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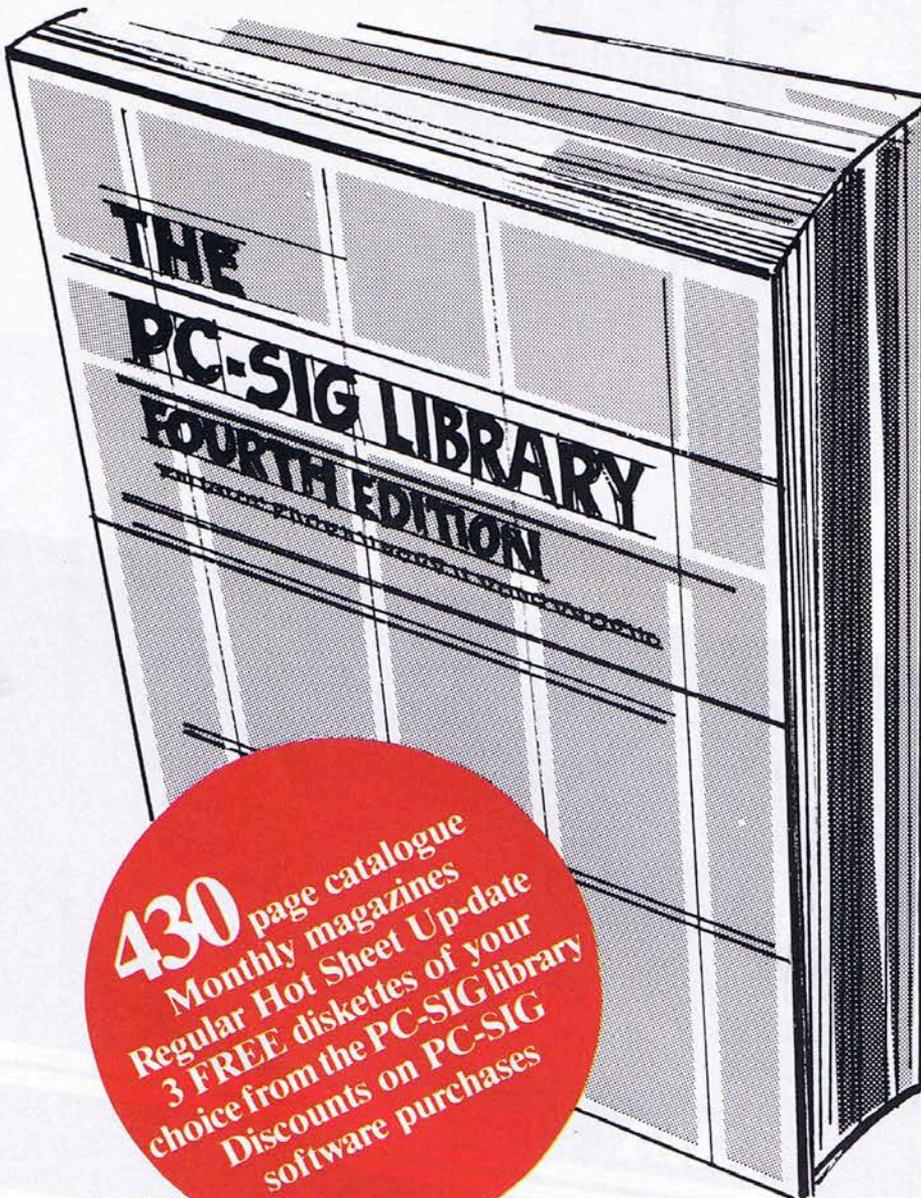
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# BITS & BYTES

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## Local promotion success

Waitemata mayor and television personality Tim Shadbolt has achieved international recognition with an award from Acorn Computers for his promotion of the BBC educational computer. Acorn runs a competition among its distributors in 45 countries for the most original advertising campaign, and the New Zealand success netted Golden Acorn Awards for The Agency and Barson Computers as advertising agency and distributor, as well as the most obvious person involved.

"It's the first award I've ever received for marketing," beamed Tim Shadbolt when he was presented with a certificate by Jonathan Thom-

son, Acorn's general manager for international sales and marketing. "But I've survived two libel cases, and thanks to Barsons in that field as well."

One-third of Acorn's workforce is engaged in R&D, with the bulk of the design work being done at its Cambridge base. About to be announced is the result of some three and a half years' work, the RISC (Reduced Instruction Set Computer) range, which Jonathan Thomson describes as having "a performance leap from a Mini to Concorde. It's aimed at education upwards, and will be the bridge between education and industry."



Jonathan Thomson (right) presents Tim Shadbolt with his Golden Acorn Award for his part in the BBC promotion.

## Monolithic merger

Advanced Micro Devices and Monolithic Memories, two of Silicon Valley's larger chipmakers, have decided to merge in a \$US420 million dollar stock swap. The agreement still needs the approval of shareholders and especially the federal government, for the result would be the country's largest semiconductor firm, boasting annual sales of nearly \$1 billion. Together, the two companies will also virtually control at least half the market for programmable computer logic chips, according to analysts.

Observers see no problems in the

merger, given Washington's current sympathy with the chipmakers' cries of unfair competition from abroad. The announcement comes just one day after Italy's SGS Microelettronica and France's Thomason SA, two of Europe's largest chipmakers, also agreed to merge, and also as AMD has announced the price tag of its battle against Intel for rights to manufacture the 80386 chip. AMD says the battle is costing \$1 million a week in sales it could have made had it been granted a licence to make the 80386 chip.

## Super joint development

Digital Equipment Corporation and Cray Research have announced a cooperative agreement to develop and market products linking each other's systems. At the same time, the first major product of the agreement – the VAX Supercomputer Gateway – was also announced. It will give Digital's products, from the VAXstations to the large VAXcluster systems, direct access to the power of a Cray supercomputer.

According to Chris Harker, Digital's New Zealand general manager, a local Digital user could log on to a Cray in the USA by wide area networking, and carry out very complex computations possible only with supercomputers. He said the announcement would be of interest to Digital's customers in a range of research fields and in such commercial applications as econometric and financial modelling.

## Calculated move by Commodore

Texas Instruments' calculators and related consumer products are to be distributed in New Zealand by Commodore Computer's dealer network. The range is expected to compete at all market levels but especially in school and scientific and business calculators.

According to Commodore managing director Dick Anderson, Texas Instruments' products are compatible with the Commodore range, being strong in the educational area. They will be sourced from Australia where TI has had a subsidiary operation since 1956.

## One step conversion

An IBM PC/XT or compatible can be converted to an AT by the installation of a single card, the Aries Speed Card. It fits a standard expansion slot, has an 80286 microprocessor and provision for an 80287 co-processor, and also has on-board cache memory.

"At just over a thousand dollars, the Aries board is a very cost-effective way to achieve significant additional computing power," says Roland Digital Group's Bennie Gunn.

## Industry recruitment fair

Australia's first Computer Recruitment Fair will run at Sydney's Centrepont on 14-15 August, to be followed by similar fairs in Melbourne in November and New Zealand in mid-1988. Said to herald a revolution in job recruitment techniques in Australia, it is being organised by Intro Australia, a joint venture between INTRO UK and the Slade Consulting Group, and will be sponsored for three years by Computing Australia.

Exhibitors at the fairs will be companies seeking to recruit experienced EDP professionals, and represented there by their senior EDP personnel. Visitors to the fair wanting to know more about companies they might like to work for can talk directly with company representatives.

Similar computer recruitment fairs have been successful in the USA, UK and Europe. The UK alone has run four in the past 12 months, with an average of 5.2 personnel per exhibitor being recruited.

## Even faster 80386

Zenith Data Systems has announced its Z-386, describing it as "one of the faster, most advanced 80386 systems ever manufactured." According to ZDS president Bob Dilworth, the new machine combines zero wait-state technology with an advanced 32-bit memory bus that has the ability to use both PC and AT compatible cards.

Supporting up to two Winchester and two floppy drives, the Z-386 comes with either 40Mb or 80Mb hard drive as standard, plus one 1.2Mb floppy disk drive and six open expansion slots. It is expected to be available soon.

## Theatrical grant

Cowan Bowman Associates has donated \$5,000 worth of computer software to the Wellington-based theatre company Encore Productions, to be used to establish financial and accounting systems. Encore was formed last year, and director Chris Gray says, "Because we're running a number of productions in different locations at one time we can use CBA at remote sites on portables, and the data transfer module will allow us to consolidate that data back at head office."

CBA also gave software to Auckland's Mercury Theatre in January this year to help with the restructuring of its financial and accounting procedures.

## Integrated Solution conference

CAD/CAM topics will be featured in this year's conference of the NZ Electronic Institute which has the theme Electronics - an Integrated Solution, and will be held at Auckland University in early September.

Two of the keynote papers will be

given by Mark Tolliver, worldwide manager of Hewlett-Packard CAD/CAM products ("Realising the Promise of Design Automation"), and Hugh Maaskant, software CAD/CAM expert with Philips, Eindhoven ("Philips' DRM System").

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## Stock exchange contract

NEC's APC IV Powermate has been chosen as the terminal for the Australian Stock Exchange's (ASX) screen trading project. The initial contract, for 200 Powermates currently being delivered, is worth about \$A1.5 million with the unit price including a Brother printer and communications card, acting as intelligent workstations connected to the ASX's 11 minicomputers.

The first stage of the screen trading project, involving 20 stocks being transferred to the new system, will go live on the Sydney and Melbourne exchanges this month. Within 12 months some 500 intelligent workstations are expected to be connected to the screen trading system, with all 2,000 stocks being traded electronically by the end of 1988.

