

Canon X-07

The rapid growth of the portable micro market has precipitated a move towards increasingly smaller machines, but at what cost to computing power? Peter Jones looks at the Canon X-07, which boasts some very innovative features...

In the spring of 1983, at the Hannover Messe (the enormous trade fair held in Northern Germany every year), Canon Incorporated demonstrated, next to its AS 100 desktop computer, its brand new portable computer, the X-07. As happens so often in this industry, it has taken from then till now for this machine to reach the European market in any quantity. To paraphrase Harold Wilson, a week is a long time in the computer business, and a machine which eight months ago looked attractive, with some interesting and novel ideas incorporated, now looks much more ordinary. That said, the X-07 is still a machine which should find a place in the portable market, given what it offers for the price.

It is certainly an attractive machine to look at, with its silver and black body contrasting nicely with the white keys and their black symbols. With the dimensions of a thickish paperback book, the machine is possibly the smallest portable on the market. It comes in a sturdy, silver-coloured plastic carrying case which hinges open to allow operation and has cut-outs at the sides to give access to the various interfaces provided on the computer. The keyboard (Qwerty) is not full-size, nor are the individual keys, but it has a nice feel (albeit calculator-style). It does not, however, permit efficient touch-typing. I think that a slightly larger computer to make room for a proper keyboard, along the lines of the Epson HX-20 or the NEC PC-8201A, would have been a better choice.

However, its small size does mean that it can be slipped easily into a suit pocket or tucked away in the corner of a briefcase, so it should appeal to the travelling businessman wanting instant computing facilities.

Hardware

The machine measures 200mm x 130mm x 26.5mm and weighs only 480g without the four AA penlight batteries. On the left hand side is a serial interface, the back has a volume control and an expansion interface, and on the right hand side is a parallel port, a contrast control for the LCD screen, an AC adaptor socket and a cassette plug. Underneath there are three covered compartments: one to hold the four batteries; one to give access to the socket which receives the 8k extension RAM chip, and the third to hold the memory cards (of which more later).

A four line by twenty character LCD screen is mounted in the top left hand corner. Next to this is the grille for the tiny piezoelectric speaker and then what looks at first sight to be a stylised flower logo but on closer examination proves to be a square white function key surrounded by the up, down, left, right cursor control keys. Then there are five blue function keys mounted under the screen and labelled F1 to F5; to the side of these are four white keys marked respectively INS(insert), DEL(delete), HOME/CLR (home cursor, clear screen) and OFF; and finally an orange coloured ON/BREAK key. Underneath this line of keys is the keyboard proper, in almost standard Qwerty layout. There is only one SHIFT key, which has been placed below the keyboard to the left of the relatively small space bar; two extra keys have been placed between the SHIFT key and the space bar — NUM(numeric keypad) and GRPH(graphic characters); and lastly, to the extreme right of the space bar is the RETURN key, white on blue.

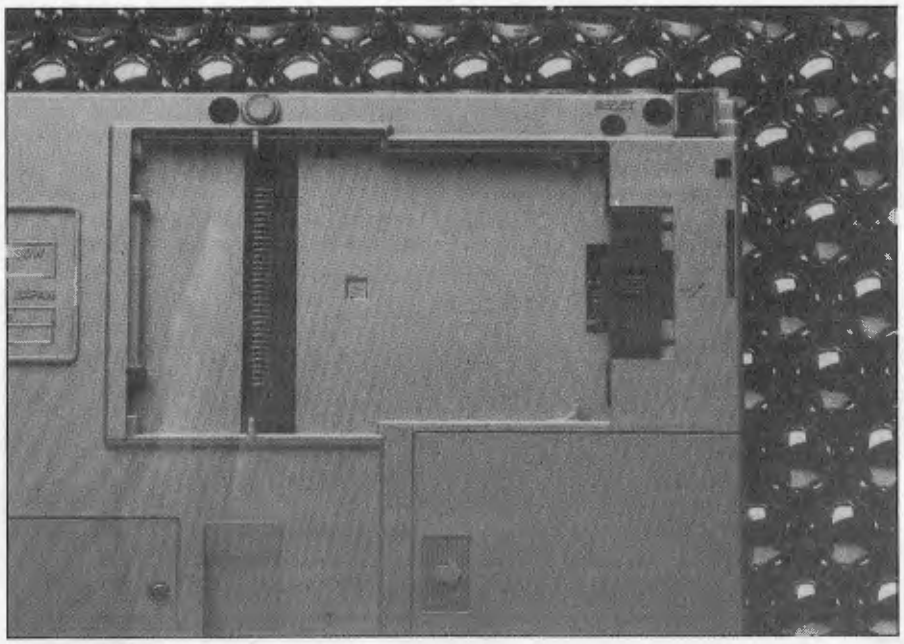
The basic machine comes with 8k of RAM, but the Basic steals some of this, so that when you switch it on you are told that you have 6761 bytes free. The RAM can be expanded to a maximum of 24k. Since all the RAM is battery-backed CMOS, whatever is in the memory is retained when the machine is switched off. The processor is the NSC800, the CMOS version of the Z80 and there is also a second processor, the T5834, a custom made CMOS chip for screen and keyboard control. The Microsoft Basic interpreter is held in 20k of ROM, and the ROM area can be increased to 42k. 12k of memory has been set aside for use by an expansion box which will, among other things, drive a full-size screen.

A tiny piezoelectric speaker has been built into the machine but, mercifully, has a volume control, so that the beep which emanates from it every time you hit a key can be turned down low or even below the threshold of hearing. The sound can also be turned off by a Basic command, CONSOLE. The LCD screen displays four lines of twenty characters which now seem rather small in comparison to the NEC PC8201A with its 40 x 8 format. Each character is formed in an eight high by six wide matrix, giving a pixel count of 120 x 32.

Graphics are also possible on the display, with each point being individually addressable. A contrast control is also provided for the screen, so that it is possible to view it from different angles, which is a useful touch on a hand-held (or lap-placed) machine. The display scrolls vertically but not horizontally. This is a shame, since a window onto a larger screen (Osborne style) would have gone some way to offset the disadvantages of the small LCD. Six function keys (with the aid of the SHIFT key) make it possible to have twelve programmable

functions available. Five of these keys are situated under the screen and the last line can be used to display the function of each key. These five keys contain default functions which can be changed. These are; PRINT TIME$, PRINT DATE$, CLOAD, CSAVE, LOCATE(X-Y cursor control), PRINT, LIST, SLEEP (turns the machine off but retains contents of screen), RUN and CONT(inue). The sixth function key, in the middle of the cursor control cluster, is empty. Use of the NUM and GRPH keys extends the keys available. The NUM toggles on and off a numeric keypad. This is formed by the original 7, 8 and 9 keys plus the U, I and O keys which become 4, 5 and 6, the J, K and L keys which become 1,2 and 3, and the M key which becomes 0. I do not regard this as a facility that I would greatly miss, but perhaps there are people who have entered so much numeric data in their time that their fingers automatically stray to the right and this might be of some use to them.

The GRPH key brings into play a whole range of special characters, a generous sprinkling of the Greek alphabet, all the accented characters needed in French and German, the pound sign, the hearts,



Underneath the machine a recessed compartment allows the insertion of 'memory cards'.

clubs, diamonds and spade symbols and one or two others. To show you the character on each key, Canon has provided an overlay which I have managed to lose twice already. It seems to me that it would have been a lot simpler to have printed the graphic characters at the side of each key directly on to the body of the computer. The effect would be exactly the same and would prevent a lot of swearing on the user's part!

The ASCII codes from 128 to 255 are used for special characters and two blocks of these — 128 to 159 and 224 to 255 – can be redefined by the user with the Basic function FONT$. The block in the middle is reserved for Japanese characters.

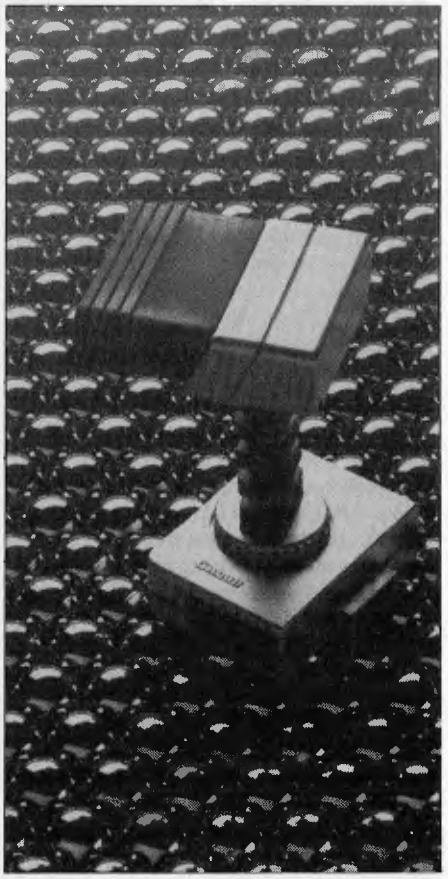
Cassette

Saving to, and loading from, cassette proved to be no problem. I was using a small Tandy model and it quite happily cooperated at the 1200 baud transfer rate used by the X-07. The volume control was set around the half-way mark, but there was a fair margin either side at which it continued to work. The standard commands CLOAD and CSAVE are used, plus a verification command, CLOAD? Given the small amount of storage (8k) available on the removable RAM cards, cassette tape must remain the best storage medium for the X-07, unless Canon intends to come out with some form of microdrive.

Memory cards

One of the innovative features of the Canon X-07 is the facility to add to, or change part of, the memory by means of a memory card. This card, which has similar dimensions to a 'credit-card' calculator, and looks like one with the display and keyboard removed, is held in a compartment underneath the X-07. The cover of the compartment has a spring-loaded latch on which is mounted a power ON/OFF switch. Only when this switch is in the OFF position is it possible to slide the latch to one side and remove the cover. The card is then simply placed in the recess, connector side down, the cover replaced and the power switch set to ON. There are four different types of cards available: 4k and 8k CMOS RAM cards, each containing a lithium battery for back-up when the card is removed from the computer; 8k ROM cards; and 8k ROM/4k CMOS RAM cards, also lithium battery-backed. The ROM and ROM/RAM cards are used to provide pre-written programs and applications.

It is possible to set aside part of the RAM of the X-07 to hold files. Logically enough, this is called a RAM FILE area in the manual. Using the Basic command FSET, parameter, one can reserve any amount of RAM to this purpose up to the total RAM available less 87 bytes. This area is always taken from the top of RAM downwards. A 4k or 8k RAM card will always sit on top of the built-in RAM, and be contiguous with it, so the FSET command can be used to ensure that all the files you create will be held in the RAM card. For example,with a 4k RAM card in place, the command FSET 4096 will turn the card into a RAM FILE area. SAVE filename will place any program you create in the card, which can then be removed from the machine and stored safely for up to eighteen months, protected by the lithium battery-backup. Just as in CP/M, the DIR command will list all the files in the RAM FILE area. The programs can be run by typing LOAD



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Programming Unnecessary

If you want to use the X-07 without worrying about programming, install one of the optional Program Cards. A program card is a kind of memory card, but consists of ROM (Read Only Memory) which contains powerful application programs such as file management, table calculations and graph drawing. Each of these programs has been developed by Canon especially for the X-07, and all of the programs are convenient and easy-to-use.
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BENCHTEST

Possibly the smallest micro on the market, the Canon X-07 runs on four AA penlight batteries.

Technical specifications

CPU	NSC800 (CMOS Z80)
RAM	8k (expandable to 24k)
ROM	20k (expandable to 42k)
Display	Four lines of 20 characters, 32 x 120 pixels
Keyboard	68 keys, including six function keys (giving 12 functions with SHIFT key). Graphic character access via GRPH key.
External storage	RAM (interchangeable lithium battery-backed cards). Cassette (600 baud)
I/O	Centronics parallel, RS232, Cassette, Expansion
Built-in software	Microsoft Basic
Applications	File Card (Database); Table Card (Spreadsheet); and Graph Card (Graphics)
Dimensions	200mm x 130mm x 26.5mm
Weight	480g (excluding batteries)
Power supply	Four AA penlight batteries or AC adaptor.

"filename" and then RUN, or simply RUN "filename".

Peripherals

One of the features that is still unique to the X-07, as far as I know, is the capability to communicate with peripherals, or, indeed, with other X-07s, without physical connection. This is accomplished using the X-721 optical coupler, which plugs into the serial interface at the side of the X-07 and provides infra-red communication with a similarly equipped X-07 or, via a second X-721 and an RS232C level convertor (X-722), with a peripheral device, such as a printer. Transmission speed can be set between 100 and 2400 bauds and the maximum range is approximately five metres. Unfortunately, this device was not available at the time of the Benchtest, but I did see one in action at the distributors linking an X-07 to a printer and it did appear to be performing faultlessly at a distance of about three metres. (See the photos here).

Two printers are available for plugging directly to the X-07. There is a 4-colour graphic printer/plotter, with specifications remarkably similar to that of the Oric MCP-40: prints in red, green, black and blue; 114mm wide plain paper, up to eighty characters per line; X-Y plotting; a printing speed of ten characters per second; and a Centronics interface. There is also a small thermal printer which prints up to 35 characters per line at a speed of 20 characters per second onto 57mm wide paper through the serial interface.

I mentioned earlier the RS232C level converter, model X-722. This is used to provide a standard 25-pin serial interface for connection to various peripherals. It is needed since the serial output from the X-07 has only the minimum nine pins needed to conform to RS232C specifications. It also provides power to the optical coupler used at the peripheral end of an infra-red link.

Finally, there will be an expansion box principally to provide output to a full-size monitor screen, but this is not yet available.

Basic

The version of Microsoft Basic implemented on this machine lacks one or two things that I miss, like AUTO and RENUM, but it does have a screen editor, even if it is a little screen. It also has a few additions which are worth describing:

TIME$** and **DATE$. These take advantage of the built-in clock.

START$. This is an auto-start string, and is best demonstrated by giving an example of its use. By putting the commands RUN and RETURN in the START$ and then turning the machine off not with the normal OFF button but with an OFF1 command, any program left in the text area of RAM will be run

whenever the machine is turned on. This function can be suspended with the OFF2 command.

ALM$. This is an alarm which can be set for the year, month, day, day of the week, hours and minutes. It will sound for one minute and functions even if the computer is switched off. It is set by one of the parameters of the CONSOLE command.

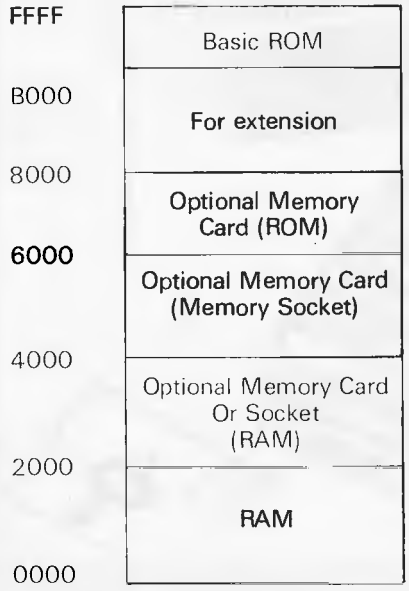
SCREEN (X,Y). This returns the ASCII code of the character located at the position indicated by the X, Y parameters.

STICK. This returns the status of the cursor keys. 0 will be returned if nothing is depressed, 1 if the UP key is depressed and 2 if the UP key and the RIGHT key are depressed simultaneously, 3 if the RIGHT is depressed and so on around the clock up to a value of 8.

LOCATE. This positions the cursor at one of the eighty character positions on the screen.

CONSOLE. This has several parameters allowing you to: set the line at which you wish scrolling to start and the number of lines you want to scroll; display the labels of the function keys below the keyboard; activate or silence the beep which accompanies a key press; and activate or cancel the key auto-repeat.

Memory map



CONSOLE@. This has parameters to turn the alarm on and off and to set the keyboard to the normal alphanumeric mode, Kana mode (Japanese characters), graphic mode or ten-key mode.

STRIG. This is an unusual one. It returns the status of the space bar and function key 6 (the one in the middle of the cursor control cluster). A = STRIG(0) will put -1 in A if the space bar is depressed, 0 if not. A = STRIG(1) works similarly for function key 6. I assume it is to be used in conjunction with STICK for games programs.

Finally, there are several graphic commands and one sound command:

CIRCLE. That's right, it draws a circle.