## Apricot bug "unlikely"

The bug affecting many of Britain's Apricot computers is, according to Barson Computer's managing director Doug Pauling, "unlikely to be present in any computers here in New Zealand." It applies only to the BIOS 2.7 Apricots manufactured before October 1985, and Barson has offered to upgrade every known Apricot in the country.

The bug suddenly puts the machine's system clock wrong by 40 days and it will stay that way until 29 February 1988, potentially throwing business accounting systems into chaos. *Apricot File* has reportedly published a short Basic program to correct the date automatically each time as an interim measure and is looking for a long-term solution to the problem.

## New consumables outlet

New to the local computer scene is Printout, an Auckland company supplying PC users with all consumables in single quantities or small packs, as well as accessories which include computer furniture. Printout manager Mike Keown says the company offers lower prices by keeping costs down, employing no field representatives and selling direct to customers as well as through selected retailers whose Printout prices are carefully controlled. Buyers can order through modem, fax or telephone.

## Benchtop troubleshooter

Antron Electronics, a British company, has developed a microprocessor system tester for use in field repair, service, debugging, development or low-volume production board testing. The MST16/32 provides predefined tests for ROM, RAM and I/O, custom tests, and allows the execution of a large amount of testing on the board.

The console has user programs stored in battery-backed RAM, with ports for terminal, printer and PC host, allowing program development, datalogging, program and results listing and mass storage.



Antron MST16/32 computer system tester for field or laboratory use.

## Twice as many

Auckland-based Cowan Bowman Associates' CBA Business Package is now installed in more than 2,000 sites, with its 650 New Zealand sales doubled in Australia where it is marketed by CBA subsidiary Automation One. The package is used hereby, among others, the Stock Exchange, Dairy Board and Shell Oil, while Australian users include the National Safety Council, BHP subsidiaries and the Victoria government's Small Busi-

ness Development Corporation.

CBA also reports that new minicomputer versions of the micro application development system DataFlex, which it distributes here, have been officially released. It is understood to be the first time an application system born in microcomputers has expanded upward to encompass minis, the reverse generally being the case. DataFlex forms the basis of CBA's Business Package.

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## Spin-offs from defence

Marine-Air Systems, the Wellington company founded more than 11 years ago, is discovering that its expertise in supplying custom-designed electronic solutions to the Ministry of Defence is useful in solving industrial and commercial problems.

Such applications include image processing, originally developed for scoring practice bomb drops but capable of being designed for inspection

of "any number of commodities - from apples to motor vehicle parts," according to managing director Neville Jordan. Electronic remote control devices are another example of military equipment with industrial usefulness, but the company believes the field with most potential is electronic simulation, "the key to industrial feasibility studies, designing and developing new processes, and training staff."

## Just the Facts

Wang Laboratories has announced a 17.9 per cent shareholding acquisition in Fact International, the New Zealand-based supplier of integrated management information systems. Fact provides and markets support services for its products in the USA, Australia and New Zealand, while third-party support is available in Canada, the UK and Asia.

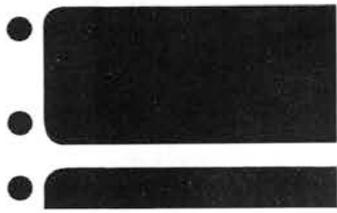
Commenting on the move, Wang Laboratories president Frederick Wang says, "The market which Fact serves is among those we have identified as holding the key to our future profitable growth. This acquisition is another tribute to the highly innovative and sophisticated expertise that Wang Laboratories Inc has found exists among software companies in New Zealand and Australia."

Wang and Fact have a firm business relationship dating from 1980, and Fact's recent international expansion has been in association with Wang around the world.

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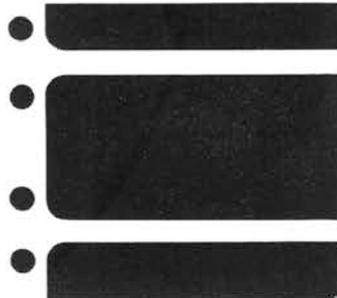
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## Trilogy result of merger

Created by the beginning of this month was Trilogy Corporation, the result of a merger between two existing Australasian computer groups, CCL Business Systems and the Andas Group, and comprising three separate companies: Trilogy Business Systems, Andas Business Machines, and Trilogy Australia.

CCL Business Systems was originally part of Computer Consultants and was created after a merger with Southern Business Machines in 1985. As part of the CCL Group, it was responsible for the marketing of computer hardware and office automation products, software development and the provision of engineering services nationwide. The Andas Group originated as Armstrong and Springhall in 1916 but developed into a large group of companies united under the Andas banner in 1979, buying the O'Reilly Corporation in 1983 as the Australian side of what is now Trilogy Corporation.

Trilogy Business Systems is a combination of the business systems arms of both the Andas and CCL groups, now described as the largest New Zealand-owned computer systems company providing a network of offices throughout the country.

## 9000 EXZEL Computers Sold

Computer Imports Limited at a special presentation has announced the recent installation of the 9000th EXZEL Computer System.

"It seems appropriate that the 9000th EXZEL in New Zealand should be purchased by a market leading organisation such as Oasis," stated Assistant General Manager, Mr Jim Mather, "reflecting our own position within the computer industry."

In talking to Mr Derek Mason — Plant Manager for Oasis Industries Limited, it was disclosed that the EXZEL Computer is being used to monitor machine utilisation and downtime plus the overall efficiency of the production line on a daily basis. Results are then presented in graphic form to allow easier interpretation of the figures.

In addition the system produces 'Manufacturing Orders' and is also used for the 'Printing of Labels'. "With the facility of being connected to their IBM System 36 Mainframe," stated Mr Mason, "we have full monitoring capabilities of our inventories from raw materials right through to finished products."

Future plans Mr Mason envisages for the computer include preventative maintenance scheduling, integrated learning packages and maybe even Real Time Production Line Monitoring. These results are being achieved using a standard EXZEL XT configured with an EGA Colour Option and a 30Mb hard disk.



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## Computer Imports Makes Impact

Computer Imports are renowned for creating an impact. Such as the case at the recent Southern Business Expo held at the Christchurch Town Hall. Computer Imports' stand encompassed the entire stage of the Town Hall making it the largest showcase of the show.

According to Mr Hackett, Marketing Manager, the costs of the show were more than recouped from orders taken, with eight system orders taken directly from the stand. "Also within 24 hours of the close of the show, we had opened our Christchurch retail showroom," stated Mr Hackett.

## Christchurch Branch Opened at 167 Gloucester Street

Those people in the South Island, and Christchurch in particular, are invited to make themselves known to the local Branch Manager, Mr George Wood.

Mr Wood commented that within hours of the lease being signed for the new premises the first customer was knocking on the door wanting to make a purchase. Even though the showroom was still in boxes a happy customer left with his purchase under his arm.

"Computer Imports' commitment is to provide a prompt, helpful service from a local base," stated Mr Wood.

In order to celebrate the opening of the Christchurch branch, Computer Imports will be offering a number of special offers to visitors calling into the office during July.

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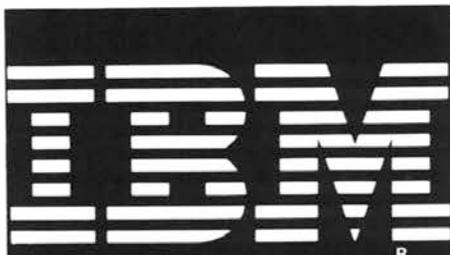
# Computing 87 Show



Richard Horsfall, of Amvest Consultants, won the draw for dinner for two at Hemingway's Restaurant. Here he is presented with his tickets by Bits & Bytes advertising manager Dave Meyer.



The robot may have been popular with the children and general public, but three solid days of it were a bit much for most exhibitors.



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On the Verbatim stand are, from left: Mike Rollo, Auckland area representative; Sean O'Connor, Wellington sales manager; Paul Woods, national sales manager, Australia; and New Zealand manager Derek Dingle.

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## Trans-Tasman expansion

Another New Zealand computer company is expanding into Australia, as Wellington-based Micropost Software & Supplies Ltd embarks on a programme of establishing sales offices in Auckland, Sydney, Melbourne and Brisbane. Micropost, in conjunction with Vecta Corporation, recently acquired the business of Australian software distributor Arcom Pacific, which will form the basis of its new Australasian activity.

Micropost managing director Fred Muys is moving to Australia early this month to manage the enlarged business, which also includes the Auckland-based software retailer First Access, intended to provide a base for the company's growth in the Auckland PC market. "We expect to make announcements shortly regarding additional senior staff appointments in both Auckland and Wellington, and a new Auckland retail showroom will be opening in a few weeks," he says.

## Merger and restructure

Christchurch-based White Knight and its associated company Radley Investments are undergoing major restructuring to increase the range of services offered, first merging the two arms into White Knight Capital Ltd and then splitting its operations into separate divisions. Managing director is Bob Radley and general manager is Warren Janett, previously a White Knight director.

The company has secured the New Zealand distributorship of the Singapore-manufactured IPC range of IBM compatibles, which will also include monitors, laser printers, fax boards, OCR scanners, plotters and digitisers. White Knight has also developed sharemarket and financial software and imports general business and utility programs, and its sales territory now extends from Whangarei to Invercargill.