LINE. You've got it!

PSET. Puts a dot at a specified X-Y coordinate.

PRESET. Erases same.

POINT. Checks for a dot.

BEEP. This is the sound command. It has only two parameters, tone and duration and covers four octaves. Despite its single-note limitations and restricted range, my wife had a lot of fun entering and running a program from the manual which turned part of the computer keyboard into a piano keyboard.

As the Benchmarks show, the Canon version of Microsoft Basic is not particularly sparkling, being considerably slower than the Hewlett Packard HP-75C, the Epson HX-20 and the Tandy Model 100, and being positively put to shame by the results obtained by David Tebbutt with the NEC PC-8201A.

This is even more surprising when one considers that the clock rate of the X-07 is 3.84MHz. This is, I feel, a serious drawback to this machine, since the type of customer who is prepared to pay out the money to have computing capacity at his/her fingertips is also likely to be the person who wants quick results from said computer, and a Basic this slow is not going to give it.

Documentation

The documentation takes up more room than the box in which the computer was delivered. There are three glossy-covered A5-size manuals: *Programming for Beginners, User's Guide* and *Basic Reference Manual*. There is also a 16-page folding card for quick reference to the Basic commands and functions. *Programming For Beginners* contains 210 or so pages, clearly laid out in two colour (light blue and black) text, diagrams and "amusing" sketches. Chapter one explains what a program is, encourages the use of flowcharts, gives a few tips on writing efficient programs, and shows how to save in the RAM file area and on cassette. Chapter two runs through *basic* Basic. Chapter three describes several practical programs to consolidate what was learned in Chapter two, while Chapter four contains programs which demonstrate the different features of the X-07: sound; graphics; colour printer; optical coupler, and so on. Chapter five is dedicated to a games program of interplanetary commerce called, appropriately enough, "Space Trader". It provides a listing of the complete program and also explains in detail how the program works.

The manual is clearly written, in good, if not absolutely perfect English, and is much better than some Japanese-written "English" manuals I have read.

The User's Guide, which is the thinnest offering at 136 pages, starts with the unpacking of the machine and then goes on to explain its functions. It also contains details on the internal workings of the Basic, listing things such as the addresses for each pointer and the pattern and format of the variable area. At the very back of the manual can be found all the interface specifications, which include the pinouts for the serial, parallel, cassette and expansion interfaces.

The Basic Reference Manual, 180-odd pages long, is fairly standard issue, with a couple of chapters dedicated to

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the "grammar" of Basic, then a description of the commands in alphabetical order, followed by the functions. A useful index, which groups instructions and functions under headings such as "Graphic Instructions", "Variable Related Instructions" and "File Related Instructions" is also included.

Overall, I think that the documentation is more than adequate and a welcome relief to someone who has suffered the rigours of CP/M manuals.

Applications software

Applications software for the X-07 falls into two categories — software in the form of cassettes, and firmware in the form of memory cards.

Three plug-in cards are currently available. The first is called the Table Card, and is a sort of call-at-a-time spreadsheet, allowing the user to specify rows and columns and to perform calculations between columns with cross totals. The tables are best displayed on the X-07 printer.

The File Card is a small data file management system providing a built-in address book, as well as customised data files. Data files may have up to nine fields, and can be sorted, searched, maintained and printed.

Graphics are provided via the Graph Card. This software cannot read data from other software products, and so the user is required to enter his data by hand. This should not be too great a task, as the package only supports twelve records of eight fields. Up to five files may exist at one time. The data files may be listed to the printer in detail, or may be plotted in one of two sizes. Five graph types are provided: two bars, two lines and also pie charts. The graphs may only be printed on the X-7104 four colour printer.

A locally developed six-pack of business applications is available. These programs are written in Basic and require the presence of the memory expansion module.

The mini general ledger program is certainly nothing to write home about. It allows you to create new accounts and alter old accounts, where an account consists of an account number, name and amount. This data can then be sorted and displayed (with a total!) for a selected contiguous range of accounts. The data can also be loaded and saved to tape.

The general finance calculations are considerably more useful, providing quite good coverage of compound interest, compound annuity, lease payments, hire purchase, interest actual, days between dates, savings analysis, amortization and reducing balance depreciation. Unlike the general ledger, it is quite easy to imagine this program being of use to the small business manager or householder.

A cash flow analysis program is also provided, allowing up to 20 items. The user may enter/edit his data, print it out and also add it up. The data can even be saved to tape, thereby providing even greater time savings to the busy executive. The work scheduling program is actually just a filing system which holds information about projects. There is no breakdown of a project into tasks – it is simply one record per project. It does, however, contain a well-used date field and so could be invaluable for remembering elusive birthdays.

The inventory control system can handle up to 50 stock items, and includes item descriptions, item values and reorder levels. The stock is initially defined and then day to day in-comings and outgoings are registered. The program can then display any items in need of ordering, can calculate total stock value, and can search for items based on various criteria.

Finally, the instant invoicing program allows you to immediately print invoices. The user is provided with the ability to edit and reprint the invoice, if required. Daily statistics are collected and may be printed in summary form.

Conclusions

I enjoyed using the machine, and particularly appreciated its portability. However, this portability is severely restricted by the life of the four AA batteries, which only allow about eight hours of operation. (With the machine switched off, they provide a back-up capability for the CMOS RAM of about one thousand hours.) An AC adaptor is available, but then the machine is no longer truly portable.

The RAM cards are a good idea, but their limited capacity prevent them from being a viable alternative to other storage media — that is, tapes and disks.

The infra-red communication capability is also a good idea, but its usefulness would seem to be limited to a medium-size office where you need to switch frequently between two different printers — say, a daisywheel and a dot-matrix, otherwise a cable would do just as well. The size of the machine makes it very convenient to slip into a briefcase but prevents it from taking a full-size keyboard. This precludes its use as a word processor, which is another application that Canon is claiming for it.

Canon talks about one of the applications of the X-07 being its use as an "electronic notepad". This, I think, is the best description of it. If this idea is pushed then, with Canon's well-known name in the industry, it should sell, but will hardly set the world alight.

Benchmarks

BM1	3.9
BM2	11.5
BM3	32.0
BM4	35.8
BM5	38.1
BM6	58.3
BM7	78.9
BM8	379.6

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

Prices (including sales tax)

Canon X-07 hand-held computer (8k)	$ 35
8k memory expansion (CMOS RAM)	10
4k memory card (CMOS RAM)	5
8k memory card (CMOS RAM)	10
X-721 optical coupler (infra-red)	7
X-722 RS232C level convertor	8
X-7104-colour graphic printer	28
X-711 thermal printer	15
XP-110 File card	8
XP-120 Table card	8
XP-130 Graph card	8

END

OPERATING SYSTEMS

What exactly is a micro's operating system, and how does it function? What should you consider when choosing one? Find out in the first of our three-part series on them.

The choice of operating system can be one of the most crucial decisions ever made by a microcomputer user. The selection can influence all areas of the computers use, including the range of available software, future growth and operator satisfaction.

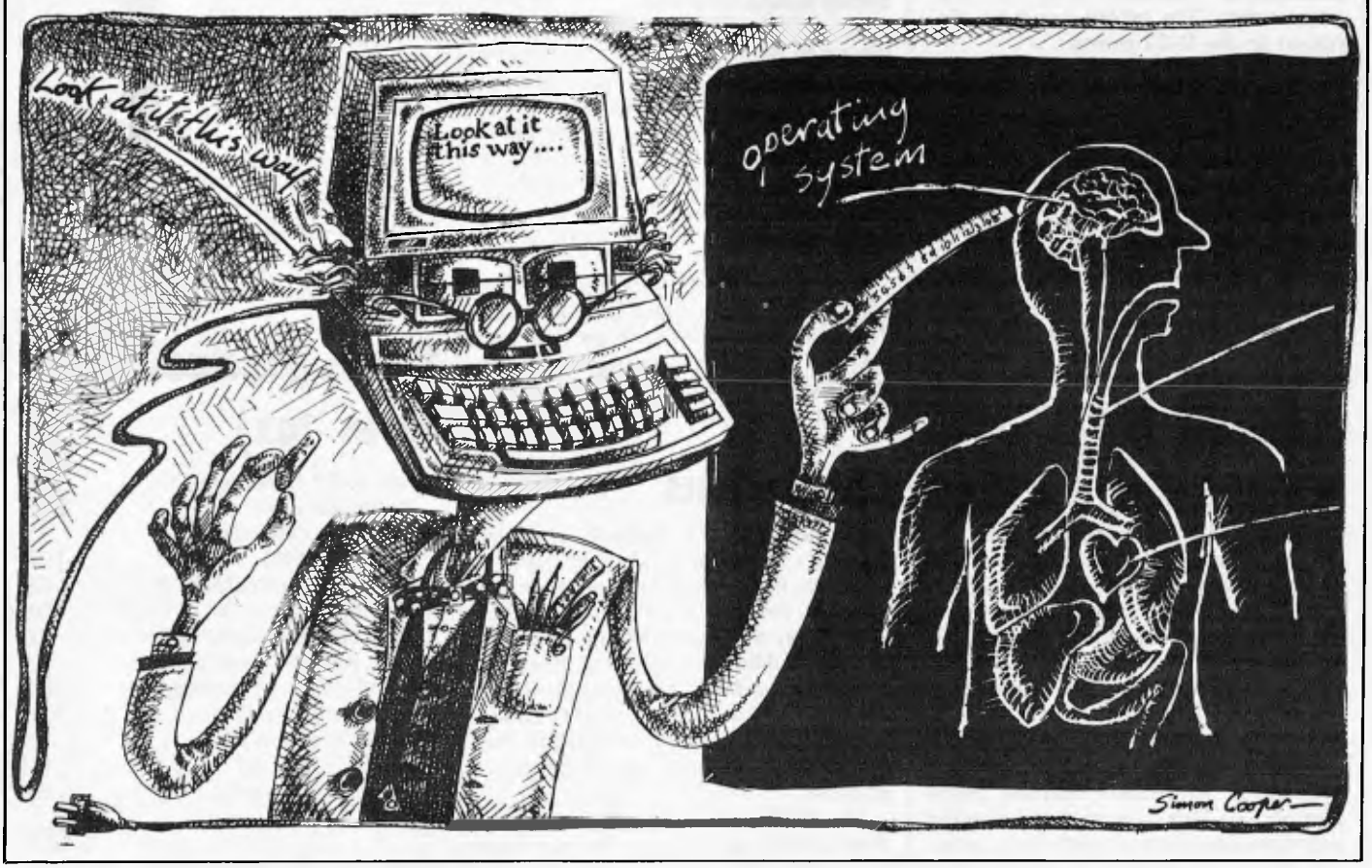
This is the first of a three part series dealing with operating systems, and will cover the general topics of 'what is an operating system?', 'what does it do?' and the criteria by which they can be judged (the second will concentrate on the specific operating systems available, comparing their features and facilities, and the last article will consist, in the main, of tables and charts concentrating on the exact command syntax used by each operating system).

An operating system to a computer is analogous to subconscious of the human brain: it takes care of the minute, but boring and repetitive detail required for living and allows the thinking brain to concentrate on more global issues(!). To achieve what we consider a simple task, such as running, hundreds of muscles have to be contracted and relaxed in coordinated action, the balance has to be maintained, the heart rate speeded up and energy released from storage. However, to actually run, the only message we send is 'RUN', and off we go — we do not have to say to the heart, for example, 'speed up a bit, I am now running'. To this extent the system can be said to be automated.

The other role of the human operating system is constant monitoring to maintain the status quo. All incoming stimuli are being assessed, and appropriate action taken without any conscious intervention. An example would be the initiation of sweating should the temperature rise. Computer operating systems, just like the brain, have these two functions: the monitoring section controls the reception, and treatment of characters from the keyboard and handles the interface between the screen and printer.

The automating section enables complex series of actions to be executed on receipt of a short simple command. The first section (just like temperature control) is invisible to the user, the second takes care of all the minutia involved in a command, such as erase a named file. In CP/M this would be ERA FILENAME — however, in the background, hidden from the user, the operating system controls the starting of the disk drive, moving the read and write head, reading the directory, finding the file, removing it and finally stopping the drive.

The commands available tend to concentrate on the management of the disk facility. A basic range of commands will allow a user to list, erase, copy, and rename files and format (initialise) a disk ready for data. Complex systems build on these by adding more facilities such as access control to files (password, ready only, list protection, and so on), and user control over the devices used for input and output of data. In addition, real time date and time stamping is usually incorporated into the directories, and help facilities are provided.



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The biggest divisions between groups of operating systems are those of single user, multi-tasking and multi-user. The single and multi-user have been with us for some time and are self explanatory; however, recently, the combination of a single user/multi-tasking machine, using operating systems such as Concurrent CP/M (CCP/M), have appeared. These are capable of running a number of tasks on the same system with only one VDU.

The simple single-user operating system can operate well with few complexities, there is no real need for password protection of files nor the sharing of CPU and other resources. Neither is there any need to protect data from simultaneous access by two or more users — file and record locking; therefore the systems are quite small in terms of memory and disk utilisation, and fairly easy to use.

This situation changes dramatically when one moves from single to multi-user. The level of administration required to control an active system with a large number of users (some possible in different locations) is many orders of magnitude more complex than a single user system. This complexity is reflected both in the size of storage the system will require and involved methods of operation.

There is a wide variety of operating systems on the market, some machines only support one, some a number (the highest we have seen is eight) the big question is 'which one do I choose?'. You may think that the best option is to go for a machine with as many as possible, to keep all of your options open.

However, in reality, it is very unlikely that more than one operating system would be used in a working environment on any machine. The reason for this is that the data files are not usually transportable between operating systems, and the range of commands that you would be required to use would make life very complex indeed.

Therefore the user is faced with an important decision: which is the right operating system for them? The 'right' one is a very personal thing, as there is no 'perfect' and 'no best'; it is a case of the most suitable option for a specific situation. The requirements of a single individual with a desktop machine, only running off-the-shelf packages, is very different to a multi-user system at a software house. One would expect each to go for a very different system — and indeed they do.

Multi/single user

The biggest division across the board is that between single and multi-user and the split is far more pervasive than most people realise. Naturally some operating systems are multi-user and some single, but in addition certain languages, such as MBasic, are only designed for single user applications, and the same can be true for application packages. Languages and packages designed for multi-user have code within them to handle file and record locking — without this they either crash, or worse still, corrupt data.

If you have need for a multi-user system then the next question must be 'how many terminals?'. All systems have some top limit, so do make sure that you are unlikely to exceed this. Once you have made your decision, at this stage you can proceed to the rest of the criteria. The single user will still have all options open, but the multi-user will have a small short list of operating systems, which will restrict the next three 'range' sections dramatically.

Range of applications

The more popular operating systems have tended to have a snowball effect, resulting in vast amounts of software: a reasonable range of software ensures machines are bought to run it, many more machines are then in use with that particular operating system and therefore, more software is written to complicate them. The reverse can also happen, killing a new operating system before it even gets off the ground — little software means no hardware sales and if these is no hardware to use it, then there is no point in writing the software.

Therefore, in your selection you must first look at your main application, and ensure that what you require is indeed present; but in addition, make sure that a range of ancilliary packages you may need, now and in the future, is available. It is also good to have a choice — CP/M, for example, there are over 40 word-processing packages, in some systems there is only one. However, do not be misled by numbers alone; it may well be, in some cases, quantity and not quality.

Range of languages

Software houses and those developing systems for internal use will be very interested in the languages available. All languages are not present on all operating systems, and some have only one or two: UCSD P, for example, has only Pascal and Fortran, so if your programming staff are all Cobol trained then you will have to consider whether the switch is worth the great cost of re-training in another language.

However, a software house has other considerations: to gain maximum return from the investment, the language used must be available on as many operating systems as possible. The package user will probably not require a super-powerful compiled language, but may in the future like to try their hand at Basic, so it would be wise to check the availability (and price) of a simple language.

Range of utilities

The developer must also look at the availability of tools and utilities to make the task easier. These may consist of just the basic editors and de-buggers or extend to sophisticated display managers, report generators, ISAM (index sequential access method) file handlers, menu managers and, recently, graphics sub-systems (GSX). The package users need not concern themselves at all with these facilities.

Facilities

These will be covered in great detail in the next two articles, so we will only gloss over them at this point. The package user will require few facilities, and indeed a well written application package system should insulate the user (if at all possible) to such an extent, by catering for all their needs, that they need never have to see the 'raw' nature of the underlying operating system. There will be a trade off between numbers of facilities and the size and complexity of the system.