## New training facility

Impact Technologies, the New Zealand distributor for Novell, TeleVideo and Impact, has opened a new training and education centre in its Auckland offices. Courses will be run in

two lecture rooms and also on-site for clients, and the education centre is authorised by Ashton-Tate and Novell, covering a wide range of subjects.

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# The psychological factor

by Martin Webb,

Investment Analyst, Paul Morgan Ltd

Over the last two or three months the New Zealand share market has displayed an extremely volatile pattern and has shown marked fluctuations in investors' sympathy and sentiment.

On Monday 18 May the Barclays Index experienced a record one-day decline of 174.28 points, falling from a value of 2987.91 on the Friday night to end at 2813.63 on the following Monday evening. In the space of about seven hours some 5.83 per cent of the value of New Zealand's 40 largest companies had been written off. Across the overall market an estimated \$1.35 billion had been stripped from total values on the New Zealand share market.

Of the 247 issues traded that day, 52.2 per cent, or 129 companies', share prices fell, with the share prices of only 21 companies improving. The media described the day as "a market crash", brokers collectively or individually termed it as "a blood bath", "panic selling" and "an overdue downward correction".

All this in a market in which \$19 million worth of stock changed hands, against the previous Monday's value of \$37.8 million and a month before Monday's value of \$17.1 million, and 10.5 million shares for these days.

Nearly all market observers and experts agreed that this "correction" was overdue and many commented publicly that such a fall "had appeared imminent for some time". Surprisingly, I can recall only one solitary broker in New Zealand recommending reduced exposure to the New Zealand market, among the proliferation of buy recommendations streaming out of brokers' offices in late 1986 and early 1987. Although many brokers recommended diversification away from the New Zealand market, most stopped short of recommending specific companies for divestment.

The reader may be asking him or herself, what does this matter? The point I am trying to make is that between the Friday night of 15 May and the Monday morning of 18 May 1987 nothing major had happened that seemingly would have affected the share prices of most of the companies listed on the New Zealand share market.

By nothing major, I mean nothing major in the sense of fundamental economic or business factors moving

in a materially negative direction.

However, the wild card factor that moved, and altered very materially, was investor sentiment and outlook. In the intervening weekend, an influential publication, widely followed by smaller investors, alerted many of its subscribers to the fact that technically the New Zealand market looked to be on a downward track.

Immediately investors, both individually and collectively, changed their opinions about the market from one of perhaps cautious optimism and preparedness to hold shares, to a mood of very, very, willing sellers.

This change in psychology had obvious ramifications for the share market and proved emphatically that although an analyst can use any number of quantitative analytical techniques to assist in valuing securities and the market, these become irrelevant when qualitative factors such as investor sentiment and fear of

losing capital permeate the collective consciences of investors.

All at once people begin to act like sheep, following the herd. Sooner or later any action taken by one individual will become the norm for most others.

In these days of computer-assisted investment analysis techniques, computer programmed securities trading methods and, in some markets, fully computerised trading operations, it is comforting (or worrying?) to know that ultimately it is the human element or psyche that will decide the direction of the market.

Is there a computer programmer about who can incorporate the logic of orthodox capital markets theory with an appreciation of the unpredictable workings of the human mind into the format of a program?

Until such a program is developed market observers must still be wary of the psychological factor.

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# High technology for export

by John King

At first glance it looks like a very large games arcade, with people standing at 70 booths lined up around a dimly-lit 2150m<sup>2</sup> open area. All are staring at screens, joysticks in hand, intent on manoeuvring things and concentrating hard.

But there are differences. The sound level is subdued, with none of the noises all too obvious near any shoot-'em-up games machine. The age spread is much greater, middle-aged and elderly people mixing with

school children and young family groups, and the length of time anybody spends at one booth is usually less than an expert will take to spin out a video game. What's happening inside this new building beside the

Freemans Bay lighter basin in Auckland's waterfront district?

Nothing more than another world first in New Zealand's high-tech microcomputer industry, to put it simply. The Microworld of Inner Space opened its doors in February after a year's development and has already established itself as one of Auckland's major attractions, managing to combine both entertainment and education in one most interesting package.

Microworld is the brainchild of Lannes Johnson and Kerry Spackman, who had the idea of the advanced opto-electronic technology combined with computerised operations, and put together the necessary technical, financial and commercial backing to make it work.

Their original idea was inspired by the work of Stephen Carter in England, who used microscope slides in a projector to show magnified images on a screen. It must be possible, they thought, to have a video camera hooked up to a microscope to achieve a better result, and an extension of the theme resulted in the technically impressive robotics and display booths now in operation at Microworld.

own self-contained ecosystem, in full view of the operator. Such things as ants' nest and beehive can be studied closely, or a gecko can be stared at eyeball-to-eyeball or a crab's complex mouth watched in detail. A weta, incidentally, looks no prettier in closeup.

The interface between viewer and robotics section is a series of Exzel microcomputers, one mounted out of sight at each booth and controlling its own location by wiring of sufficient complexity to keep an enthusiast happy for years. The computer is programmed with its own focus, tracking and other controls, and can be used to debug or reprogram that location, but is locked out in what is described as "foolproof" manner so that even the most determined member of the public can use it only in the way it is intended.

The robotics room is glass-fronted for public viewing, although physical access is restricted for obvious reasons. Each location has its own Zeiss microscope, Sony video camera, 100-watt halogen lighting for colour stability, and platform containing eight exhibits, moved around under the microscope in three axes by screw threads turned by Philips step-



Kerry Spackman (left) and Lannes Johnson in the machine room.

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Basic design and software writing took only six months with a team approach and assistance from many experts in their fields. Kerry Spackman specialised in the machinery side while Lannes Johnson coordinated the specimens and text, all 4,000 pages of it.

## Battle

None of it was easy. "We had a huge battle to get the building approved," recalls Spackman. "This area is zoned Industrial H (for marine use) and we had to have a special departure.

"Another aspect was more than a hundred hours of legal negotiation, because under the Human Tissue Act it's illegal to display human tissue in a public place." Several displays feature such things as carcinomas and other skin exhibits, and one shows human embryos in various stages of development. No drawings or photographs are used; Microworld's displays are all unique slide specimens in full colour, sometimes enhanced by the use of polarised lighting.

Having achieved all this, what's the next step? "The Mark 2 version will have compound as well as stereo microscopes, going up to 1100 x magnification - the current technology is 440 x - with high-res cameras," says Spackman. "Model B in The Living Tunnel will have faster tracking and



*Not unlike a games arcade in appearance, Microworld has a very different function.*

better depth of field.

"But everything is now geared for export. There's a very big worldwide market for this technology, up to a thousand units a year, and already we've had approaches from five countries, without any sort of advertising at all."

The potentials for uses of this New Zealand-developed technology reach far beyond Microworld's semi-education, semi-entertainment public attraction. Tertiary education institutions have shown much interest as the techniques enable a large audience to experience things previously visible to only one person peering into a microscope, while further advances in 3-D with stereo microscopes also show promise.

And it's not the first time that New Zealanders have developed world-leading technology based on microcomputers. Nor is it expected to be the last.

Each of the 70 booths, divided into specialist areas, has a theme common to its eight viewing options. The viewer uses a standard computer keyboard to make a choice with the numeric keys, and further options of explanatory text (and language) by using the function keys, with everything appearing on the standard green-screen monitor in front of the keyboard. Once the choice has been made, the microscope in its separate room is controlled by three separate levers beside the keyboard: zoom (up to 200 x magnification, depending on the exhibit); focus (most of the objects are solid, allowing inspection of the surface or deep inside the contours); and four-way tracking around the limits of the exhibit, with the video image appearing in colour on a separate screen.

A variation on the theme is found inside The Living Tunnel, where each of 20 scanners concentrates on its

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# Multispeed comment

Dear Sir,

We read with some interest the Multispeed review by Mark James in your June 1987 issue. Whilst, in the main, it is a useful product review, there are some aspects that should be addressed.

The reviewer's comments regarding support are not factually correct:

- NEC Information Systems has been established in New Zealand since March 1986. We are geared to supporting hardware and sys-

tems software supplied to our Authorised Dealers. These dealers in turn provide full end-user support as was clearly demonstrated by the assistance rendered to your reviewer by Software Architects and Kerry Salter Associates.

- The fact that an NEC sales conference coincided with the review is totally irrelevant. The administrative, engineering and support aspects of our company were unaffected by the conference, and at no

time received an enquiry from the reviewer.

- The manufacturer, and our parent company, is now NEC Corporation, not Nippon Electric Corporation.

**Nigel B. Ekins**

*Corporate Sales,  
NEC Information Systems  
Australia Pty Ltd,  
Auckland*

## Slow to recognise

Dear Sir,

I was interested in your column "Micros at Work" subtitled "IBM - will its PCs set another standard?" on page 64 of your June 1987 issue. It states, "Remember that you can usually only perform one task at a time on a standard microcomputer."

When will your editors and authors recognise Concurrent DOS? With this system the **standard** ICL microcomputer not only runs four screens on the one microcomputer but will, provided memory requirements are suitable, run up to four processes on each of those four terminals.

**C.V. Currie**

*Director,  
Systems Software and  
Instrumentation Ltd,  
Christchurch*

## Printer ribbons

Dear Editor,

I note your article on reinking printer ribbons on page 66 of your May issue.

It is worth noting that inks are specially formulated for dot matrix printers with no solids content and with lubricants added. Most general purpose inks are made with a high solids content to give dense print, and the metal font in numbering machines is unlikely to require lubricants.

Your readers should be aware that reinking may save the cost of a few ribbons, but probably at the cost of substantially reduced printhead life.

**Basil Orr**

*Chief Executive,  
Control Microcomputers*

## In search of a portable

Dear Sir,

Having read the article "Why my dog hates Tandy" on page 61 of the April issue, I would like to obtain further information on the hardware options mentioned, but am finding this rather difficult. My interest is in the lightweight options mentioned, namely Sord, Epson PX-8, Tandy 100/101 and NEC/Olivetti equivalent.

If you or your correspondent could provide further information or a list of local suppliers I would be most obliged.

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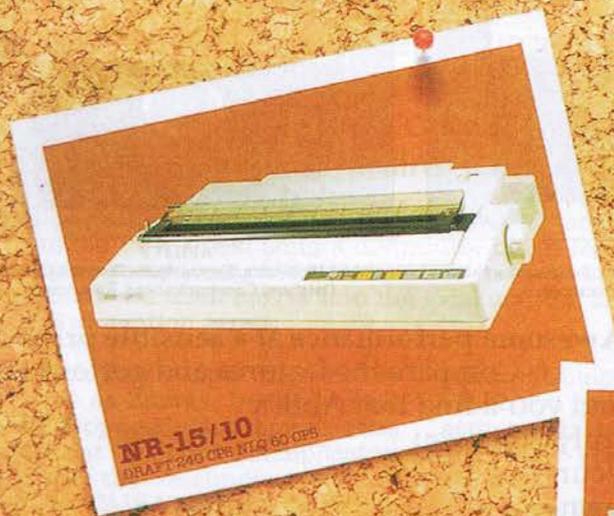
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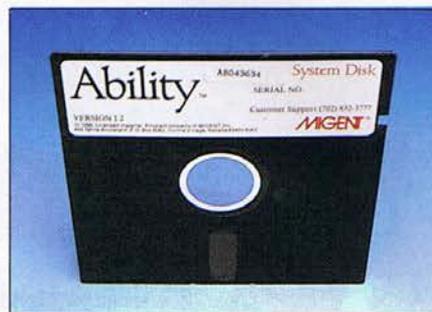
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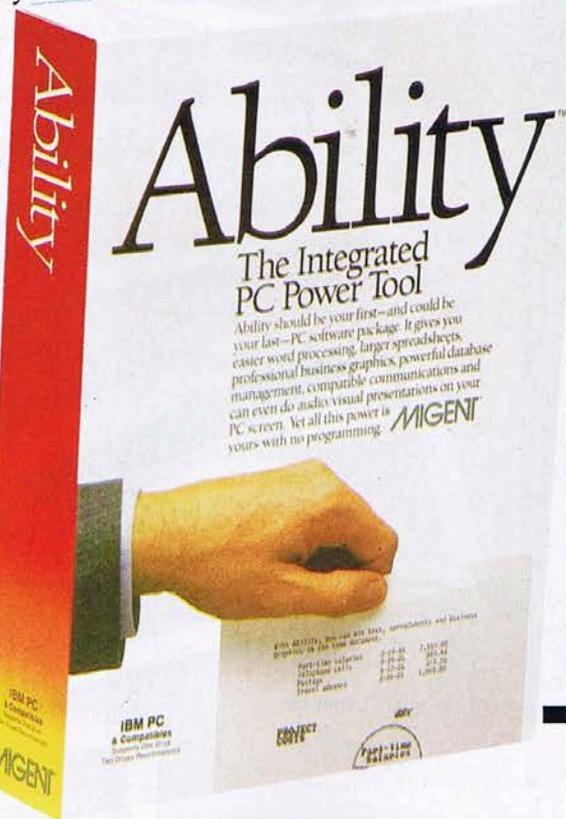
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# The Zebra changes its stripes

A new range of medium-to-heavy weight multi-user computers has been launched on the Australian and New Zealand market, sourced from California. Mark James Picks through one model and its operating system which, although definitely not MS-DOS compatible, is already gaining familiarity.

**A** amalgamated Wireless Australia, or AWA as most of us know it, has just changed its stripes. Long a distributor of the Microdata range of McDonnell-Douglas computers, AWA Computers has just switched away from that line as Microdata itself moves into the local market, and instead taken on the General Automation series.

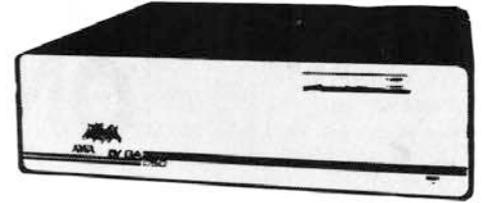
GA's computers are known the world over as Zebras, but the name has been dropped in this region as the arrangement is more complicated than merely that of supplier and distributor, and AWA sells the machines under its own label. The model numbers are the same, however, and as they are beginning to arrive in force in New Zealand, *Bits & Bytes* decided to have a look.

The model that we had for review was the Zebra/AWA 1750. Although it looks at first sight like an ordinary IBM-compatible microcomputer, the 1750 is in fact quite a different animal. A glance at the 12 serial ports on the back panel gives an indication that this machine is built more along the

lines of minicomputers than micros. When you power the thing on and the screen asks you "OPTIONS(X,F,B)=", you know you are not dealing with MS-DOS.

In fact the AWAs, like the Microdata range that preceded them, are machines designed specifically for the Pick operating system. As such, the 1750 differs from most other computers of its size in a number of ways, many of which are again reminiscent of larger machines:

- It is built from the ground up to be multi-user.
- It has no memory-mapped console; all terminals on the system are "dumb" screens with, generally, no graphics capabilities.



- Its microprocessor is the Motorola 68010 chip, a competitor to the Intel 80286 used in the IBM PC/AT and compatible machines.
- It runs the Pick multi-user system exclusively; no MS-DOS or other non-Pick programs or systems will run.
- It has an inbuilt network port that can hook up to other AWAs.

## Physical description

The main unit of the 1750 has a 45-by-44cm footprint and stands 13cm high, making it slightly smaller than the IBM PC/AT and its clones. The monitor on the review machine was a Lear-Siegler ADM-11. This has a tilt-and-swivel base and a detachable keyboard with 84 keys, including four function keys and five cursor-control keys which appear to have no function in the Pick operating system. The F and J



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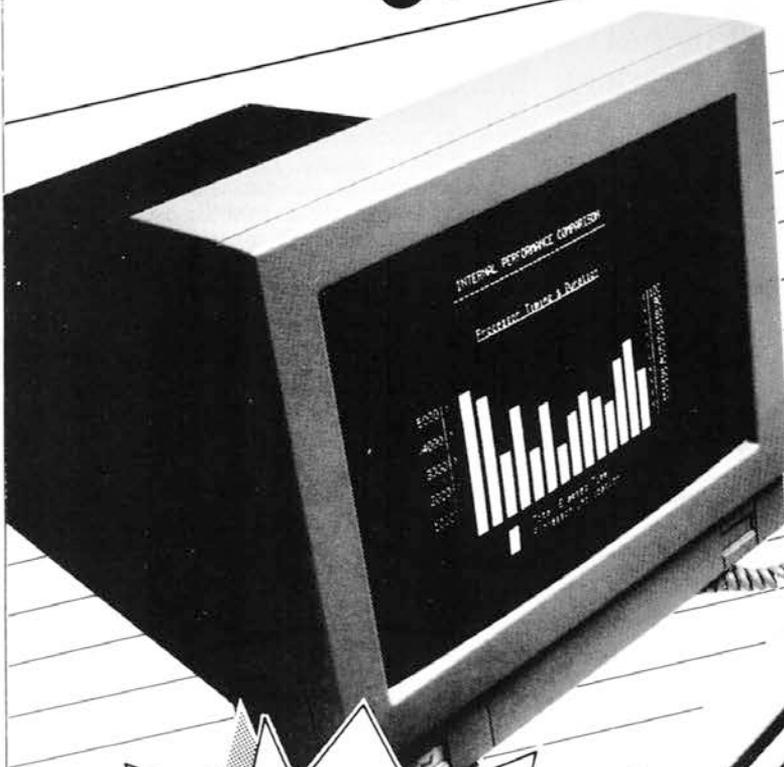
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keys are dished for touch typists, and the keyboard has a slightly clackly feel to it.

On the front panel of the main unit is a cassette tape backup unit, which is the only device on the front panel. The AWA range does not support floppy disks. On the back, apart from the power switch and power inputs (including one for an optional uninterruptible power supply – a wise touch), are all of the communications ports. The 1750 comes with six serial ports as standard, and the review machine had six more.

All except one of the serial ports are nine-pin D-connectors. The exception is a full 25-pin connector, suitable for connecting to another computer's serial port. There is also a Centronics-standard parallel printer port, and room for two optional connections for the AWA's own local-area network. The network can connect up to 255 AWAs together, but cannot be used to communicate with non-AWA computers.

Inside the main unit is the 68010 processor, one megabyte of memory (which resides on a card on the bus, and not on the motherboard), the power supply, the tape unit, a 47Mb hard disk, and a controller card for the six extra serial ports. There are three bus expansion slots; only cards supplied by General Automation may be used here. Options include a second one-megabyte memory card, six more serial ports, and the local-area network controller. There is also room for two more disk drives.

## Pick

The AWA computers run an implementation of the Pick operating system, the operating system and the hardware being tightly integrated, so that the computer cannot boot from any other system, or run any other programs. Those users who know the Pick system will find the AWA implementation familiar, with inbuilt enhancements such as a communications package, a spreadsheet and a half-decent text editor. However, people who have invested time and effort in learning MS-DOS or Unix or another system might have some concern at the prospect of unlearning it all and starting afresh, so a few words on Pick would seem appropriate.