One thing to watch out for though, is the memory utilisation. Complex and sophisticated operating systems require large amounts of both RAM and disk space. A full Unix system, for example, can use up to 5Mb of disk space and to get a CCP/M system functioning realistically at least 256k of RAM is needed. In addition to the general facilities, one should also look at the system limitations. In particular, the largest file the system can handle, the maximum number of disks, terminals and printers.

Ease of use, and documentation

The ease of use of *all* operating systems if often criticised. Areas highlighted for particular complaint are the cryptic error messages, poor error handling and lack of help levels. One of the reasons for this state of affairs is the way many of the systems have grown up, having started as hobbyist tools for small systems. The programmer will tolerate having to learn operating systems command 'shorthand' and the absence of long descriptive error messages and help levels, has been, in the past, due to the lack of memory storage.

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OPERATING SYSTEMS

However, this is all changing, with the increased use of computers in business, where cryptic commands are less acceptable, and increased storage means that some of the 'frills' (some would say essentials) can now be incorporated. Another criticism often levelled at operating systems is the quality of the accompanying documentation. In this area we are glad to say there have been great improvements made in the last few years, especially in that produced by the popular manufacturers such as Digital Research and Microsoft (it's surprising what competition can do!). The manuals should be examined in great detail, because a feature is only a feature if it is explained well enough to make use of it.

Transportability

For some people transportability may well be an important issue. The ability to run your software on a variety of machines, and perhaps from different manufacturers, can be especially important to users of many machines and those fearing over-dependence on a particular company. Operating systems such as that of the PET, Apple DOS and Tandy's TRSDOS (to name the most familiar), only run on the machine they were designed for. CP/M on the other hand runs on hundreds of computers.

Some systems such as the CP/M family tend to be CPU dependent, and a version has to be written for each process, hence, the following series: CP/M-80 for the Z80, 8088 and 8085, CP/M-86 for the 8086 and 8088, and lastly (for the moment) CP/M-68 for the 68000. ASCII files (primarily data) are naturally transportable across such a series; however one cannot guarantee that this will be possible across operating systems. Some do have this facility though, MSDOS's READCPM, for example.

Future growth

So what about the future? The systems of today that prove successful will have software produced for them for many years to come, and when the time comes to upgrade, it will be a simple route. However, it will be a very different situation for those that fall by the wayside. The situation is even worse with software (unless there is a very high market penetration) as soon as the new system appears, writing for the old, virtually ceases. Even with high numbers in the field new products will cease to appear for the old standard in a few years.

People that are at present looking at single-user but feel that multi-user is the next step up would be wise to opt for a system with upgrade routes. CP/M-86 will upgrade to MP/M-86, and MSDOS 2 is said to be compatible with Xenix. In many ways the future looks rather rosey for the user, with operating systems appearing which are easier to use, have more facilities, and are better documented than those of the past.

END

LAZING AROUND

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 3x3 grid shown

	C	P	S
S			
P			
C			

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

February prize puzzle

A very mediocre response to the February prize puzzle, about 50 entries only. Perhaps it was more difficult than usual.

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 Neil Cornish from le Hill. He only submitted one solu-

END

BLUDNERS

Last month we published wrong prices for Uni Co-op. The three books Super Calc Super Models, VisiCalc and CP/M Software Finder were originally marked down from $29.95 not $25.95.

Data Parts are selling the Osborne I with D/D drives, 100 column screen for $1895 not $1795. A wrong telephone number for Data Parts Ballarat Store, it should read (053) 31 3399.

Another wrong number, Microprogramming's telephone number should read 560 7664.

END

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DIGITAL RESEARCH

Of Mice and Macs

In last month's issue we Benchtested Apple's Macintosh. This month we'll take a closer look at the Mac as a system — its software, its printer and how they work together.

Hardware

To recap on last month's Benchtest, the Mac uses a 68000 main processor, 64k of ROM, a respectable 128k of RAM and feeds all this with a single hard-shelled 3½in, 400k Sony disk drive.

Its other notable feature is its "mouse" which allows you to manipulate the menus and control functions, draw shapes on the screen and just about everything else except actually enter text and data. This, you'll be pleased to hear, is left to a conventional keyboard.

The Mac and Imagewriter can also be used to 'mock up' layouts for publciations.

The result of all this is displayed on a small but eminently readable monochrome screen (the one colour keeps up the resolution without gobbling up vast amounts of video RAM). Styling is another interesting Mac feature. Some have called the Mac ugly (I like it, but you can see for yourself). What may not be apparent from the illustrations are the unusual dimensions. The high-rise approach to the hardware design has left the Mac taking up little more deskspace than a telephone. It has also made the machine "luggable" if such is your want, and Apple will supply a shoulder bag for the purpose. The keyboard too is quite small.

Another interesting point is that Apple has "sealed" the Mac. Expansion options will be daisy-chained through a high-speed serial bus system and these are rumoured to include such goodies as a modem and a parallel interface.

Early last year, Apple released the Lisa. That particular computer was, and still is, horrendously expensive. At the time it was seen as an important product, not because it was likely to sell in great quantities, but because it set a certain standard in user-friendliness. Apple had thrown a gauntlet to the rest of the microcomputer industry. This, Lisa seemed to say, 'is the ease-of-use level that the public is going to require for the next generation of personal computers, let's see who can match this at an affordable price.'

There quickly followed an upsurge in mice as manufacturers realised the public thought mouse and easy-to-use software went claw in hand. Other concerns selfconsciously took different approaches. Microsoft decided that windows (where two programs coud be run concurrently in different parts of the screen with data transferred between them) represented a respectable improvement over the conventional single program approach.

While Apple's Lisa software meant applications had to be written to take advantage of the completely new operating system, other companies baulked at this rather risky 'great leap forward' and took the more cautious option of attempting to improve the personalities of those applications programs already up and running under MSDOS.

Hewlett-Packard decided it was time to dust off its old favourite, the touch-sensitive screen, for its entry into the personal computer market. (See a full Benchtest of the HP150 elsewhere in this issue). Apple, meanwhile, was busy conceiving a little brother for Lisa — Lisa-type technology at an affordable price.

Operating system

What Apple has tried to do with the Mac is improve what goes on between the user and the software, rather than what

Even detailed drawings are possible with Mac.

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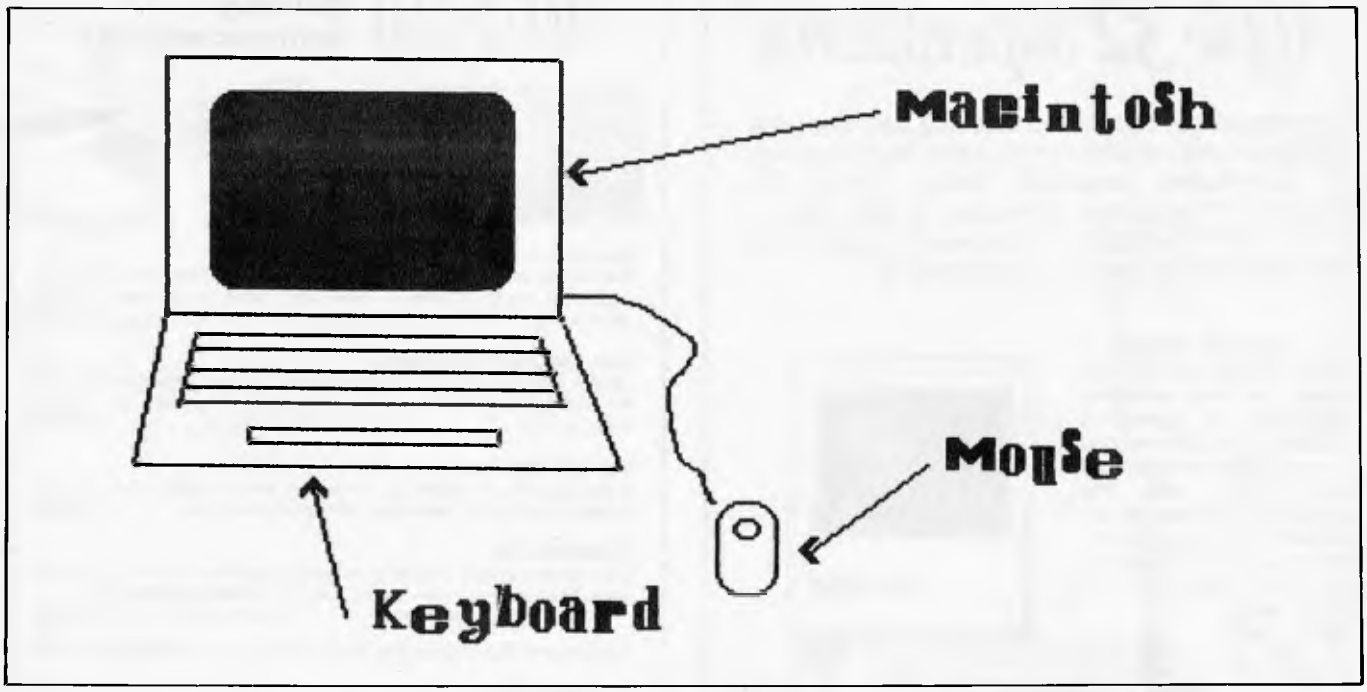


Labelled technical diagrams are easy to develop using the line-drawing and fill commands on MacPaint.

goes on between the data and the program. In many ways this is sensible. There seem to have been only four 'types' of personal micro applications programs so far invented — a word processor, a database, a spreadsheet and a graphics package. Given this it hardly seems sensible to try to invent a better mouse trap when the users seem quite satisfied with the ones they have. But cheese to go on it, well that's something else again. Apple calls its cheese 'Lisa technology'. It's basically a way of representing functions by small on-screen symbols or 'icons'. For instance, the routines necessary to rid the system of a file are generated when the user manipulates the mouse to position the cursor over a small waste bin in the corner of the screen. You push the mouse's single button and the file is zapped into the vortex.

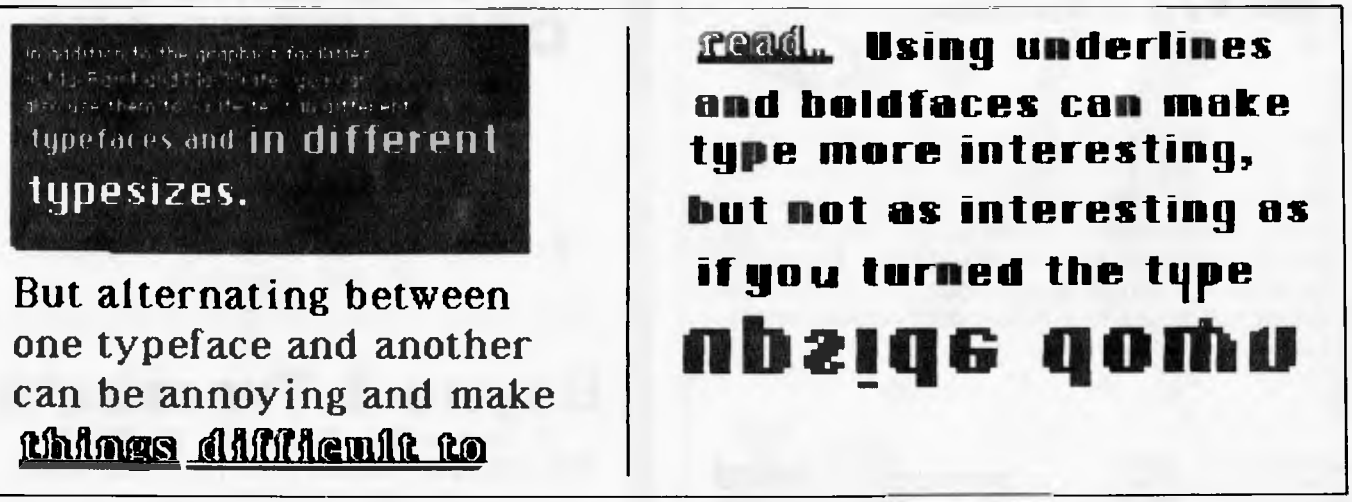
All the other functions are undertaken in a similar way. In Macwrite, the Mac's word processor, there is a collection of 'pull down' menus. You position the cursor over a word on a status line at the top of the screen, press the button and a small document unfurls over part of the text (see illustrations).

More applications software will eventually become available and it will be (comparatively) cheap. But the surprising thing about what we've seen so far is that once you get past your mouse and icons, there's not much here that hasn't been seen before. This is not to say that Macwrite and paint aren't good programs — they are, but it never fails to surprise how little actually changes. No doubt somebody will soon have Wordstar running under the Mac operating system and the Mac's chances of 'hit' status will become assured.

Given this, it may well be argued that Apple has taken an eminently sensible path. Until someone comes up with another program idea as good as Visicalc, it's either do what Apple has done or churn out endless, obscure 'ultimate' word processors and the like.

Perhaps the main disappointment with the Mac was its file handling — it is fairly conventional. Normally this wouldn't really be a criticism, but when a manufacturer starts plonking 16/32 bit chips in a personal computer you would expect this to be one of the most important areas with which to start being innovative.

Good file handling would seem even more important given the Mac's single drive. Although the drive has the



A large number of typefaces are possible within both MacPaint and MacWrite, including both bold and inverse, plus other tricks.

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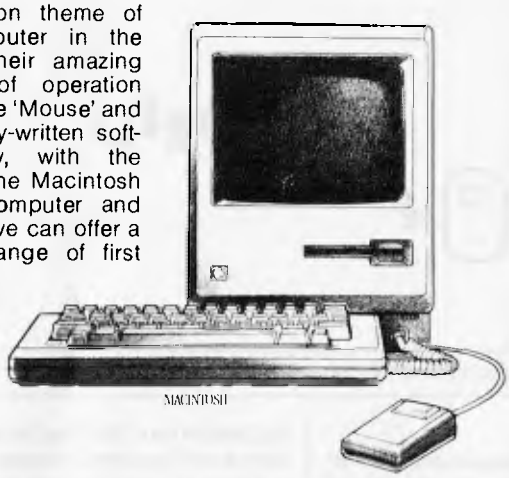

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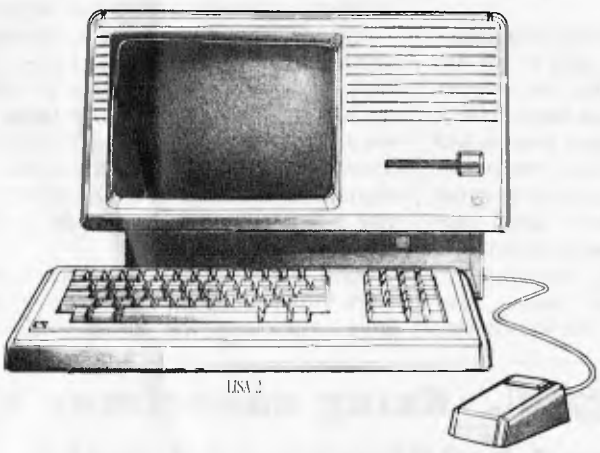

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interesting habit of automatically ejecting disks, the way the files are organised and the various system routines necessary to have lying about either on disk or in memory to do simple opening and closing jobs, make us think that most users will soon find the extra disk drive option more a necessity than a luxury.

This is unfortunate, for one of Apple's price trade-offs was the single disk route. Now it appears that it wasn't a very good trade-off after all. While Mac uses the mouse and the icons, it isn't able to do the multi-tasking which made the Lisa the darling of the executive desktop. So while it has lots of potential power it's definitely hampered by its unwieldy storage and low memory. In normal circumstances 128k RAM and 400k online would be perfectly acceptable, but the Mac's ease-of-use qualities really start and finish with the icons and mouse and this is a shame because it comes so close.

Verdict

The question is, has the Mac had its usefulness eliminated by compromises. The product must be delightfully easy to sell — if the term sexy can ever be ascribed to a collection of high technology then the Mac is probably X-rated. But while this may gladden the heart of the Apple dealer, it doesn't really do the user much good if, once the novelty wears thin the Mac is found to be simply a computer on which you can draw pretty pictures as well as do the average applications programs.

This said, priced as it is, the Mac can do many jobs admirably. Even if you include $744 for the excellent printer, and several more hundred for an extra disk drive, it is one of the most competitive products around. For word processing there is nothing to touch it and my guess is that this is what it will end up being used for most, with a little financial modelling on the side.

The Lisa front-end technology takes some getting used to for those used to the conventional "BDOS ERROR ON B" approach but there's little doubt that the machine is targeted straight at the first time buyer. As such it's a winner.

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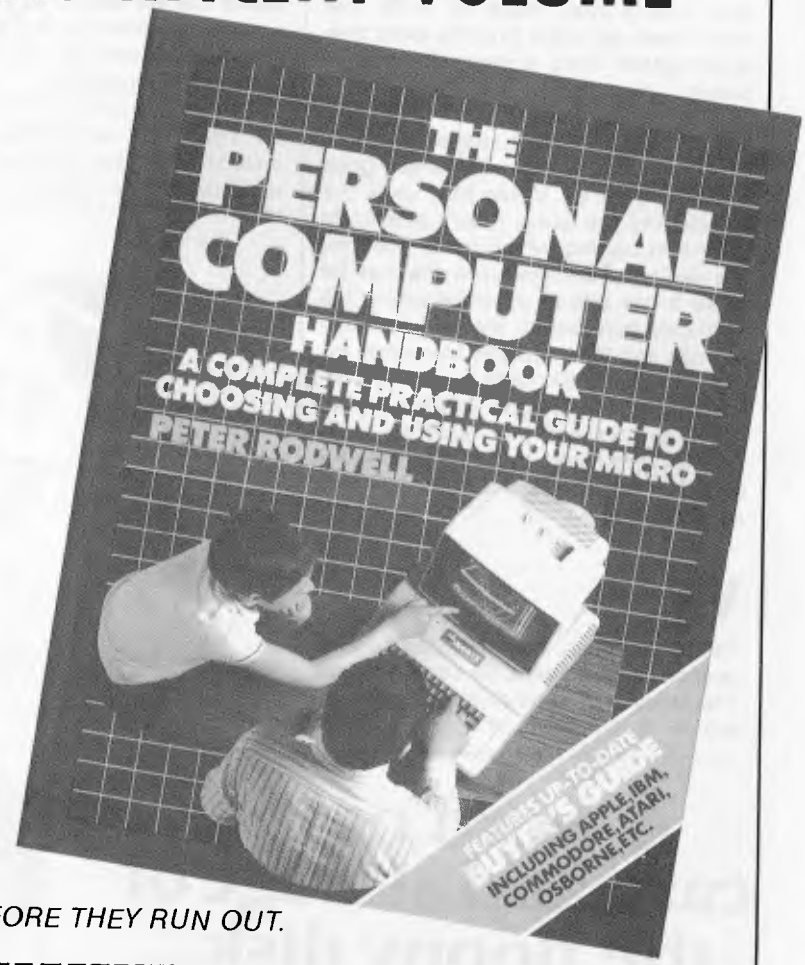

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Brother EP44

The Brother EP44 is an electronic typewriter, text editor, computer printer, calculator and serial terminal all in one. At under $400, Surya wondered whether it was all too good to be true.

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 ($349), 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 1984 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 $399.00.

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.

Print quality in either ribbon or thermal form is extremely good

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 and 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.

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

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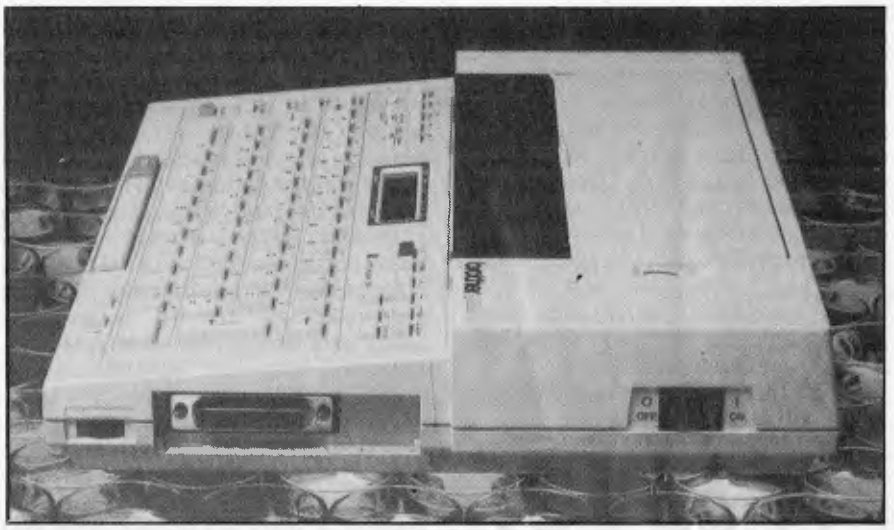
CODE-N for New text. Everything typed after this (or rather up to 4k's worth) will be stored in RAM as well as printed. When you have finished the letter, remove the printed letter, insert a fresh piece of paper and press CODE-P to Print the contents of RAM — an instant copy. You can repeat this process 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 +,—,/,X,% 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 x 0.85c per word = 2975 (the total was printed by the Brother when I pressed the equal key).



The RS232C port enables the machine to be used as a serial printer

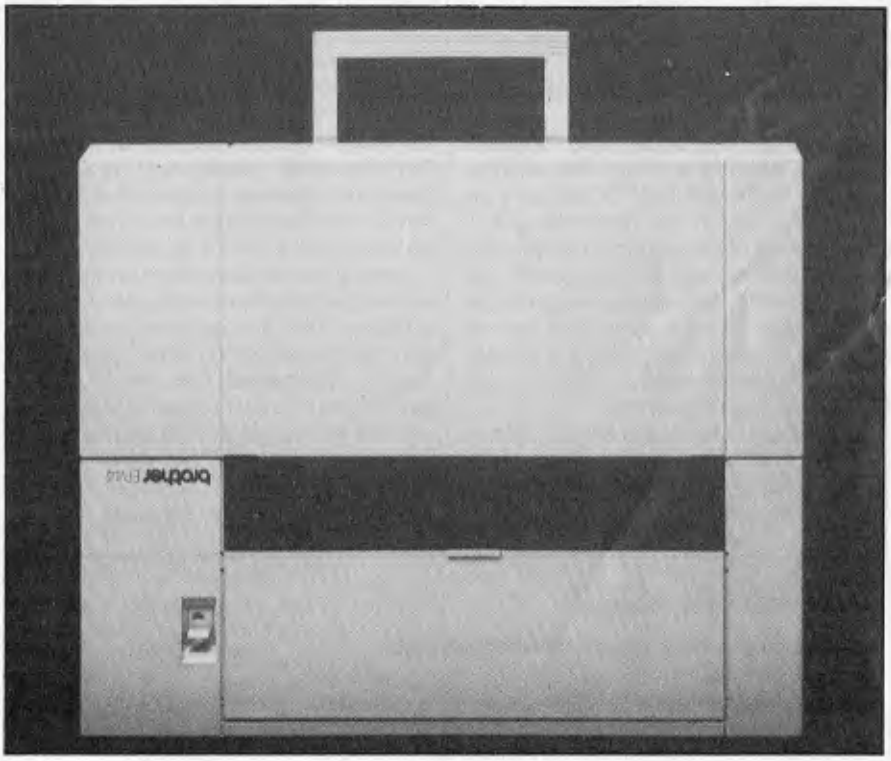
After using cursor-left to insert a dollar sign and decimal point, you then have 3500 words x 0.85c per word = $279.50. Similarly, you can type a whole column of items and prices while the 44 keeps a running total.

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.



A protective lid with carrying handle slips over the keyboard

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 cost-

ing $49.00 from a good computer dealer. Brother supplies a connecting appli-cations 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, and Sharp PC1500. 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 ($7.00 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 '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 communciations 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 $10.00 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 $7.00 per 500 sheets, or $35.00 for a box of 10 PCS. 40,000-character ribbons (box of 5 cards) cost $17.50. Thermal paper is more expensive at $7.00 per 100 sheets, $70.00 for box of 10 PCS —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 print-out, 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 hard-copy, it was workable.

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

C♦H♦E♦C♦K♦O♦U♦T

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, and was then further uploaded at the office (after editing), to a large micro 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 CBBS boards, as well as public database systems.

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 learned, 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.

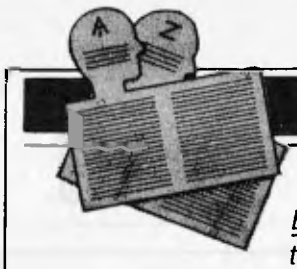
Brother has packed a lot of features into a very compact machine at an equally compact price.

Prices

Brother EP44	$399.00
Optional roll-paper holder	$10.00
40,000-character ribbon (box of 5 cards)	$17.50
100 sheets of thermal paper	$7.00
500 sheets of standard paper	$7.00
Thermal paper (box of 10 PCS)	$70.00
Standard paper (box of 10 PCS)	$35.00

Available from Norman Brothers, Coronet Copy Centre, Collings and Co. and other large department stores. Brother can be contacted on (02) 439 7344.

END



USER GROUPS INDEX

DIRECT ACCESS

Below is a list of alterations and additions to the list of user groups published in the last issue. The next full listing will appear in the September issue of APC.

NEW SOUTH WALES

SOUTHERN DISTRICTS
COMMODORE
USERS GROUP
A new listing for Commodore users. The group meets on the 1st and 3rd Wednesday of every month and is also interested in exchanging ideas and programs with other clubs.

For further details contact A Toms (President), 3 Lucille Crescent, Casula 2170.

SYDNEY MICROBEE
USERS GROUP
Meetings are held on the 3rd Saturday of each month at the McMahons Point Community Centre, Blues Point Road, North Sydney from 1pm to 5pm, and the 1st Tuesday of each month at the Auburn Girls High School, Braemar Street, Auburn from 7pm to 9pm. Membership costs are $24.00 per annum. The group has one of the largest libraries of MicroBee public domain programs.

For further details contact Colin Tringham, President/ Editor, S.M.U.G., P.O. Box C233, Clarence Street, Sydney 2000.

VICTORIA

NEC PORTABLE
USERS GROUP
A new group for users of the NEC 8201A portable computer. Meetings are held on the 2nd Wednesday of the month at Myers Computer Centre, Lonsdale Street at 7.30pm. The group hopes to cater for all levels of interest from raw beginner to business user to advanced hardware and software buff.

Further information may be obtained from the club's President, D Green on (03) 611 3380 (Business Hours) or the Secretary, M Truman on (03) 605 4509 (Business Hours).

OTRONA ATTACHE
USERS GROUP
For further details contact the Australian Chairman, David Broadbent. Telephone (03) 528 2792.

SPECTRAVIDEO
USERS GROUP
Meetings for the new Spectravideo Users Group are to be arranged.

For further information contact Mitch Raitt, Fernhill, Tindals Road, Warrandyte 3113.

TASMANIA

TASBEEB
BBC Users Group has recently been formed. Monthly meetings are scheduled for the 1st Monday of each month and are held at the Elizabeth Matriculation College in D Block (entrance off Warwick Street), Hobart, commencing at 8pm.

Enquiries for membership can be directed to John M Hannon, P.O. Box 25, North Hobart, Tasmania 7000. Telephone: (002) 342 704.

NEW ZEALAND

NELSON COMMODORE
USERS GROUP
Formerly known as Nelson VIC Users Group. The group accepts 'out-of-town' members, and are keen to hear from other similar groups.

For further details contact Peter J Archer, Group Co-ordinator, P.O. Box 860, Nelson, New Zealand. Telephone (054) 79362.

BENCHMARKS

A list of of Benchmarks used when evaluating micros is given below. An explanation can be found in the February '84. 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
```

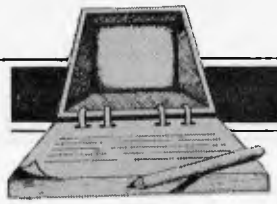
```
100 REM Benchmark 4
110 PRINT "S"
120 K=0
130 K=K+1
140 A=K/2*3+4-5
150 K<1000 THEN 130
160 PRINT "E"
170 END
```

```
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 GOSUB220
170 FORL=1 TO 5
180 NEXTL
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 NEXTL
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 travel arrangements to avoid wasted journeys due to cancellations, printer's errors, etc.

Sydney	Data '84 Contact: Graphic Directions (02) 212 4199	May 22-24, 1984
Perth	International Microcomputer Conference and Exhibition Contact: (09) 325 4427	May 22-24, 1984
Perth	Microcomputer Exhibition Contact: Jenna Ledgerwood (09) 325 0111	May 22-25, 1984
Hong Kong	Percom '84 Contact: Adsale Exhibition Services. Tel: (Hong Kong) 5-892 0511	June 19-22, 1984
Las Vegas, USA	NCC '84 Contact: USA (703) 558 3612	July 9-12, 1984
Melbourne	3rd Australian Personal Computer Show Contact: Australian Exhibition Services. Tel: (03) 267 4500	July 18-21, 1984

NETWORK NEWS

Steve Withers and Peter Tootill give their summary of what's happening in the telephone networking world.

Once again we have news of more systems that have been set up overseas (including one in New Zealand), plus a contributed item about the AMUG BBS we briefly mentioned last month. But first of all, you should take note of a deletion from our list of numbers. It seems that TARDIS RCPM system was never intended for public use — it was set up as a means of distributing software within Telecom.

Overseas Bulletin Boards

New or altered entries notified this month are:

New Zealand

NZ Micro Club RBBS, 24 hours daily, telephone: 0011 64 9 762 309.

United Kingdom

BASUG, now 24 hours daily on 0011 44 742 66 79 83.
Computer Answers BBS, 24 hours daily, telephone: 0011 44 631 3076.
CBBS-Surrey, 24 hours daily, telephone: 0011 44 4862 25174.
Forum-80 Milton Keynes has closed.
CBBS-North East has closed.

Germany

Hamburg University Mailbox, (times unknown), telephone 0011 49 40 4123 3098.

Australian systems

Adelaide BBS

Richard Newcombe took the trouble to provide us with details of the Adelaide Micro User Group's system, and we are pleased to publish his contribution in full.

"As with most clubs our group has been contemplating developing a bulletin board service for some very considerable time but more for the reason of a lack of suitable auto answer modems (and in addition reasonably priced modems for users generally) this took considerably longer to achieve than have most other developments related to computers in the United States. We began developing our own software during the latter half of last year with a few particular objectives in mind. One of my prime concerns was that I would not be the unlucky sod to have to supervise all the activity of the service itself. As the system that is now designed, it allows for multiple special interest groups and operators that have full control over files within their own data base.

This has allowed us to run multiple sections which include such things as system information, announcements, main bulletin board and special interest groups. The latter are run independently by their own special interest group operators (SIGOPs) and presently include a TRS-80 1,2,4 SIG, a Colour Computer SIG, and LNW SIG, a CP/M SIG and also the MS/PC DOS SIG. Each SIGOP is responsible for maintaining, deleting and generally managing the file of the data base concerned and can add programs for down loading, as can any person who rings in with particular offerings for the bulletin board. We have tended to confine programs to the special interest groups as the main bulletin board functions better as a general chatter section and it becomes a little tedious having to scroll through large amounts of text and information which may not be of relevance to most people.

There is no limit to the actual number of special interest groups or user sections within the general bulletin board structure and this will obviously change as there is a demand for any particular service. We have not as yet implemented such things as post (i.e. items directed to individual members of the bulletin board) but, just as with the current restricted hours of operation, various other features will be added as the service becomes more active.

Presently the problem is not lack of people willing to run the special groups but, between the various clubs, there is still a minority of general members who actually possess modems to access such a service. For this and the reasons of the general evolution of computing at the present time, our own group has felt it appropriate that we form some type of affiliation with other serious user groups and try to combine our own efforts into a service which has some attraction. As such a club activity is

obviously costly in terms of the capital cost of equipment, we decided to charge an initial sign on fee (although annual fees will be determined later) but we have recently allowed public access to the system but persons ringing in without the use of passwords only gain access to the system information and the general bulletin board. They are also limited in the size of messages that may be left on the bulletin board and as a result have no access to the special interest group or any programs for down loading contained therein.

This really has been done for a matter of stimulating interest as obviously people would like to see what is involved in a particular service before outlaying money and we have had instances whereby people with various brands of equipment have not joined our club purely because of distance but have been coerced to do so now that they receive a substantial newsletter and have access to a bulletin board even if they are otherwise limited with regard to attending meetings.