Pick is a system designed around a database. It has its own disk filing structure, its own command language, its own programming language and even its own computer jargon. For example, a database record is not called a record but an "item", and fields within the record are called "attributes". A "value" refers not to the contents of an attribute but to a sub-field. These concepts are fairly

elegant once one becomes accustomed to them, but they do require some effort for the new user to master.

Everything to which the ordinary user has access on the Pick database is stored as displayable text. An item (record) on the database may be thought of as a text file, and the attributes (fields) as lines of text within that file. This means that most of the database can be displayed and changed with the text editor program, although this is not a very friendly way to do so. Attribute text is of variable length, so that there is no wasted space for trailing blanks; this is the only form of data compaction that Pick uses.

Each Pick file must have a dictionary. A Pick dictionary relates the various lines of text in an item to specific kinds of information, such as name, address, or account balance. In addition, it performs the functions of an ordinary data dictionary, specifying field characteristics and data validation criteria. The interpretation of database records is impossible without the relevant dictionaries.

---

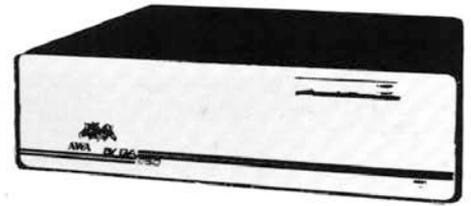
*A glance at the 12 serial ports on the back panel gives an indication that this machine is built more along the lines of minicomputers than micros.*

---

There is an overhead involved in having to keep track of dictionaries as well as records, as this adds to the number of disk accesses that the system must perform. Disk accesses are the efficiency bottleneck of Pick systems, as they are for most multi-user systems. Pick has a caching algorithm for disk sectors, which helps with this problem, while the hardware also incorporates intelligent disk controllers optimised for Pick disk operations.

The overhead of the dictionaries has its benefits, however. Users may make changes to data formats simply by editing the appropriate dictionary with the changes taking effect immediately. There are limits to the kinds of changes that can be made in this way (the order of attributes within an item, for example, must remain fixed), but the Pick database remains one of the most flexible around.

Pick's command language is rich in database query commands, called Access commands, which would require a separate database product



under most other systems. Users may type such self-explanatory instructions as LIST CLIENT-FILE WITH CITY="NAPIER", and the system will do just that. The Pick database is not, properly speaking, relational, but it does have the ability to link items in a relational way, which is all that most people need.

Its filing structure is geared for efficiency in two operations: finding a record whose identity is known exactly; and reading through an entire file. The database does not maintain records in any inherent order, so that the system is weak on such operations as find-next and find-on-partial-key. To perform such functions, the system must first read through the entire file and sort it in an appropriate order; this is very fast for small files, but response times can become quite slow for large ones.

For programmers, Pick supports only one language: Pick BASIC. This is an enhanced, structured BASIC with many instructions specific to the Pick operating system and file structure. Programs written for any other system or in any other language (even other BASICs) must be extensively rewritten to run under Pick.

Pick, then, is a heavily database-oriented system, intended for on-line transaction processing and database queries. It is not fast at calculations, and although the AWA implementation has both a spreadsheet and some support for graphics terminals, neither stands out as a particular strength of Pick.

## Ease of use

Apart from the question of getting used to the Pick way of doing things, the AWA is an easy-to-use system. Every site will need at least one person familiar with the workings of Pick to set up or modify files (not a self-evident procedure). However, day-to-day operations do not require much in the way of expertise, once the user becomes accustomed to the Access command language.

One thing that Access cannot do, however, is make changes to the data. Unless there is a specific BASIC program to do this, the user must employ a text editor to create, update or delete items in a file (taking advantage of the fact that all data are stored as displayable text).

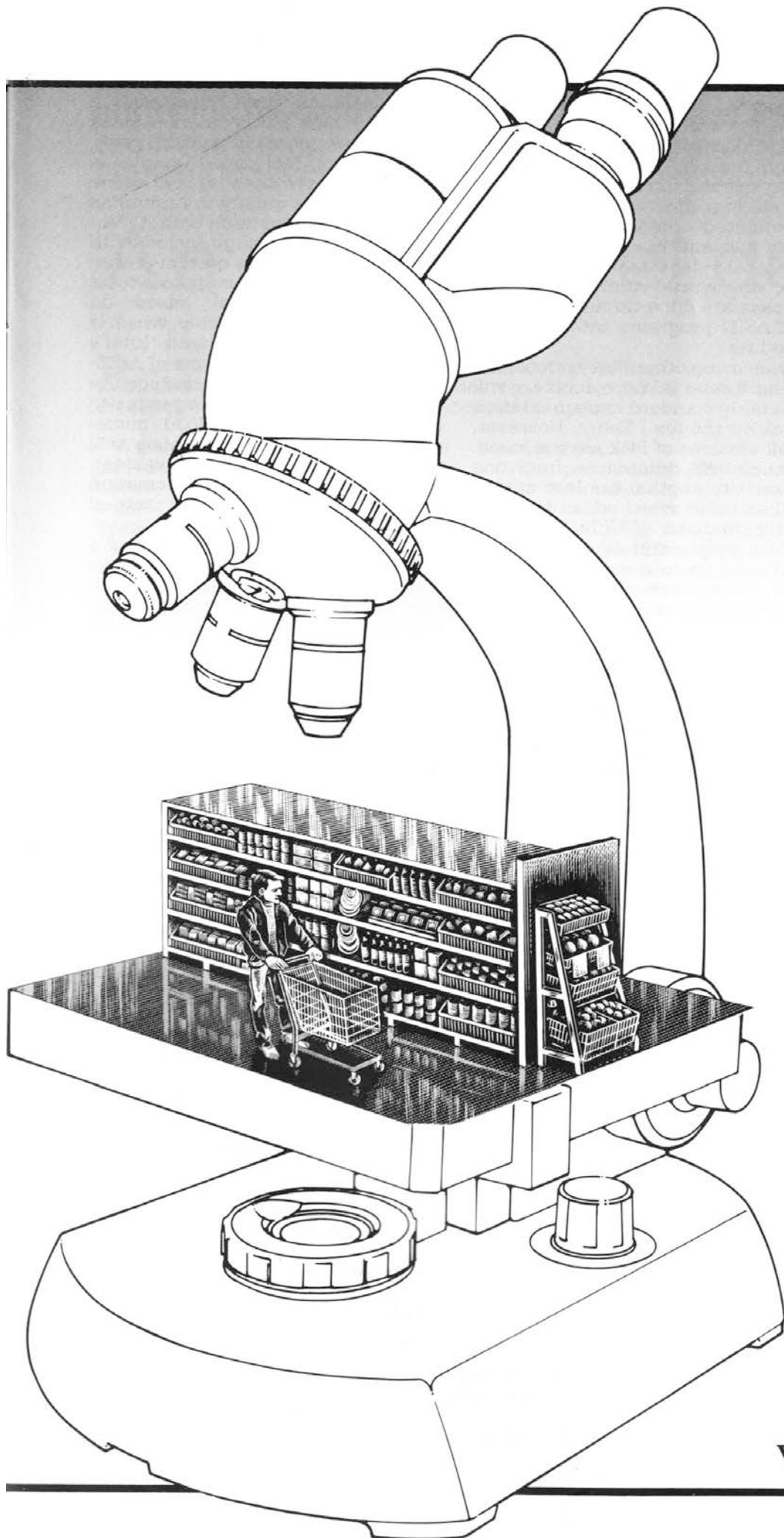
**We studied supermarkets  
for years so they  
could restock in seconds.**

Keeping track of 5,000 kinds of food is enough to age the most energetic manager.

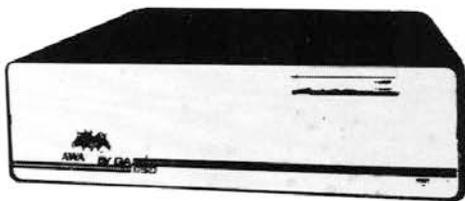
To help Foodtown restock on time, we worked with the world's best supermarkets, like Sainsbury's in Britain and Euromarché in France. Only after we had mastered the details did we focus on Foodtown. And create a masterpiece.

For example, when someone buys a can of soup, the computer system records the sale, tells the head office and finds out how much soup is left. So restocking is ready to race.

That's our approach at ICL. We fuss over details. So your days are freed for bigger things.



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Pick's own Editor program is atrociously user-hostile, and is not recommended for those unaccustomed to such things. Like the EDLIN program of MS-DOS, the Pick Editor works on only one line at a time, as if it were running on an old Teletype printer-terminal. A series of cryptic one- and two-letter commands must be memorised, and changes to the data might not even show on the screen until the text is "filed" (saved to disk).

Fortunately, the AWA range comes with an alternate text editor called Jet, a full-screen editor with visible cursor control, word wrap, reasonable cut-and-paste provisions, and a spelling checker. Its documentation pretentiously calls it a word processor, which it is most certainly not. Text must be entered in upper-case only, and special commands used to convert whatever needs to be in lower-case, which is Jet's worst feature.

*With its new distributorship and a concentration on packaged solutions rather than just the "raw" Pick system, AWA is approaching the market from a new angle.*

There is an obtrusive command mode that gets in the way of the editing, although this is not as bad as in the Pick Editor, and there is no proper character-insert mode, right-margin justification or page indicators. Although a vast improvement over the Pick Editor, Jet is not very impressive itself. Text editing must still be considered one of the weak points in the AWA's ease of use.