The arrangements for financing the bulletin board are based on the principle of 'user pays' as the general club revenue could not afford to support the system itself. However, if we do have a loose affiliation with other groups, we run into some legal technicalities in that, being an incorporated body, we are required to pay tax on monies received from non members and as such we have not finally determined the most practical arrangement. One obvious method of circumventing this problem is through making all persons from other clubs honorary members of the Adelaide Micro User Group even though they will not otherwise receive the club newsletter or other fringe benefits (although we may greatly like to attract more members by fair means or foul).

It is quite likely that, in the prevailing circumstances, it will take another 3-6 months before the volume of use becomes apparent with the bulletin board but in the meantime this allows us to develop added facilities at a more orderly rate and the SIGOPs also will have some time in becoming familiar within the system and adding some material to attract prospective members and also make the service more generally useful.

The sign on fee (not annual fee) for members of AMUG and affiliated groups is:
$30 for metropolitan Adelaide members
$15 for South Australian country members (>50km from GPO)
$10 for interstate members.

The telephone number for non members wishing to have a look at the service is (08) 271 2043. Presently it is operating from 10.00am to 10.00pm weekends and South Australian public holidays but these hours will be extended as the amount of use increases. Also the BBS protocol requires an 8-bit word, 1 stop bit, no parity."

Micro Design Lab RCPM

The phone number of the MDL RCPM hasn't changed, but there were some problems. We're told that everything is back to normal on (02) 663 0150. Hours: 5pm—7am weekdays, 24 hours weekends.

MI Computer Club BBS

Telephone: (02) 662 1686. Program downloading. Hours: 24 hours daily.

Sydney Public Access RCPM

Telephone: (02) 808 3536. System Operators: Barrie Hull and David Simpson. Hours: 24 hours daily.

Software Tools RCPM

Telephone: (07) 378 9530. Hours: 24 hours daily.

MICOM CBBS

Telephone: (03) 762 5088. System Operator: Peter Jetson. Hours: 24 hours daily.

Gippsland RCPM

Telephone: (051) 34 1563. System Operator: Bob Sherlock. Hours: 24 hours daily.

Sorcerer Computer Users Association CBBS

Telephone: (03) 836 4616. System Operator: Bruce Alexander. Program downloading for SCUA members. Hours: 24 hours daily.

Perth RMPM

Telephone: (09) 367 6068. Hours: 6pm—9pm WST.

Adelaide Micro User Group BBS

Telephone: (08) 271 2043. Hours: 10am—10pm, weekends and public holidays only.

Darwin RCPM

Telephone: (089) 277 111. Hours: 24 hours daily.

New Zealand systems

NZ Micro Club RBBS

Telephone: 0011 64 9 762 309. System Operator: Chris Cotton. Hours: 24 hours daily. Software up/downloading.

This information is correct and current to the best of our knowledge. Please send corrections and updates to: Steve Withers, *C/- Australian Personal Computer*, 77 Glenhuntly Road, Elwood, Vic 3184.

American/Canadian systems

TYPE	SYSTEM NAME	NUMBER	NOTES
Forum 80	HQ system,	0011 1816 861 7040	
CBBS	HQ system	0011 1312 545 8086	
FBBS	HQ system	0011 1312 677 8514	
ABBS	Ottowa, Ontario	0011 1613 725 2243	
ABBS	HQ system	0011 1703 255 2192	
MABBS	Fort Walton Beach	0011 1904 862 1072	
Bull-80	Alabama	0011 1205 492 0373	
Conn-80	Colour Computer	0011 1212 441 3755	colour graphics for TRS-80 Colour

European systems

ELFA	ABC-MONITOR Sweden	0011 468 7300706	Half duplex
ABC-Banken	Halmstadt, Sweden	0011 463 5110771	
ABC-MONITOR	ABC Club of Sweden	0011 468 801523	Passwords required
CBBS	Gothenburg, Sweden	0011 463 1292160	75/1200 baud
		0011 463 1690754	300 baud
TEDAS	Germany	0011 4989 596 422	
Mailbox	Hamburg University, Germany	0011 49 40 4123 3098	
CBBS	Helsinki, Finland	0011 3580 722 272	

UK systems

CBBS	London	0011 44 1 399 2136	
CBBS	Surrey	0011 44 4862 25174	
Forum-80	Hull	0011 44 482 859169	
Forum-80	London	0011 44 1 902 2546	
Mailbox-80	Liverpool	0011 44 51 428 8924	
TBBS	London	0011 44 1 348 9400	ring-back system
TBBS	Blandford	0011 44 258 54494	
BBS	Southern	0011 44 243 5111077	ring-back system
BBS	Computer Answers	0011 44 631 3076	
CBBS	South West	0011 44 626 890 014	
BASUG		0011 44 742 667 983	

African systems

Connection 80	Cape Town	0011 27 21 457 750
Ape Computer Club	Cape Town	0011 27 21 215 363
Connection 80	Johannesburg	0011 27 11 834 5135
	Durban	0011 27 31 66 356
	Johannesburg	0011 27 11 642 3722

* 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 systems need resetting and you type <I> C R.

PROGRAMS

APC is interested in programs written in any of the major programming languages for all home and small business micros. When submitting programs to APC please include the following:
(a) A cassette or disk of the program.
(b) A listing on plain, white paper (typewritten if no printer available).
(c) Comprehensive but brief documentation,
(d) A suitable SAE if you would like your materials to be returned after use.
Please mark (a), (b) and (c) with your name, address, program title, machine (state minimum RAM where appropriate) and — if possible — a daytime number.
All programs must, please, be fully debugged.
Programs are paid for at the rate of $20 per page of published listing. Send contributions to:
APC Programs, 77 Glenhuntly Road, Elwood, Vic 3184.

Games
Scientific/mathematic
Business
Toolkit/utilities
Educational/Computer Aided Learning

COMMODORE 64 PLANE ATTACK

by B Houlsworth

'Plane attack' is an action game converted from a PET program by P Toogood. A joystick is required, and full instructions are given within the program.

```
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.TOOGDOD 1980 FOR THE PET"
100 PRINT" CONVERTED BY B HOULDSWORTH FOR COMMDDORE 64 1.4.83"
110 GOSUB30000:GOSUB10000
121 REM * START *
200 PRINTPL$;:PX=PX+K1:X=X+K1
210 POKE1983-79,31
240 IFX>CCTHEN8=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+KI: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+KI:FORA=PX+K1TOPX+I7STEP3
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"          "PL$;:PX=PX-39
7020 X=X+J0:RETURN
8000 A=PEEK(SE)*10+XX
8010 IFPX<1863THENPRINT"          "PL$;:PX=PX+41
8020 V$="LANDED SAFELY"
8030 RETURN
9000 REM LE
9010 POKEJ2,W5-L5+KX:POKEJ2+54272,1:POKEJ4,W3-L3+KX:POKEJ4+54272,1:R1=K0
9050 C$="  "+STR$(CC-X):C$=RIGHT$(C$,JG)
9070 FORA=K1TOJG:VV=VAL(MID$(C$,A,K1)):POKEJ5+A,VV+KX:POKEJ5+A+54272,1:NEXT:RETU
RN
10000 REM I
10010 GOSUB58000
10015 D7=56320:SE=214:IU=1:KP=2:Z$="' ' AND 'Z''
10040 PRINT"PLANE ATTACK BY PETER TOOGOOD
10042 PRINT"THE OBJECT IS TO LAND THE PLANE
10043 PRINT"BY DESTROYING THE BUILDINGS":PRINT"WITH YOUR WEAPONS
10045 PRINT"PLEASE SELECT:
10050 PRINT"LEVEL OF PLAY:"SPC(13)"1  TO  3":GOSUB50000
10060 GETW$:IFW$<"1"ORW$>"3"THEN10060
10066 R1=VAL(W$):GOSUB58000
10070 IFR1=1THENCC=999:W3=7:W5=4:MF=22:FQ=INT(2*RND(TI)+1):LY=2:EX=4
10080 IFR1=2THENCC=900:W3=5:W5=4:MF=15:FQ=INT(3*RND(TI)+2):LY=1:EX=3
10090 IFR1=3THENCC=800:W3=4:W5=3:MF=13:FQ=INT(3*RND(TI)+2):LY=0:EX=2
10210 PRINT"BOMBS WILL FALL STRAIGHT DOWN"
10220 PRINT
10260 K6=40:GOSUB58000
10270 PRINT"DAY OR NIGHT RUN:"SPC(10)"D  OR  N":GOSUB50000
10275 GETW$:IFW$<>"D"ANDW$<>"N"THEN10275
10280 PRINT"":GOSUB58000:IFW$="N"THENBG=11:GOTO10310
10290 BG=14
10310 W$="":PRINT"CONTROLS:"SPC(24)"LIMITS:
10315 PRINT" ALL KEYS REPEAT IF HELD DOWN
10320 PRINT" <JOYSTICK BUTTON> FOR BOMBS<UNLIMITED>
10322 PRINT" <JOYSTICK LEFT> FOR CLUSTER BOMBS<"W5">
10325 PRINT" <JOYSTICK RIGHT> FOR FOWARD GUNS<"W3">
10330 PRINT" <JOYSTICK UP:DOWN> FOR UP:DOWN CONTROL
10350 PRINT" UP CONTROL BURNS MORE FUEL
10355 PRINT"MISSILES WILL BE LAUNCHED AGAINST YOU
10360 IFLY>0THENPRINT"YOU CAN WITHSTAND"LY"DIRECT HIT<S>
10390 PRINT"THERE ARE 6 MISSILE LAUNCH SITES":Z$=""
10395 PRINT"THE"EX+1"VISIBLE ONES CAN BE BOMBED
20100 PRINT" RANDOM OR SELF-DRAW TARGET? KEY R OR S ":GOSUB50000
20200 GETA$:IFA$<>"R"ANDA$<>"S"THEN20200
20205 POKE53281,BG
20300 PRINT"":IFA$="S"THENGOSUB21000
20400 IFA$="R"THENGOSUB22000
20500 PRINT""
20505 POKE53281,BG
20550 FORA=0TO79:PRINT"";:NEXT
20600 PRINT"!FUEL=!!!!!!!!C-BOMBS=!!!!!!F-GUNS=!!!!!";:POKE2023,64
20655 POKE53281,BG:POKE56295,13
20700 PRINT"";:B=0:K=0:FB=0
20750 FORA=0TO55:POKE1024+A,K3:NEXT
20800 FORA=0TOEX:POKEMT(A)+K2,JR:POKEMT(A)+K2+54272,1
```

PROGRAMS

```
20900 NEXT:EX=0:P=0:X=0:FC=0:FQ=0:R1=0:A$="":RETURN
21000 REM SD
21010 PRINT" INPUT HEIGHTS <0-9> LEFT TO RIGHT        KEY <=> TO END
21015 GOSUB50000:GOSUB56000
21020 FORA=3STO1STEP-1
21030 GETW$:IFW$=""THEN21030
21040 IFW$="="THENX=0:A=0:GOTO21090
21050 X=VAL(W$):IFX=0THEN21090
21060 FORB=1TOX:P=1(K2*B)+A+B0):POKEK-P,K8:POKEK-P+54272,BG+1:NEXT
21070 NEXT:RETURN
22000 REM RD
22010 GOSUB56000:FORA=3STO1STEP-1
22030 B=JK*RND(TI)+FQ:FC=INT(4*RND(TI)):IFFC=K1THENB=B+XX
22050 FORFB=1TOB:P=((K2*FB)+A+B0):POKEK-P,K8:POKEK-P+54272,BG+1:NEXT:NEXT:RETURN
30000 REM PV
30020 FORA=0TO2:POKE59466,15:POKE59467,16:NEXT
30050 k=0:FB=0:FC=0:FQ=0:PX=0:ML=0
30100 A=0:K0=0:K1=1:K2=40:K3=32:K4=33:K7=36:K8=35:K9=33:KZ=34:KN=210:
30200 KX=48:J9=59464:J0=4:J8=.334:J2=2007:J4=2020:J5=1990:J7=1064:J1=1989
30300 J3=16:J6=37:JK=2:JG=3:DIMMT(5)
30305 IU=7:KP=I4:XX=6:FORA=0TO5
30306 MT(A)=INT11B6B+30*RND(TI))
30307 FORB=0TO5:IFMT(A)=MT(B)THEN1FA<>BTHEN30306
30308 NEXT:NEXT:D7=547
30315 K=2023:PX=1029:JR=38
30325 PL$="[illegible]":POKE53281,BG:RETURN
40000 REM RE
40010 FORA=0TO2500:NEXT:POKE53281,1I
40014 PRINT"[illegible] STATUS AT GAME END[illegible]":PRINT" [illegible] 'V$" [illegible]
40032 IFEX>0THENPRINT"[illegible]"EX"MISSILE HIT<S>
40035 PRINT" YDU USED UP:"
40040 PRINT"X" FUEL"
40050 PRINT"L5"  C-BOMBS"
40070 PRINT"L3"  F-GUNS"
40075 PRINT"W4"  BOMBS"
40080 PRINT" RESTART ?  PRESS Y OR N ":GOSUB50000
40090 GETA$:IFA$<>"Y"ANDA$<>"N"THEN40090
40094 IFA$="Y"THENPRINT" ":CLR:BG=11:GOTO110
40096 PRINT" ":END
50000 FORA=0TO15:POKEJ9,85:NEXT
50150 FORA=0TO15:POKEJ9,140:NEXT
50200 POKEJ9,0:RETURN
55000 IFP=K9THENV$="LANDED SAFELY"
55010 IFP=K8THENV$="CRASHED":POKE53281,2:ML=PX:GOSUB5600:POKE53281,BG
55020 IFP=KZTHENV$="BLOWN UP":POKE53281,8:ML=PX:GOSUB5600:POKE53281,BG
55030 IFP=K4THENB=K1:GOTO320
55040 GOTO40000
56000 IFNF=0THENRETURN
56005 FORA=1903TO1024TEP-1:POKEA,K3:NEXT:RETURN
58000 PRINT"      ":FORA=0TO34:PRINTPL$;:NEXT:PRINT" ":RETURN
60000 RESTORE:FORI=14336TO14336+64*8
60010 READA%:POKEI,A%:NEXT
60020 RETURN
61000 DATA170,1,128,1,128,1,128,85,0,60,98,98,126,98,98,98
61016 DATA0,124,98,98,124,98,98,124,0,60,98,96,96,96,98,60
61032 DATA0,124,98,98,98,98,98,124,0,124,98,96,120,96,98,124
6104B DATA0,124,98,96,120,96,96,96,0,60,98,96,102,98,98,60
61064 DATA0,98,98,98,126,98,98,98,0,60,24,24,24,24,24,60
61080 DATA0,14,4,4,100,100,100,56,0,98,100,104,112,104,100,98
61096 DATA0,96,96,96,96,96,98,126,0,194,230,218,194,194,194,194
61112 DATA0,99,98,114,106,102,98,98,0,60,98,98,98,98,98,60
61128 DATA0,124,98,98,124,96,96,96,0,60,98,98,98,106,100,58
61144 DATA0,124,98,98,124,98,98,98,0,60,98,96,60,2,98,60
61160 DATA0,126,90,24,24,24,24,24,0,98,98,98,98,98,98,60
61176 DATA0,98,98,98,98,98,52,24,0,194,194,194,194,218,230,194
61192 DATA0,98,98,36,24,36,98,98,0,98,98,36,24,24,24,24
61208 DATA0,126,98,4,8,16,34,126,0,28,48,24,112,24,48,28
61224 DATA255,129,189,189,189,189,189,129,255,0,56,12,24,14,24,12,56
61240 DATA56,68,43,237,154,77,50,12,0,32,64,254,254,64,32,0
61256 DATA0,0,0,0,0,0,0,0,56,68,43,237,154,77,50,12
61272 DATA16,16,16,56,40,0,56,16,126,201,201,255,255,201,201,255
61288 DATA0,0,0,0,0,0,56,0,0,0,60,24,60,60,24,0
61304 DATA16,16,16,24,44,165,255,129,40,44,46,255,63,0,0,0
61320 DATA0,0,0,255,240,255,0,0,0,28,124,207,31,191,0,0
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 DATA0,0,0,0,0,0,0,48,48,0,24,24,0,126,0,24,24
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 DATA0,0,24,24,0,24,24,0,0,0,24,24,0,24,8,16
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.
```

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

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simply following the prompts.