The machine comes with three fat binders with a dozen manuals inside, including two introductory guides to the Pick system and separate volumes for the Access language, Pick BASIC, general Pick operations, and Procs (a "Proc" is Pick jargon for a command file). Although the quality of the presentation is sometimes lacking, the documentation itself is uniformly well-written. All manuals are indexed. There is also a small

Quick Guide, which presents a summary of commands and their syntax, and proved to be extremely useful during the review.

All in all, with the exception of text editing, the AWA is an efficient, easy-to-use system. Since the problem of text editing affects everything in a text-oriented database, AWA is wisely concentrating its sales energies on fully-developed package systems, in which changes to the database are done through pre-written BASIC programs rather than a text editor.

Those using other Pick systems (including former AWA machines) will find a fairly standard implementation of Pick on the (ex-) Zebra. However, not all versions of Pick are the same. Although the differences from one "flavour" to another are less annoying than those which afflict the various incarnations of Unix, the AWA support people still estimate that it could take up to a week to convert large systems from another Pick system over to the new machine.

## Conclusions

AWA's decision to market General Automation's Zebra computers stems, according to managing director Martyn Coe, from disappointment in the inability of their previous supplier, McDonnell-Douglas, to come up with cost-effective products and first-rate support. However, it

has been no secret that McDonnell-Douglas has been itching to set up in Australasia, and that it was only a matter of time before friction arose with its Australasian distributor, AWA. In fact, McDonnell-Douglas is reported to have already sold Micro data computers quietly to Australian hospitals, in competition with AWA.

The new AWA range includes, in addition to the 1750, a bottom-of-the-line 1350 as well as larger systems (really minicomputers) based on Motorola's 32-bit 68020 chip, which is in direct competition with Intel's 80386. Later this year, General Automation is scheduled to introduce the 8820, possibly the first computer to use Motorola's new 68030 microprocessor, which AWA claims will support up to 256 users. It is clear, then, that General Automation intends to stay up with the state of the art.

With its new distributorship and a concentration on packaged solutions rather than just the "raw" Pick system, AWA is approaching the market from a new angle. The quality of the packaged software and the suitability of the Pick system for a given situation, of course, must be the deciding factor as to whether a company should consider purchasing an AWA computer.

However, the computer itself is a well-designed machine with a multi-user orientation and thorough documentation, and the support of an established local organisation.

*Review machine supplied by AWA Computers, Auckland.*

### Microcomputer Summary

Name	AWA 1750
Manufacturer	General Automation Inc., Anaheim, California
Microprocessor	Motorola 68010
Clock speed	12.5 MHz
RAM,	1 Mb (expandable to 2 Mb)
Input/output	6 serial ports (expandable to 18) 1 Centronics parallel port 1/4-inch cassette tape drive optional local-area network (to other AWA computers only)
Graphics	None
Monitor	Lear-Siegler ADM-11 ASCII terminal
Keyboard	84 full-travel keys, including 4 shiftable function keys, 8 cursor-control keys, numeric keypad and BREAK key
Disk	47 Mb Rodime hard disk
Operating system	Pick
Language	Pick BASIC
Bundled software	Jet editor, Compusheet spreadsheet, COM.SYS inter-Pick communications, Accuplot graphics
Base price	\$28,500
Options	second 1Mb memory \$5,500 6 more serial lines \$2,800 network controller board \$3,100 uninterruptable power supply \$2,500 Extra 47, 67 or 140-megabyte disk drives
Ratings (5 highest)	Documentation 4; support 5; ease of use 4; expansion capability 4; connectivity 3.

Databases are widely recognised as being essential for the modern business, of whatever size. Some are more complex and versatile than others, but Paul Left looks at what Ashton-Tate is marketing as....

# An entry-level database

**R**apidFile is a simple file management, text-editing, and mail-merge package aimed at users who do not need the relational or sophisticated reporting capabilities of higher-priced database systems.

Ashton-Tate's new product is aimed at a specific end-user. Unlike dBase, Rbase, or the other more sophisticated database management systems, RapidFile does not provide a programming environment or the ability to relate data in multiple files. It does, however, provide file-management features which may prove of use to those who need to work with simple database structures and utilise the data in creating text files. The package, then, is intended for relatively unsophisticated applications and users with neither the knowledge, time, nor need to develop their own applications.

RapidFile displays a copyright notice upon booting, then displays the File Menu. There are five main pull-down menus, accessed by pressing the "/" key (as in Lotus) or by typing Control-F for File, etc. This is becoming a standard interface which makes the task of learning new software simple, provided the menu choices are sensibly arranged under headings. The pull-down structure can be altered to a Lotus-like menu for those who prefer it. Commands are provided to create and manipulate files, alter screen layout, and sort and select records.

Normally, the first action is to retrieve an existing or create a new file. Also available from the File Manager is the Write menu, which provides the options of creating a memo or a form letter. The memo editor is a simple text-editor which provides justification of text, search and replace, various typestyles (although I was unable to see them on the LCD screen I was using), and altered margins and tabs. In other words, it is a fairly standard text-editor which includes the most useful and commonly-used functions.

The merge facility is based on the text-editor, and allows fields from the current database file to be inserted anywhere within the text from the menu. Data from the current record are shown in reverse, and the menu also allows the form letter to be displayed for all records selected from

the database.

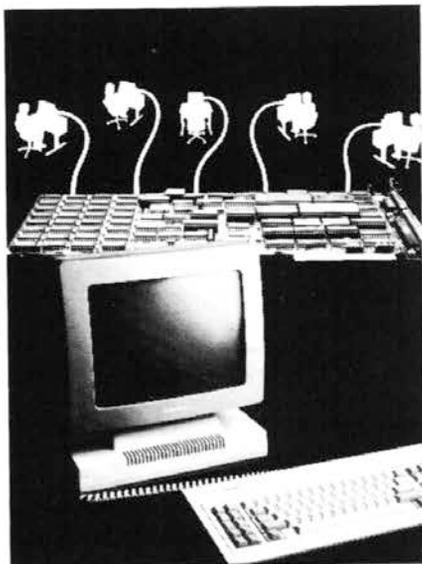
This previewing feature should make the mail-merge process accessible to those users who would not attempt it using embedded merge fields as in WordStar or some main-frame word processing packages.

By default, the database file itself is displayed on the screen as a table. That is, records are displayed as rows with the field names as column headings. This can be altered to a form layout (where each record is displayed as a single screen), or a split form/

table layout where the cursor may be scrolled through the table display of the file and the current record is displayed in the form section of the screen. As the file is stored in RAM (the disk is used as virtual memory as needed), only a slight delay is noticeable in moving among records.

Also available from the Layout menu are label and report options. A label is, by default, six lines high but may be customised or changed to any of a number of pre-defined sizes. Up to 10 labels may be printed across the page. The label layout may be customised by placing fields and text inside the label depicted on screen. Fields may be reversed (that is,





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Q11

'Smith, Ann' becomes 'Anne Smith') or word-wrap may be enabled where a field is composed of lengthy text.

Reports are produced in a similar manner to labels. Quick reports are simple columnar tables which allow for two sort fields as well as sub-averages, counts, and totals. Custom reports allow the placing of fields and text anywhere within the page, as well as headers, sub-headers, titles, and footers.

The design process is quick and easy, and report sections are simple to define, while the visual nature of the process allows the user to consider placement carefully and also removes the need for trial-and-error procedures.

*RapidFile's text capabilities and ease of use could also make it a useful educational tool.*

The database function of RapidFile is the core of the package. Creating a new file or altering the structure of an existing file is a simple menu-driven procedure. Field-types are Text, Numeric, Date, Calculated (derived from other fields), or Report (using data in fields of one or more records). A useful feature of the database is the ability to 'Zoom' a text field, which enters the text-editor and allows the creation of a file up to 64k characters in length which is linked to the field. This ability to treat large chunks of text as database fields makes the database a useful tool for manipulating information which does not fit well into a highly-structured file.

But there are a few features of RapidFile which I found inconvenient:

1. There are two ways of accessing menus in the File Manager: the first is to use the Ctrl key and the other is to press "/". Pressing the "/" key in the memo-writer, however, merely inserts this character in the file.

2. There are inconsistencies in the keys used to set some options using the menus. For example, sometimes the F9 key (Implement) is used, at others the Esc key is used. I found the mixture of menus, control-characters, and function keys confusing to use and not intuitive. The attempt to provide compatibility with Lotus 1-2-3 commands seems to have been partly responsible for the poor choices made for some commands.

3. When entering data, pressing Tab moves to the next field. Pressing Enter does the same, when it may have been more sensible to remain on the same field. I was reminded of a certain spreadsheet which moved the cursor on pressing Enter in the direc-

tion of the last cursor key pressed... which always seemed to be the direction least expected.

4. When entering data, fields wrap around the screen, so that moving to the right of the last field in a table layout causes the cursor to jump to the first field and the display to scroll horizontally. I found this jumpy screen display annoying and disorienting at times. It seems unnecessary when there are keys defined to jump to the first and last fields.

RapidFile allows users with little database experience to manage files, produce reports using numeric calculations, and create and print mailing labels and form letters. It is not suitable for those users who need the more sophisticated file-management capabilities of the top-end database management software available.

As such, it would prove most suitable for small organisations which need an easy-to-use package to keep a mailing list or other simple database files. RapidFile's text capabilities and ease of use could also make it a useful educational tool, as a database which allows storage and retrieval of large amounts of word-wrapped formatted text is a powerful learning tool.

The prospective purchaser of a new database system must clearly identify his or her needs and compare the software available under criteria relevant to the tasks that will be required of it. RapidFile might prove a sensible and economical choice for those with limited requirements and budgets. It might also serve as a good entry point for those with little computer expertise, even though they may expect to grow out of it in a year or so.

After all, encouraging the development of this expertise in new users is an important function for all in the industry. RapidFile may play an important part in this growth, and accordingly be of benefit to many.

### Some technical details of RapidFile

Max. file size:	10MB
Max. records/file:	64,000
Max. fields/record:	250
Max. characters/record:	7,500
Max. character/text field:	64,000
Sorting levels:	15
Hardware required:	IBM PC or compatible two floppy drives or hard disk
Price:	256kb RAM \$795 excl. GST

Review system provided by Ashton-Tate (New Zealand) Ltd, Hamilton.

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# The new technology

Recently IBM announced the IBM Personal System 2, a new range of personal computers. These machines introduce advanced technology and a higher level of built-in functions to a range of computer products. IBM claims its new technology improves reliability by as much as five times over the original PC, and two to three times over current models.

The technical advances combined in the new series are extensive and include new memory packaging, data storage media, a system board with more capability and more powerful support chips, together with new monochrome and colour displays. There are four computers, four monitors and two printers in the new series.

The four computers are the Model 30, Model 50, Model 60 and the Model 80 with the larger numbers indicating more powerful performance. The Model 30 has an 8086 running at 8MHz, the Models 50 and 60 have an 80286 running at 10MHz while the Model 80 has the 32-bit 80386 running at either 16 or 20MHz. All models use 3.5 inch (90mm) diskette drives with the Model 30 having 720kb capacity while the others have 1.44Mb capacity. A hard disk is standard in all models except the Model 30 where it is an optional fit. The two smaller models use the 20Mb disk, while the model 60 can use one or two 44Mb or 70Mb disks, and the model 80 can have one or two 44Mb, 70Mb or 115Mb disks.

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*The most noticeable feature of the computer is the reduced size of the system cabinet. No longer will it dominate your office desk.*

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All of these computers come in new cabinets. The first two models are for desk-top mounting and have different sized cabinets; both, however, have a smaller footprint than the standard PC models. The other two models are free-standing and have a common cabinet. All models use the same 101-key keyboard that was introduced in 1986.

There are one new monochrome and three new colour monitors. All

the displays have a no-glare screen and have either an integrated or optional tilt and swivel base that allows the user to more readily adjust the screen.

The monochrome display has a 12 inch screen with a 720 x 400 dot matrix in text mode and 640 x 480 dot matrix in graphics mode. Two of the colour displays have the same resolution and come with either a 12- or 14-inch screen. The top-of-the-line colour display has a 16-inch screen and can display both text and graphics on a 1024 x 768 matrix.

The Proprinter II and XL are new dot matrix NLQ printers differing only in their print width, of 8 and 13.6 inches respectively. Both have a print speed in draft mode of 240 characters per second. The other new printer is the Quietwriter III, a thermal letter-quality printer with a print speed in NLQ draft mode of up to 274 cps. The maximum print width is slightly smaller at 13.2 inches.

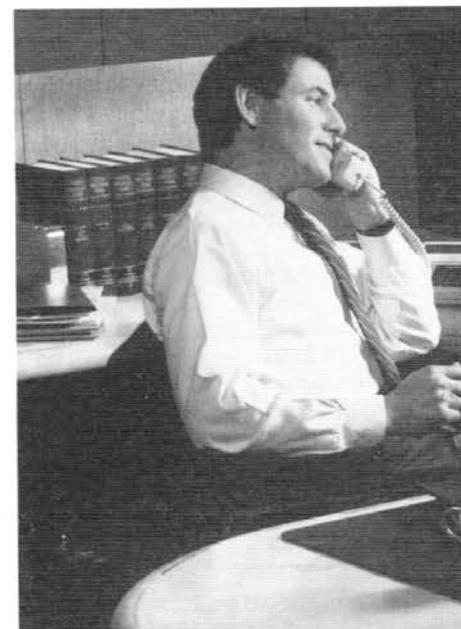
There is also available, for all four models, an optical file that can store up to 200Mb of information. This is equivalent to 100,000 double-spaced typewritten pages. The optical file may be written to once and read many times, to store and retrieve large amounts of information, or as a backup storage device for fixed disks.

## Model 30

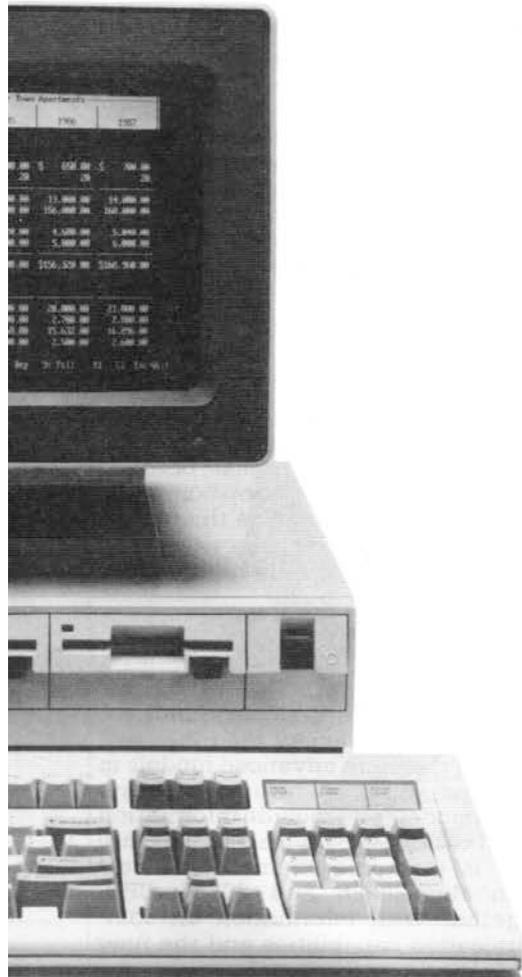
I was recently given an opportunity to review one of the new IBM computers, an IBM Personal System/2 Model 30. This computer, the smallest in the new range of IBM computers, was supplied by Tech Rentals (NZ) Ltd of Newmarket, Auckland.

The most noticeable external feature of the computer is the reduced size of the system cabinet. No longer will it dominate your office desk. Instead the new cabinet complements the size of the display unit which will normally sit above the system unit on a tilt-swivel base.

There are three changes that enable a reduction in the size of the computer: a change from 5.25 inch to 3.5



The industry waited with bated breath for IBM's announcement of its new range of microcomputers. Will they set the new standard even before the new Operating System/2 is available some time next year? Are they different or better? Jim Barclay looks at the new Model 30, the entry-level model of the range.



inch disk drives, a reduction in the number of expansion slots from eight to three, and the use of higher-density semiconductor packages. A secondary effect of these changes is a smaller power demand, which is satisfied with a 70-watt power supply.

A standard 101-key keyboard was supplied with the computer. This keyboard includes separate numeric and editing keys, 12 function keys and has a two-metre coiled cable. The keyboard has the same width as a PC's and is noticeably wider than the Model 30 system cabinet.

Although there have been significant advances in the design of the Model 30, there is one area where the design has lagged badly. Three stiff black cables are used for the power and video connections. The video cable is 1.2 metres long while the individual power cables for the system unit and display unit are each 1.8 metres long.

Functionally, the Model 30 supplied for review is an improved PC XT. Internally it has an 8086 CPU running at 8MHz, together with 640kb of RAM, and 20Mb hard drive and 720kb 3.5 inch diskette drive. The similarity stops there, as what was normally added as an option to a standard computer is now integrated into the main system board. The new functions include display, serial and parallel ports, pointing device port and a keyboard port.

The other new function is the multi-colour graphics array (MCGA), or in earlier terminology - video. The MCGA supports existing colour graphics modes and provides up to 256 colours, from a palette of 256,000. The new displays and adapter are compatible with existing software, including both CGA and EGA graphics, while in monochrome mode 64 shades of grey are supported. The display modes are 320 x 200 x 256 colours and 640 x 480 x 2 colours.

The removable cover is readily removed by first releasing the two screws on each side, easing the cover rearwards then lifting it clear. The moulded cover forms the top and sides of the assembled computer. A large piece of aluminium is securely attached to the inside of the cover upper surface.

The 70-watt power supply and power switch are located in the right rear of the cabinet. The switch is

operated by a linkage to a toggle lever on the front panel. The computer may be locked to prevent unauthorised access by turning a key on the side of the computer.

Although the system board is smaller than that fitted to the earlier PC it occupies the same relative area. The system board represents a significant shift forward in computer technology, with both CMOS VLSI custom gate arrays and surface mounted integrated circuits. A number of the devices are in square 84- and 68-pin packages, while the smaller devices carry more familiar 74 series part numbers.

Most of the major chips still retain their DIP packaging, the Central Processing Unit, (optional) Co-Processor, Read Only Memory, and Disk Controller, etc.

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*The system board represents a significant shift forward in computer technology, with both CMOS VLSI custom gate arrays and surface mounted integrated circuits.*

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The 640kb memory is fitted as standard. Of this memory 512kb comprises two banks each of 256kb, each bank having nine surface mounted devices on a small card that snaps into custom-designed connectors on the system board.

A five-inch long wire on the upper surface of the system board suggests that IBM had second thoughts about one aspect of the computer design.