When typing in the listing, please 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$(I)="END"THEN300
280 I=I+1:IFI>KLTHEN300
290 GOTO200
300 ND=I-1:I=0
310 I=I+1:D=I-1:IFI>=NO THEN380
320 D=D+1:IFD=NO+1THEN310
330 IFO=1THENPRINT"SORTING WORD ";I;"[CL] [CU]":GOTO320
340 IFLEN(A$(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:FOR1=1TONO:LK=LK+LEN(A$(I)):NEXTI
420 AC=39:IFAA$="P"THENAC=78
430 DD=INT((LK*3)/AC)
440 IFDD<2THENDD=DD+2
450 DIMD$(AC,DD)
460 PRINT"[CLS]"
470 FOR1=1TONO:PRINTA$(I):NEXT
480 PRINT"[CD]SIZE:"AC"*"DD
490 FORW=1TO ND:LE=LEN(A$(W))
500 PRINT"COUNT:"(ND+1)-W"[CL] [CU]"
510 Y=INT(RND(1)*DD):X=INT(RND(1)*AC)
520 A1=INT(RND(1)*3+1)-2
530 A2=INT(RND(1)*3+1)-2:A=0:L=1
540 IFA1=0ANDA2=0THEN520
550 A$=MID$(A$(W),L,1)
560 K1=X+(A1*L):K2=Y+(A2*L)
570 IFK1<1ORK2<1THEN510
580 IFK1>ACTHEN510
590 IFK2>DDTHEN510
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$="Y"THENGG=1
810 FORI=1TOAC:PRINT#3,"-";
820 NEXTI:PRINT#3:FORI=1TODD
830 FORD=1TOAC
840 IFD$(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$(D,I);
870 NEXT:PRINT#3:NEXT
880 FORI=1TOAC:PRINT#3,"-";
890 NEXT:PRINT#3:I=0
900 IFGG=1THENGG=0:PRINT#3:GOTO810
910 GOSUB1190
920 FORD=1TDS
930 I=I+1:IFI>ND THENB$="":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]"
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
```

FLASH SIMULATOR

by F M O'Dwyer

'Hardware flash' is a term used to describe video chips that allow for flashing characters on the screen. This program simulates a hardware flash using machine code to manipulate a hardware register in the Atari's ANTIC display processor. Lines 40 to 90 simply demonstrate the use of the system. Using this program, the programmer can create displays in 4 modes (not to be confused with Atari's graphics modes). The modes are:

0 Ordinary display.
1 Inverse letters flash on foreground colour.
2 Flashing cursor, inverse letters flash between inverse and normal.
3 Flashing cursor, inverse letters flash on background colour.

The modes are only effective in Graphics 0 or in a text window. In addition to the modes, the programmer may control the rate of flash. The commands to tailor the system are as follows.

X=USR (FLASH) Initialises the system.

POKE RATE,N Initialises the flash rate to N (0≤N≤255), smaller numbers give faster flash rates. POKEing RATE with 0 disables the system completely. To restart use X=USR(FLASH).

POKE MODE,M Sets the mode to M (0 ≤M≤3). Other numbers produce exotic effects such as turning all the characters upside down.

Note: All commands should be followed by POKE 755,2 to ensure that the hardware flash doesn't get off on the wrong foot. In particular POKE to MODE should be followed by this.

One thing you will notice about this program is that the Basic program is free to do other tasks while the characters flash, and that there is no noticeable degradation in speed of Basic. It is even possible to enter POKE MODE,2:POKE 755,2 in direct mode and have a flashing cursor while using INPUT in Basic programs. NEW does not disable the system but Reset does. It is also temporarily disabled during such operations as CSAVE, LPRINT, etc. Assembly language programmers should be aware that the program requires the use of the system timer at Hex 21A (system timer two).

```
10 REM Hardware flash simulator by F.M.
   O'Dwyer
20 FOR N=0 TO 30:READ A:POKE 1536+N,A:
   NEXT N
30 FLASH=1536:MODE=1550:RATE=1548
40 GRAPHICS 0:PRINT"INVERSE=>this is a
   test"
50 PRINT:PRINT "CURSOR=>";
60 X=USR(FLASH)
70 FOR SPEED=20 TO 1 STEP -1:POKE
   RATE,SPEED:FOR N=1 TO 200:NEXT N:
   NEXT SPEED:POKE RATE,10
80 FOR TYPE=3 TO 0 STEP -1:POKE
   MODE,TYPE:POKE 755,2
90 FOR N=1 TO 2000:NEXT N:NEXT TYPE
100 DATA 104,169,17,141,40,2,169,6,
    141,41,2
110 DATA 169,20,141,26,2,96,72,173,
    243,2
120 DATA 73,2,141,243,2,32,11,6,104,96
```

PROGRAMS

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 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 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.

Programs Editor

```
30000 GRAPHICS 0:CLR :DIM DD$(20),DU$
(20)
30004 REM ********** PRINT OPTIONS
30005 ? "{CLEAR}":? "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":DD$="D:"
30040 ? :INPUT DD$:IF DD$="" THEN 30
005
30042 REM ********** SCAN CHOICE
30050 FOR I=65 TO 75:X=I-45:IF I=69 OR
I=X+1105
30060 IF ASC(DD$)=I THEN GOTO {30000+
(I*2)}
30070 NEXT I
30075 ? "No Such ITEM":GOTO 30030

30150 OPEN #4,6,0,"D:*.*"
30151 INPUT #4,DD$:? DD$:GOTO 30151
30152 POKE 580,0:? #USR(58484)
30154 ? "OLD NAME,NEW NAME":GOTO 30200
30156 ? "DELETE FILESPEC ":GOTO 30200
30158 ? "SURE YOU WANT TO FORMAT(Y/N)"
:INPUT DD$:IF DD$="N" THEN 30030
30159 GOTO 30300
30140 ? "LOCK FILESPEC ":GOTO 30200
30142 ? "UNLOCK FILESPEC ":GOTO 30200

30144 GOTO 30400
30146 ? "SECRITY PROCESS INHIBITED":POK
```

```
L 1913,80:GOTO 30030
30140 ? "VERIFY PROCESS ENABLED":POKE
1913,87:GOTO 30030
30150 ? "RENAME SELECT (Y/N)";:INPUT B
$:IF B$$="N" THEN POKE 3118,184:? "
RENAME SELECT DISABLED":GOTO 30030
30154 POKE 3118,0:? "RENAME SELECT ENA
BLED":DU$$="D:";X=32:GOTO 30134
30199 REM **********INPUT FILESPEC

30200 INPUT DO$$:DU$$(LEN(DU$$)+1)=DO
$:XIO X,81,0,0,DU$$:GOTO 30030
30299 REM **********I/O ROUTINE
30300 XIO X,81,0,0,"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$)>5 THEN ? "FILE$ TOO
 CHARACTERS PLEASE":GOTO 30420
30450 NAME$(LEN(NAME$)+1)=CHR$(34)
30460 ? "COLD START (Y/N)";:INPUT
 CHOICE$: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
,20,3,201,69,240,5,232,232,232,208
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,
141,112,6,169,26,141,105,6,96,172,108
30680 DATA 6,240,9,165,123,6,206,108,6
,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,
0,0,32,32,32,32

30710 DATA 32,32,58,60,34,78,85,82,58,
49,44,48,56,53,69,75,79,60,255
30720 DATA 255,226,2,227,2,0,6
```

CHARPATT

by J Press

The program displays the character patterns of all the 256 characters on the Sord M5. It also displays the character pattern numbers for use with the command for storing characters on the G1 graphic screen.

There are two options available, the first displays the whole character set, the second allows you to specify the character to be displayed, explicitly.

Note that control characters are denoted by square brackets. Therefore [K] (home) is obtained by pressing Func+Ctrl and K simultaneously.

```
100 REM CHARPATT
110 REM
120 REM FROM J PRESS
130 REM FEB 1984
140 REM
150 CLS:PRINT "[U][S][L]";
160 PRINT CURSOR(9,10);"CHAR.PATTERN
DEMO";CURSOR(9,11)"-----------------";
170 PRINT:PRINT:PRINT "Options":PRINT "-
-------"
180 PRINT:PRINT "1:- LIST all Patterns
(0-255)"
190 PRINT "2:- SHOW pattern for selected
character"
200 PRINT "3:- END the demo"
210 PRINT CURSOR(0,22);"Please select
noe":LET B$=INKEY$:IF B$="" THEN GOTO
210
220 IF B$="1" THEN GOTO 230 ELSE IF
B$="2" THEN GOTO 360 ELSE IF B$="3" THEN
GOTO 390 ELSE GOTO 210
230 LET Y=0:LET Z=255
240 CLS:FOR CH=Y TO Z:PRINT "[K]ASCII
CODE ";CH;:IF CH<33 THEN PRINT ELSE
PRINT CHR$(CH)
250 PRINT: LET A9$=""
260 PRINT "    **********"
```

150 Puts the computer into Graphics 1 mode.

170-220 Print the menu and get option in B$.

230-350 Recall character patterns for each character in turn, print the details and wait for the space bar to be pressed, then return to the menu.

```
270 FOR I=CH*8+10240 TO CH*8+10247
280 LET A=VPEEK(I):PRINT
RIGHT$(HEX$(A),2);
290 LET A9$=A9$+RIGHT$(HEX$(A),2)
300 PRINT " *";:LET K=128
310 IF A AND K THEN PRINT CHR$(244);
ELSE PRINT CHR$(32);
320 IF K=1 THEN GOTO 340
330 LET K=K/2:GOTO 310
340 PRINT "*":NEXT I:PRINT "
**********"
350 PRINT CURSOR(0,13);A9$;:GOSUB
$FLASH:NEXT CH:GOTO 100
360 CLS:PRINT "Enter character";
370 LET A2$=INKEY$:IF A2$="" THEN GOTO
370
380 LET Y,Z=ASCII(A2$):GOTO 240
390 CALL 0
400$FLASH:PRINT CURSOR(3,20);"Press
'SPACE' to continue";:FOR D=1 TO
400:NEXT
410 PRINT CURSOR(3,20);"[X]";:FOR D=1 TO
400:NEXT
420 IF INKEY$=" " THEN RETURN ELSE GOTO
400
```

360-380 Allow the user to select single character recall, print the details and return to the menu.

390 Option 3, call the power on reset routine, this clears the programs and goes to 'Ready'.

400-420 Flash a prompt and wait for the space bar to be pressed.

APE KING

by R Bulcock

Ape King is a game for the unexpanded VIC 20. Most people will recognise the style of the game and know what to do. For those who don't, you, the hero, have to go up the ladders and along the walkways to the gorilla at the top.

If you are using joysticks then jump over the barrels and holes by pushing the joystick up after turning to face the way you want to go. In order to climb the ladder, position yourself under the first rung and jump until the next walkway is reached. On reaching the gorilla the screen flashes, scaring the gorilla up another 25 metres. You get 50 points for jumping over a barrel and 500 points for reaching the top.

To convert the game to run from the keyboard put in the following alterations

6 L=14: SC=0

22 IF PEEK (197) = (KEY FOR LEFT) THEN G=3: D=-1

23 IF PEEK (197) = (KEY FOR RIGHT) THEN G=4: D=1

24 IF PEEK (197) = (KEY FOR UP) THEN 100

310 IF PEEK (197) = (KEY FOR UP) THEN (REST OF LINE AS LISTED)

To find the keys to use, enter the following routine and run it with RUN 1000. Press the key you want for the direction. The number printed is the number that should be put into the appropriate line. Repeat this for right, left and up.

1000 PRINT PEEK (197): GOTO 1000

```
5 GOTO5000
6 L=14:SC=0:PA=37151:POKEPA,0:PB=PA+1:RB=PB+2
10 M=8144:C=30720:G=4:D=1
15 POKEM,G:POKEM+C,7
20 POKE36876,220:M=PEEK(PA):POKEPA,127:B=PEEK
   (PB):POKERB,255
22 IF(AAND16)=0THENG=3:D=-1
23 IF(AAND128)=0THENG=4:D=1
24 IF(AAND4)=0THEN100
```

```
  25 IFPEEK(M+D)=0ORPEEK(M)=0THEN4000
  26 IFPEEK(M+22)=32THEN4000
  30 IFPEEK(M+D)=1THEND=0
  35 IFM+D=8143THEND=0
  40 POKE368  0:POKEM,32:M=M+D:IFM=7818THEN4500
  50 POKEM,G: .  M+C,7:GOSUB3000:POKE36874,180
  90 SYS828:IFPEEK(M+D)=0THEN4000
  95 POKE36874,0:FORT=0TO50:NEXTT
  99 D=0:GOTO20
 100 IFPEEK(M-22)=2THENGOTO300
 101 IFPEEK(M-21)=20RPEEK(M-23)=2THEN25
 105 GOSUB3000
 110 POKEM,32:M=M-22
 111 IFG=3THENM=M-1:GOTO123
 112 M=M+1
 123 POKEM,5:POKEM+C,7
 125 FORT=1TO2:POKE36876,220:SYS828:POKE36876,0
 126 IFPEEK(M+22)=0THENSC=SC+50:POKEM+22,10:
     POKE36875,200:FORR=0TO100:NEXTR:POKE3
     6875,0:POKEM+22,0
 127 FORR=0TO100:NEXTR:NEXTT
 128 POKEM,32:M=M+22
 129 IFG=3THENM=M-1:GOTO132
 130 M=M+1
 132 IFPEEK(M)=0THEN4000
 135 POKEM,G:POKEM+C,7:GOTO25
 300 POKEM,32
 301 M=M-66:POKEM,5:POKEM+C,7
 305 POKE36877,200:FORT=0TO200:NEXTT:POKE36877,0
 306 A=PEEK(PA):POKERB,127:B=PEEK(PB):POKERB,255
 310 IF(AAND4)=0THENPOKEM,2:POKEM+C,7:M=M-44:
     POKEM,G:POKEM+C,7:FORR=0TO100:NEXTR:GOTO20
 320 POKE36876,220:SYS828:FORT=0TO15:NEXTT:POKE
     36876,0:FORT=0TO100:NEXTT
 330 GOSUB3000
 340 GOTO306
3000 A=INT(RND(1)*L)+1
3001 IFA=1THENPOKE7795,0
3002 RETURN
4000 POKE36876,0:POKE36875,0:POKE36874,0:POKEM,5
4001 POKE36877,200:FORV=15TO0STEP-1:POKE36878,V:
     FORR=0TO50:NEXTR,V:POKE36877,0
4002 FORT=0TO1000:NEXTT
4005 POKE36869,240:PRINT"■■SCORE"SC"ON LEVEL"
     14-L:PRINT"■■TRY ANOTHER 25M."
4055 FORT=0TO2500:NEXTT:CLR:RUN
4500 POKE7818,5:POKE36876,240:FORT=0TO200:NEXTT
     :POKE36876,0
4501 POKE36876,190:FORT=0TO200:NEXTT:POKE36876,0
4505 POKE36874,160:FORT=0TO200:NEXTT:POKE36874,0
4510 FORR=0TO10
4515 POKE36879,25:FORT=0TO100:NEXTT
4520 POKE36879,8:FORT=0TO100:NEXTT
4525 NEXTR
```

STOP PRESS

Ape King goes bananas in lines 40 and 50. It should read:
40 POKE 36876, 0:POKE M, 32
the rest is as printed.

Line 50 should have been:
50 POKE M,G:POKE M+C,7
and again, the rest as printed.

```
4535 POKE7818,32
4536 FORT=0TO2000:NEXTT
4540 L=L-1:IFL<6THENL=10
4545 SC=SC+500
4550 GOTO10
4999 END
5000 PRINT"■ONE MOMENT":POKE36878,15
5001 FORT=7416TO7524:POKET,0:NEXTT
5005 FORX=0TO87
5010 POKE 7168+X,PEEK(32768+X):NEXTX
5015 FORX=0TO87:READA
5020 POKE 7168+X,A:NEXTX
5025 DATA0,24,36,90,90,36,24,0,255,66,36,24,36
     ,66,255,0
5027 DATA129,255,129,129,129,255,129,129
5028 DATA8,24,72,62,10,8,20,36
5029 DATA16,24,18,124,80,16,40,36
5030 DATA146,84,56,16,16,146,254,0
5031 DATA3,5,7,2,3,1,31,63
5032 DATA192,160,224,64,192,128,248,252
5033 DATA111,55,55,7,14,12,24,24
5034 DATA246,236,236,224,112,48,24,24,0,238,
     138,234,42,238,0,0
5036 I=828
5037 READA:IFA=999THEN6000
5038 POKEI,A:I=I+1:GOTO5037
5040 DATA173,115,30,141,139,30,169,32,141,115,
     30,162,14,189,138,30,201,0,208,8,157,139
5041 DATA30,169,32,157,138,30,202,208,238,173,
     152,30,141,5,31,169,32,141,152,30,162,0
5042 DATA189,243,30,201,0,208,8,157,242,30,169,
     32,157,243,30,232,224,19,240,3,76 ,104,3
5043 DATA173,243,30,141,98,31,169,32,141,243,
     30,162,18,189,97,31,201,0,208,8,157,98,31
5044 DATA169,32,157,97,31,202,208,238,173,116,
     31,141,225,31,169,32,141,116,31,162,0,189
5045 DATA208,31,201,0,208,8,157,207,31,169,32,
     157,208,31,232,224,19,240,3,76,171,3
5046 DATA169,32,141,207,31,96,999
5599 END
6000 PRINT"■■■■":PRINT"■■":PRINT"■■":POKE36879
     ,8
6005 POKE36869,255:PRINT"■■■■FG":PRINT"
     ■D■B■■HI"
6009 PRINT"■AAAAA":PRINTTAB(5);"A"
6010 FORW=1TO4:READS,F
6011 FORT=STOF:POKE36876,0:POKET,1:POKET+
     30720,2:POKE36876,200:NEXT
6012 DATA7834,7853,7946,7965,8054,8073,8164,
     8185
6015 NEXTW:POKE36876,0
6016 FORL=1TO3:READS,F
6017 FORT=STOFSTEP22:POKE36874,0:POKET,2:POKET
     +30720,7:POKE36874,200:NEXT
```

```
6018 DATA7852,7918,7947,8013,8072,8138
6020 NEXTL:POKE36874,0
6021 FORT=0TO4:READA:POKEA,32:NEXT
6022 DATA8060,8066,7950,7956,7846
6030 FORT=38TO200:POKE36865,T:NEXTT
6035 FORT=200TO38STEP-1:POKE36865,T:NEXTT:CLR
     :GOTO6
```

HIRES EDITOR

by P Lukes

This program for the MicroBee was accompanied by the following notes:

"The HIRES mode provides a resolution of 512 by 256 dots on the screen, which allows detailed drawing and plotting. The drawback is the limited number of HIRES shapes available, but that is something we have to put up with until the new version of the MicroBee with extended memory becomes available.

It is possible to superimpose normal characters over HIRES screen bytes, but trying to plot on bytes which were previously used for normal characters produces an error and destroys the screen. Most diagrams require some labelling, and the usual method is to plot the diagram and then print the labels by using the cursor positioning commands. The screen editor allows direct access to the screen both for dot-plotting and for printing normal characters.

The program is in four separate modules. The first module contains the instructions which should be self-explanatory.

SCREEN DISPLAY

The scaling of the VDU and any printer is usually different. The "circle" on the screen is drawn to the scale of the Tandy Line Printer VII (Seikosha unihammer printer, also known as GP 100), which has a horizontal spacing of 60 dots per inch and vertical spacing of 63 dots per inch in the graphic mode. The printing width is 8 inches, so that only the first 480 dots per line of the 512 available can be sent to the printer. Most VDUs have a height and width adjustment, and this could be used to bring the display closer to the printer scaling.

SCREEN EDITOR

This module allows the editing of the HIRES screen after the initial plot. In the character mode, normal characters can be printed anywhere on the screen, other than in the last screen position, which would scroll the screen and destroy it. Should we try to plot over a normal character (including a character space), the error is intercepted and we have the option to reset the offending byte to blank graphic by printing CHR$(128) over it. (Since 128 is the code indicating the end of a string, we have to use the special form [A1 128] to get it on the screen.) The byte is then available for HIRES plotting.

The graphic mode allows us to draw or erase dots on the screen. Movement in straight lines is easy, but drawing curves is very difficult. The main use for this mode would probably be repair of diagrams damaged by over printing and underlining.

In both modes the cursor is moved by intercepting the codes produced by ESC (27), TAB (9), BACKSPACE (8), and LINEFEED (10). The graphic cursor is a flashing dot. Should it be hard to find on the screen, toggling to character mode will place the normal flashing cursor over it. The toggling is effected by holding down the CTRL and pressing L (12). DEL (127) has a dual function: in the graphic mode it toggles between draw and erase; in the character mode it resets the byte to graphic. The BREAK key (3) is intercepted to a special section which allows us to break by pressing BREAK again, or start the printing by holding down CTRL and pressing P (16), or to get back to the screen by pressing any other key.

PRINTER ROUTINE

The Seikosha printers produce a graphic line of 480 columns across the page. Each column consists of seven printing positions, each of which either produces a dot or leaves a blank, depending on whether it is set or not. The column is sent to the printer as one byte, whose bit 7 must be set to indicate a graphic character, and bits 0 to 6 control the dots: if a bit is on (1), the dot is printed; if a bit is off (0), the column position is left blank. So code 128 prints a blank column, 129 only the top dot, 130 only the second dot, 131 the two top dots and so on to 255, which prints a column of seven dots.

To copy the screen to the printer, we have to start in the top left hand corner (HIRES co-ordinates 0,255) and assemble the first seven vertical dots (to co-ordinates 0,249) into a byte for the printer. The next bytes will represent dots 1,255 to 1,249 etc and the last byte on the line will cover dots 479,255 to 479,249. The next line will start with dots 0,248 to 0,242 and finish with 479,248 to 479,242. This process continues until the 256 vertical lines are covered in steps of seven screen lines for each printer line. The printer bytes are assembled by using the POINT function, which returns the value -1 if the addressed screen dot is on, and 0 if it is off. If the addressed position is a normal character, the function generates an error and requires special handling.

A normal character on the screen covers a rectangle equivalent to eight horizontal dots by 16 vertical dots. A printer character is five columns wide and seven dots high, so some adjustments have to be made. The horizontal adjustment is quite easy: the characters are spaced more widely to keep in step with the screen. The vertical adjustment is more involved: since we are examining the screen in steps of seven vertical lines, each normal character will affect three printing lines. The two strings contain the numbers of printing lines which require special handling. (Strings can contain character codes 0 to 127, and the SEARCH function is convenient for checking if a particular code is included). The printing lines are counted from top, starting with zero and finishing with 36 at bottom.

LO$ contains the line numbers where

the character code has to be replaced by a space to avoid printing the same character on two consecutive lines. The line numbers in L1$ are the lines for character printing. Lines not included in either of the strings lie partially outside the character outline, and the routine will keep cycling to cover as many dots as possible.

The routine is painfully slow. FOR . . . NEXT loops, which would speed it up, cannot be used because their structure is destroyed by an error. My printer has only a 90 byte buffer, so the printing head has to make six passes to cover a graphic line, producing copious smudging. Photocopying can improve the appearance. (The successor DMP 100 has a much larger buffer). It takes about half an hour to print a screen. When the printing is finished, the routine returns to the screen editor. Printing can be aborted by holding down CTRL+P; the buffer will be printed out and again the routine will return to the screen editor, but printing can only be restarted from the beginning."

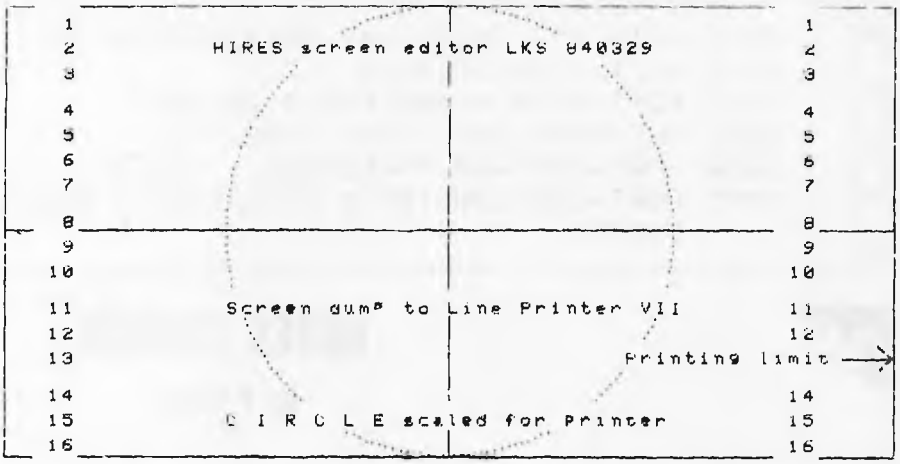

Figure 1: Sample screen dump to printer.

```
00360 rem Graphic mode
00370 Y=Z/64:X=(Z-Y%64)*8+4:Y=255-Y%16-8:H=X:V=Y
00380 if X<0 then let X=0 else if X>511 then let X=511
00390 if Y<0 then let Y=0 else if Y>255 then let Y=255
00400 invert X,Y
00410 gosub 520:K=asc(key)
00420 if K=9 then let V=Y+1:rem TAB
00430 if K=27 then let H=X+1:rem ESC
00440 if K=10 then let V=Y-1:rem LF
00450 if K=8 then let H=X-1:rem BS
00460 if K=127 then let F=-F:rem DEL
00470 if F then reset X,Y else set X,Y
00480 if K=12 then 240:rem CTRL+L
00490 if K=3 then 560:rem BREAK
00500 X=H:Y=V:goto 380
00510 rem Graphic byte count
00520 curs 60:A=U-used:print[I4 A]:curs 125:print F:curs Z:if A<
10 then play 9:return else return
00530 rem Graphic-on-character error
00540 on error goto 540:print key [A5 7] key,:goto 240
00550 rem BREAK key (BREAK to break, CTRL+P to print, any other
key to return to screen editor)
00560 play 1:poke 140,0:K=asc(key):if K=U then 560 else if K<>16
 then 210
00570 rem Printer routine (parallel port; chr$(18)=graphic, chr$
(30)=character mode)
00580 on error goto 700:curs 125:print [A2 U]:curs 60:outL#1:lpr
int chr$(18);
00590 Y0=0:Y7=255:X0=0:X7=479:Y=255-int(Y0):if flt(int(Y0)/7)<>Y
0/7 then stop:rem Set printing limits
00600 U=128:S=61440:L0$="":L1$="":restore:for A=0 to 6:read K:L0
$=L0$+chr$(K):next A:for A=0 to 15:read K:L1$=L1$+chr$(K):next A
00610 X=int(X0):print [I4 (255-Y)/7]:curs 60
00620 B=1:K=U:A=0
00630 K=K-B*point (X,Y-A)
00640 B=B*2:A=A+1:if A<7 then 630
00650 lprint [A1 K];
00660 K=asc(key):if K=16 then lprint chr$(13);:goto 210:rem CTRL
+P stop print and return to editor
00670 if X<int(X7) then let X=X+1:goto 620 else if X7-X0<479 the
n lprint chr$(13);
00680 Y=Y-7:if Y>int(Y0) then 618 else lprint chr$(13);:goto 210
00700 if errorL<>630 then play 9,9:print errorC errorL:stop else
 on error goto 700
00710 D=(255-Y):if search(L1$,chr$(D/7))>0 then 720 else if sear
ch(L0$,chr$(D/7))=0 then 640 else let L=32:goto 730
00720 P=S+D/16%64+(X+1)/8:L=peek (P):if L<32 or L>127 then let L
=92
00730 lprint chr$(30) chr$(L) chr$(18) [A3 U];:X=X+7:goto 670
00740 rem Graphic lines for space print (L0$)
00750 data 0,7,15,16,23,30,32
00760 rem Graphic lines for character print (L1$)
00770 data 1,3,5,8,10,12,14,17,19,21,24,26,28,31,33,35,
```

OISTERADS

by P Rule

Here is a video game featuring hi-res graphics and sound effects, where the object is to transport supplies back and forth between the Lunar Base and the Mother Ship. The game was designed to be used on an Apple II with a joystick (although paddle 0 should work just as well).

Instructions are in the program.

```
10  REM **********************
20  REM * OISTERADS          *
30  REM * BY PAUL RULE       *
40  REM *                     *
50  REM * FOR APPLE ][       *
60  REM * WRITTEN ON 48K     *
70  REM * ][ PLUS ON 8/2/84 *
80  REM **********************
90 :
100 :
110 :
120 :
130 :
140  REM HI SCORE 1800
150  TEXT
160  HOME
170  FLASH
180  PRINT "                OISTERADS                "
190  NORMAL
200  PRINT : PRINT
210  PRINT "  YOUR MISSION IS TO TRANSPORT SUPPLIES"
220  PRINT "BETWEEN THE LUNAR BASE AND THE MOTHER"
230  PRINT "SHIP AND BACK."
240  PRINT "  TO MOVE YOUR SHIP USE A JOYSTICK OR"
250  PRINT "PADDLE 0"
260  PRINT "POINT YOUR SHIP IN THE DIRECTION YOU"
270  PRINT "WANT TO GO BY MOVING THE JOYSTICK LEFT"
280  PRINT "OR RIGHT. TO THRUST PRESS BUTTON 0"
290  PRINT "  ONCE YOU HAVE LEFT THE LUNAR BASE YOU"
300  PRINT "CANNOT LAND THERE AGAIN UNTIL YOU HAVE"
310  PRINT "DOCKED WITH THE MOTHER SHIP."
320  PRINT "  YOU HAVE TO LAND AND DOCK BACKWARDS"
330  PRINT "OTHERWISE YOU CANNOT GET OUT AGAIN."
340  PRINT "  YOU GET 50 POINTS FOR DOCKING WITH"
350  PRINT "THE MOTHER SHIP AND 250 POINTS FOR"
360  PRINT "LANDING AT THE LUNAR BASE."
370  PRINT
380  PRINT "YOU NOW HAVE THREE SHIPS. GO FOR IT!";: GET A$
390  FOR A = 770 TO 792
400  READ B: POKE A,B: NEXT
410  DATA 173,48,192,136,208,5,206,1,3,240,9,202,208,245,174,0,3,76,2,3,96,0,0
420  FOR A = 7676 TO 7802: READ B: POKE A,B: NEXT
430  DATA 3,62,8,0,26,0,46,0,146,27,36,37,60,36,37,37,37,46,46,46,54,55,46,54,6,
0,44,44,53,44,46,53,45,54,62,55,63,62,63,36,63,39,37,44,5,0,146,82,73,41,45,45,4
5,45,45,45,45,63,63,39,63,60,39,63,60,39,63
440  DATA 54,54,38,36,36,36,36,44,45,45,45,45,37,54,60,63,63,63,63,63,63,63,63,6
3,63,63,63,63,63,39,54,44,45,45,45,45,53,54,54,54,54,62,63,63,63,63,63,63,63,45,
45,37,45,44,37,45,44,37,45,0
450  POKE 232,252: POKE 233,29
460 LI = 3
470  ROT= 0
480  SCALE= 1
490  HGR2
500  HCOLOR= 3
510  HPLOT 0,190 TO 20,170 TO 40,185 TO 60,170 TO 80,190 TO 100,180 TO 110,188 T
0 135,170 TO 135,185 TO 147,185 TO 147,165 TO 170,170 TO 180,185 TO 200,170 TO 2
02,190 TO 220,168 TO 240,182 TO 260,180 TO 270,170 TO 279,190
520 HB =  INT ( RND (1) * 198) + 40
530  DRAW 3 AT HB,6
540  FOR AS = 1 TO 20
550 RX =  INT ( RND (1) * 260) + 20
560 RY =  INT ( RND (1) * 100) + 50
570  ROT=  INT ( RND (1) * 64) + 1
```

```
580 HC = INT ( RND (1) * 7) + 1: IF HC = 4 THEN 580
590  FOR T = 1 TO 3
600  SCALE= INT ( RND (1) * 3) + 1
610  IF RX > 120 AND RX < 160 AND RY > 140 THEN 550
620  HCOLOR= HC
630  DRAW 2 AT RX,RY
640  NEXT
650  NEXT
660  SCALE= 1
670  ROT= 0
680 P =  - 16336
690 X = 140
700 Y = 180
710 XO = X
720 YO = Y
730 AX = 0
740 AY = 0
750 R = 0
760 THRUST = .4
770 :
780 :
790 :
800  HCOLOR= 3
810  XDRAW 1 AT X,Y
820  IF  PEEK ( - 16287) < 128 THEN 910
830  IF R = 8 OR R = 0 THEN AY = AY - TH
840  IF R = 1 THEN AX = AX + TH:AY = AY - TH
850  IF R = 2 THEN AX = AX + TH
860  IF R = 3 THEN AX = AX + TH:AY = AY + TH
870  IF R = 4 THEN AY = AY + TH
880  IF R = 5 THEN AX = AX - TH:AY = AY + TH
890  IF R = 6 THEN AX = AX - TH
900  IF R = 7 THEN AX = AX - TH:AY = AY - TH
910  IF  PDL (0) > 154 THEN R = R + 1: GOSUB 1070
920  IF  PDL (0) < 100 THEN R = R - 1: GOSUB 1070
930 X = X + AX
940 Y = Y + AY
950  IF X >  = HB - 3 AND X < HB + 3 AND Y < 12 THEN 1470: REM   DOCKED
960  IF X >  = 138 AND X < 146 AND Y > 180 THEN 1550
970  IF Y < 10 AND X < HB - 16 THEN  HCOLOR= 3: HPLOT 0,0 TO HB - 16,0: HCOLOR=
0: HPLOT 0,0 TO HB - 16,0:AY =  - AY:Y = Y + AY: GOTO 970
980  IF Y < 10 AND X > 140 THEN  HCOLOR= 3: HPLOT HB + 16,0 TO 279,0: HCOLOR= 0:
 HPLOT HB + 16,0 TO 279,0:AY =  - AY:Y = Y + AY: GOTO 980
990  IF X > 270 THEN  HCOLOR= 3: HPLOT 279,0 TO 279,190: HCOLOR= 0: HPLOT 279,0
TO 279,190:AX =  - AX:X = X + AX: GOTO 990
1000  IF X < 10 THEN  HCOLOR= 3: HPLOT 0,0 TO 0,190: HCOLOR= 0: HPLOT 0,0 TO 0,1
90:AX =  - AX:X = X + AX: GOTO 1000
1010  XDRAW 1 AT XO,YO
1020  XDRAW 1 AT X,Y
1030 XO = X
1040 YO = Y
1050  IF  PEEK (234) <  > 28 AND  PEEK (234) <  > 47 THEN  GOSUB 1130: GOTO 470
1060  GOTO 820
1070  IF R * 8 > 64 THEN R = 1
1080  IF R * 8 < 0 THEN R = 7
1090  XDRAW 1 AT X,Y
1100  ROT= R * 8
1110  XDRAW 1 AT X,Y
1120  RETURN
1130  FOR B = 1 TO 10
1140 C =  PEEK (P):C =  PEEK (P):C =  PEEK (P):C =  PEEK (P):C =  PEEK (P):C =
PEEK (P):C =  PEEK (P):C =  PEEK (P):C =  PEEK (P):C =  PEEK (P):C =  PEEK (P):C
 =  PEEK (P):C =  PEEK (P):C =  PEEK (P):C =  PEEK (P):C =  PEEK (P):C =  PEEK (
P):C =  PEEK (P)                              :C =  PEEK (P):C =  PEEK (P)
1150  NEXT
1160  FOR B = 1 TO 10
1170  HCOLOR= HC
1180  GOSUB 1350
1190  HCOLOR= 0
1200  GOSUB 1350
1210  NEXT
1220 LI = LI - 1
1230  IF LI > 0 THEN  RETURN
```

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```
1240  TEXT : HOME
1250  FOR R = 1 TO 40
1260  VTAB 10
1270  INVERSE
1280  PRINT "YOUR SCORE IS :"SC
1290  NORMAL
1300  VTAB 10
1310  PRINT "YOUR SCORE IS :"SC
1320  NEXT
1330  END
1340  RETURN
1350  IF Y < 10 THEN Y = 10
1360  IF Y > 186 THEN Y = 185
1370 HC =  INT ( RND (1) * 7) + 1: IF HC = 4 THEN 1370
1380  HCOLOR= HC
1390  HPLOT X - 10,Y TO X + 10,Y
1400  HPLOT X,Y - 10 TO X,Y + 10
1410  HPLOT X - 9,Y - 4 TO X + 9,Y + 4
1420  HPLOT X - 4,Y - 9 TO X + 4,Y + 9
1430  HPLOT X + 4,Y - 9 TO X - 4,Y + 9
1440  HPLOT X + 9,Y - 4 TO X - 9,Y + 4
1450  HPLOT X - 9,Y + 4 TO X + 9,Y - 4
1460  RETURN
1470  IF F <  > 0 THEN  GOSUB 1130: GOTO 470
1480  GOSUB 1620
1490 SC = SC + 50
1500 AY = 0
1510 F = 1
1520 Y = Y + 2
1530  IF  PEEK ( - 16287) < 128 THEN 1530
1540  GOTO 830
1550  IF F <  > 1 THEN  GOSUB 1130: GOTO 470
1560  GOSUB 1620
1570 SC = SC + 250
1580 AY = 0
1590 F = 0
1600 Y = Y - 2
1610  GOTO 470
1620  FOR Z = 1 TO 3
1630  FOR A = 25 TO 15 STEP  - 1
1640  POKE 768,A
1650  POKE 769,26 - A
1660  CALL 770
1670  NEXT
1680  NEXT
1690  RETURN
```

LABEL PRINTER

by S Cook

This program prints a cassette label with notes for side one and/or side two as required. It works on the MicroBee with a MicroBee (Admate) or any Epson type dot matrix printer. The minimum RAM requirement is 8k. When printed the program indicates where to cut and fold for insertion in a cassette case.

This program is designed for a parallel printer, however it could be modified for a serial printer by deleting the "OUT#1" command in line 810.

Note also: where a "—" appears in the program, it must be typed in using SHIFT and DEL . . . NOT a minus sign.

```
00100 REM ************************************************
00110 REM ****  Cassette Label Printer   by Stephen Cook  ****
00120 REM ****                                           ****
00130 REM **** Note: Where a "_" appears in this program  ****
00140 REM ****       this is printed by using SHIFT & DEL ****
00150 REM ****       NOT a minus sign.                   ****
00160 REM ************************************************
00170 STRS(1000)
00180 POKE 257,1
00190 CLS:POKE 220,112:DIM N1(5),C1(2,5)
```

```
00200 FOR S=1 TO 2:FOR J=1 TO 5:C1$(S,J)="":NEXT J:NEXT S
00210 S=0
00220 INVERSE:PRINT [A17 32];"Cassette  Label  Printer";[A20 32]:NORMAL
00230 PRINT\
00240 B1$="":PRINT"Type in title of cassette (Maximum of 16 letters) :"\"_";
00250 GOSUB 260:T1$=B1$:GOTO 340
00260 A1$=KEY:IF A1$="" THEN 260
00270 IF A1$=CHR(8) : A1$=CHR(127)
00280 IF A1$=CHR(127) AND B1$<>"" : B1$=B1$(;1,LEN(B1$)-1):PRINT [A2 127];"_";
00290 IF A1$=CHR(13) THEN RETURN
00300 IF LEN(B1$)=16 OR A1$<" " OR A1$>"z" THEN 260
00310 PRINT CHR(127);A1$;"_";
00320 B1$=B1$+A1$
00330 GOTO 260
00340 POKE 257,0
00350 PRINT CHR(127):PRINT
00360 POKE 220,111
00370 S=S+1:IF S<3 THEN PRINT"Are there any notes for side";S;" (Y/N)?"
00380 IF S=3 THEN 670
00390 A1$=KEY:IF A1$<>"y" AND A1$<>"n" THEN 390
00400 IF A1$="n" THEN PRINT:GOTO 370
00410 N=0:CLS:UNDERLINE:PRINT"Enter notes for side";S:NORMAL
00420 PRINT"** Press <RETURN> to enter each line (maximum 40 characters) **"
00430 PRINT"** Press <ESC> to redo last note.                              **"
00440 PRINT"** Press <LINEFEED> when notes for side";S;" are finished.       **"
00450 N1$(1)="first":N1$(2)="second":N1$(3)="third":N1$(4)="fourth"
00460 N1$(5)="fifth"
00470 B1$="":N=N+1:PRINT"Enter the ";N1$(N);" comment:"
00480 POKE 220,112
00490 PRINT"_";
00500 A1$=KEY:IF A1$="" THEN 500
00510 IF A1$=CHR(27) AND N>1 AND B1$="" : C1$(S,N)="":PRINT CHR(127);CHR(15);
 [A63 32];[A63 8];CHR(15);[A63 32];[A63 8];:N=N-1:GOTO 480
00520 IF A1$=CHR(10) THEN CLS:GOTO 370
00530 IF A1$=CHR(8) : A1$=CHR(127)
00540 IF A1$=CHR(127) AND B1$<>"" : B1$=B1$(;1,LEN(B1$)-1):PRINT [A2 127];"_";
00550 IF A1$=CHR(13) THEN 590
00560 IF LEN(B1$)=40 OR A1$<" " OR A1$>"z" THEN 500
00570 PRINT CHR(127);A1$;"_";
00580 B1$=B1$+A1$:GOTO 500
00590 C1$(S,N)=B1$:PRINT CHR(127):IF N<5 THEN 470
00600 PRINT"Only five comments per side are allowed."
00610 POKE 220,111:UNDERLINE
00620 PRINT"Do you wish to redo the comments for side";S;"? (Type Y or N)";
00630 NORMAL
00640 A1$=KEY:IF A1$<>"y" AND A1$<>"n" THEN 640
00650 IF A1$="y" THEN 410
00660 CLS:GOTO 370
00670 CLS:UNDERLINE:PRINT"Label printout":NORMAL
00680 PRINT\"How many copies of this label do you want (1-9) ?"
00690 A1$=KEY:IF A1$<"1" OR A1$>"9" THEN 690
00700 N=INT(VAL(A1$))
00710 PRINT A1$
00720 UNDERLINE
00730 PRINT\\"SET PRINTER FOR PRINTOUT....THEN PRESS ''P'' TO BEGIN PRINTING"
00740 NORMAL
00750 IF KEY<>"p" THEN 750
00760 FOR L=1 TO N
00770 REM ******************************************************
00780 REM *** Note: This program is set for a Parallel Printer.
00790 REM *** For a Serial Printer delete OUTL#1 in Line 810
00800 REM ******************************************************
```

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```
00810 OUTL#1:LPRINT [A42 95];"    <==== CUT"
00820 LPRINT:LPRINTCHR(14);
00830 T=LEN(T1$)+4:IF T<20 THEN FOR J=1 TO INT(FLT(10-T/2)):LPRINT" ";:NEXT J
00840 LPRINT"* ";T1$;" *"
00850 LPRINT CHR(20);
00860 FOR S=1 TO 2
00870 LPRINT"¦Side";S":";:FOR J=1 TO 33
00880 LPRINT" ";:NEXT J:LPRINT"¦"
00890 IF C1$(S,1)="" THEN FOR J=1 TO 5:LPRINT"¦";[A40 32];"¦":NEXT J:GOTO 950
00900 FOR J=1 TO 5:IF C1$(S,J)="" THEN NEXT*J 920
00910 LPRINT"¦";C1$(S,J);TAB(42);"¦":NEXT J:GOTO 950
00920 FOR K=5 TO J STEP -1
00930 LPRINT"¦";[A40 32];"¦"
00940 NEXT K
00950 LPRINT [A42 95];
00960 IF S=1 THEN LPRINT ELSE LPRINT"  <==== FOLD"
00970 NEXT S
00980 LPRINT:LPRINT CHR(14);
00990 IF T<20 THEN FOR J=1 TO INT(FLT(10-T/2)):LPRINT" ";:NEXT J
01000 LPRINT"* ";T1$;" *"
01010 LPRINT [A42 95];"  <==== FOLD"
01020 LPRINT\\\\\[A42 95];"  <==== CUT"
01030 LPRINT\\\\\\
01040 NEXT L
01050 CLEAR:GOTO 100
01060 END
```

```
                                          <==== CUT
-----------------------------------------
  * CASSETTE LABELS *
¦Side 1:                                 ¦
¦Cassette Label Printer                  ¦
¦This is a sample cassette label         ¦
¦printed using this program.             ¦
¦                                        ¦
¦                                        ¦
-----------------------------------------
¦Side 2:                                 ¦
¦Notes may be entered for side one       ¦
¦and/or side two as required.            ¦
¦                                        ¦
¦                                        ¦
¦                                        ¦
-----------------------------------------  <==== FOLD
  * CASSETTE LABELS *
-----------------------------------------  <==== FOLD


-----------------------------------------  <==== CUT
```

Figure 1. Sample label output.

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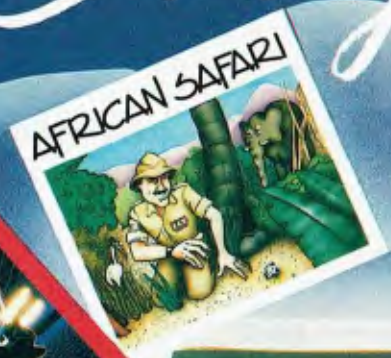

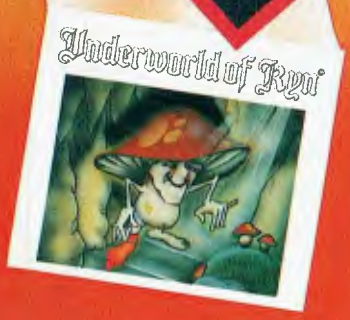

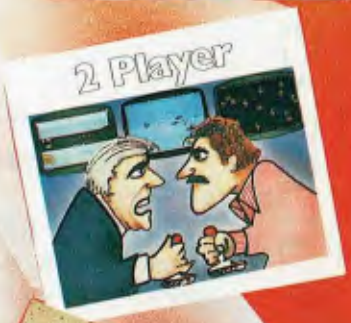

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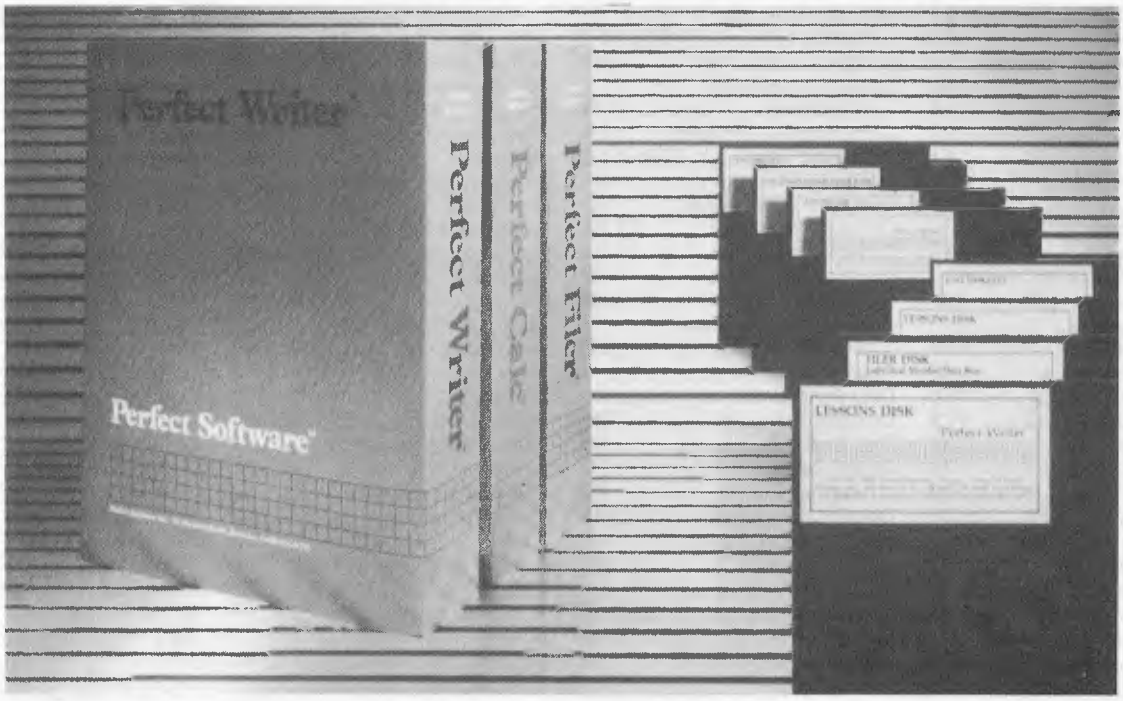

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