More than one crystal is fitted. One crystal had a frequency of 25.175 MHz while a second has a frequency of 14.31818 MHz, the latter frequency being three times the more familiar 4.77 MHz. There appeared to be a third crystal on the system board, but as it was located below the disk drives it was not possible to read any marking on the upper surface. However, a telephone call to IBM advised me that it was the main clock crystal of 48MHz. This crystal is used to gen-

erate the CPU frequency of 8MHz. IBM also advised that the 25MHz frequency is associated with the video display.

A number of functions that have previously required separate expansion cards are now incorporated in the system board. However, provision is still made for three full length expansion cards. These cards still run from front to rear, but are now aligned horizontally and stacked one above the other, rather than the vertical orientation of previous models.

The computer supplied for review was fitted with one 720kb 3.5 inch (90 mm) diskette drive together with a 20Mb fixed disk. Both disk drives were of Japanese manufacture and were quiet in operation. The computer can be alternatively configured with two 720kb diskette drives. For those readers who have not used the 3.5 inch diskette before, take care when first write protecting a diskette. The 3.5 inch model has a small plastic write protect shutter built into it, and moving it one way or the other either enables or disables the write protect function. The convention, however, is **opposite** that of the 5.25 inch diskette, and when the hole is open the diskette is write protected.

## Display

Both the monochrome display 8503 and colour display 8513 were supplied with the computer. Both displays are described by IBM as analogue displays and both provided high quality and high clarity displays. The monochrome display has a white phosphor, and colours can be automatically converted to up to 64 shades of grey. The colour display features a 0.28 mm dot pitch and 256 colours can be selected from a palette of 256,000 colours.

## Operating system

The operating system is PC-DOS version 3.30, which comes on a 3.5 inch diskette and also on two 5.25 inch disks. The DOS came with the normal high quality manuals, including a Reference Manual, User Guide and a Quick Reference Card.

DOS 3.3 has a number of new features such as a DOS Batch facility, a Call command that allows iterative processing, a Fastopen command that reduces the time to reopen recently addressed files, and an Append command which allows programs and data files to be retrieved from a directory other than the one you are using. Improvements have been made to some of the existing commands: Backup, Restore, Date, Time, Attrib and Sys,.

## Software

The Model 30 is provided with a starter diskette, which has a very useful tutorial on how a computer works. The tutorial makes full use of the colour capability and display resolution of the computer, although surprisingly text is generally shown in a lower precision 40-column format.

One of the demonstrations is an electronic version of the game we probably played with as children. A hot-air balloon is placed on eight squares in a 3 x 3 grid, and the cursor keys are used to move one of the squares into the vacant space. This gave quite an impressive demonstration of the power of the video display. On closer examination, however, there was an unexpected characteristic of the square as it was being moved. As the square moved a shear layer developed where the top and bottom portions of the square moved relative to each other.

The starter diskette also has a number of useful diagnostic programs on it, which allows reasonably comprehensive testing to be undertaken by the user.

Only a limited range of software on a 3.5 inch diskette was available to the reviewer. Software used included Profax (from Computerland, Manukau City) and Rapidfile (from Ashton Tate), both of which worked satisfactorily but unfortunately did not allow the full colour capability of the computer to be demonstrated. However, they did allow the monochrome display characteristics to be viewed.

A number of purchasers of the new series computers will probably have a large investment in software on the earlier computers, either on a hard disk or 5.25 inch floppies. IBM has produced a Data Migration Facility

Adapter to help overcome this problem. The device (DMFA?) plugs into the printer port of the System/2 computer, and a standard printer cable is then used to connect the DMFA to the host computer which has the files for downloading. Only a few keystrokes are required on the receiving computer, then the sending computer to initiate file transfer. Files can be transferred to or from floppies, hard disks and directories.

Despite my best efforts, however, I could not get my Brand X XT to transfer information to the Model 30. Changing printer cables and reading the manual 10 times would not convince the bytes it was time to go. Unfortunately I did not have sufficient time to try a transfer using another computer to see whether it was something specific to my machine.

## Summary

In conclusion the Model 30 provides good performance personal computing. It will appeal both to those who want a desktop computer that does not monopolise the available desktop area or those who want to make use of the new high quality displays.

## Coming

Because of printers' deadlines we are not able to review the other features of the more advanced models in the new series. A future article on those models will include information about the Micro Channel architecture that is incorporated in the models with the 80286 and 80386 CPU, together with information on communication capabilities and the new IBM Operating System/2.

### Microcomputer Summary

Model	IBM Personal System/2 Model 30
Microprocessor	8086 8MHz 0 wait states
ROM	64kb
RAM	640kb
Integrated functions	display, serial, parallel pointing device, keyboard
Display	320 x 200 pxls x 256 colours 640 x 480 pxls x 2 colours
Storage	two 720kb 3.5 inch diskette drives or one 720kb 3.5 inch diskette drive and one 20Mb fixed disk
Expansion	three expansion slots
Dimensions	102mm H x 397mm W x 406mm D
Operating system	DOS 3.3
Keyboard	101 keys, 12 function keys
Rec. retail price (excl. GST)	dual floppy drives, monochrome \$4,283 20Mb fixed disk, colour \$6,266
Rental price	dual floppy drives, monochrome \$533.50/mth 20Mb fixed disk, colour \$814.00/mth

*Review system supplied by Tech Rentals, Newmarket, Auckland.*

# The 1987 Wellington Computer Exhibition



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## Selecting a business computer

Establishing the criteria for making the right choice of a business computer system. The key issues to consider.

Presented by John Monin, Department of Management and Administration, Massey University

Session 1, Thursday July 9, 10am.

## Microcomputers and the Sharemarket

Using a microcomputer to aid your analysis of shares, efficient record keeping and accessing sharemarket databases.

Presented by Bob Radley, author of "Profit from Shares"

Session 2, Thursday July 9, 11am.

## Desktop Publishing — a guide

What is desktop publishing, how it can benefit your business, an overview of the competing hardware and software available.

Presented by John Monin, Department of Management and Administration, Massey University

Session 3, Thursday July 9, 12 noon.

## A guide to Database Software

What is a database? What role does a database have in business? Major database software available in New Zealand.

Presented by Dr John Bircham of Ashton Tate (NZ)

Session 4, Thursday July 9, 1pm.



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## Laser Optical Disks

The huge storage capacity of laser optical disks make them ideal for a number of business applications. A look at the three main types of optical disks, what's available in New Zealand and how to make best use of them.

Presented by Dr David Robertson, Division of Information Technology, DSIR

Session 5, Thursday July 9, 2pm.

## Pagemaker and Desktop Publishing

A demonstration of the software that launched the desktop publishing phenomenon and is still the market leader — Pagemaker. Plus a complete, cost effective, desktop publishing package.

Presented by Computer Imports

Session 6, Thursday July 9, 3pm.

## Local Area Networks Explained

The fallacies, pitfalls and the benefits of linking computers together in a network.

Presented by Tony Dixon of Impact Technologies

Session 7, Thursday July 9, 4pm.

## Selecting a Business Computer

Establishing the criteria for making the right choice of a business computer system. The key issues to consider.

Presented by John Monin, Department of Management and Administration, Massey University

Session 8, Friday July 10, 10am.

## Data Communications

An explanation of the different options, leased line, packet switching etc available for computer to computer communications over long distances.

Presented by Telecoms

Session 9, Friday July 10, 11am.

## Desktop Publishing — a guide

What is desktop publishing, how it can benefit your business, an overview of the competing hardware and software available.

Presented by John Monin, Department of Management and Administration, Massey University

Session 10, Friday July 10, 12 noon.

## Desktop Publishing — the Hewlett Packard Solution

A demonstration of a complete desktop publishing solution including the Laserjet Series II (voted best laser printer by "Computerworld" magazine readers), Scanjet scanner and Pagemaker software.

Presented by Hewlett Packard

Session 11, Friday July 10, 1pm.

## Sharedata — The Sharemarket Database and Software

A demonstration including sharemarket portfolio management, market analysis, subscriber downloading facilities etc.

Presented by Bob Radley of White Knight Services Corporation

Session 12, Friday July 10, 2pm.

## Pagemaker and Desktop Publishing

A demonstration of the software that launched the desktop publishing phenomenon and is still the market leader — Pagemaker. Plus a complete, cost effective, desktop publishing package.

Presented by Computer Imports

Session 13, Friday July 10, 3pm.

## Selecting and Implementing a CAD System

Evaluation of the right computer aided design system for your business and efficient implementation into the workplace.

Presented by Tim McMahon of Cable Price Engineering

Session 14, Friday July 10, 4pm.

## Computers in Education

An insight into educational computing — where it has come from and where it is going. How to make best use of computers as an education tool (includes a 20 minute video).

Presented by Jim Fergusson, Computers in Education Unit, Department of Education.

Session 15, Saturday July 11, 10am.

## Desktop Publishing — Using IBM and Compatibles

Recently released software packages, Ventura and Pagemaker plus hardware that marked the entry of IBM and compatibles into the desktop publishing field will be covered.

Presented by Computerland

Session 16, Saturday July 11, 11am.

## Pagemaker and Desktop Publishing

A demonstration of the software that launched the desktop publishing phenomenon and is still the market leader — Pagemaker. Plus a complete, cost effective, desktop publishing package.

Presented by Computer Imports

Session 17, Saturday July 11, 12 noon.

# DOWNSTAIRS EXHIBITORS

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Philips
Cannon Data Products
Logical Methods
Modular Computer
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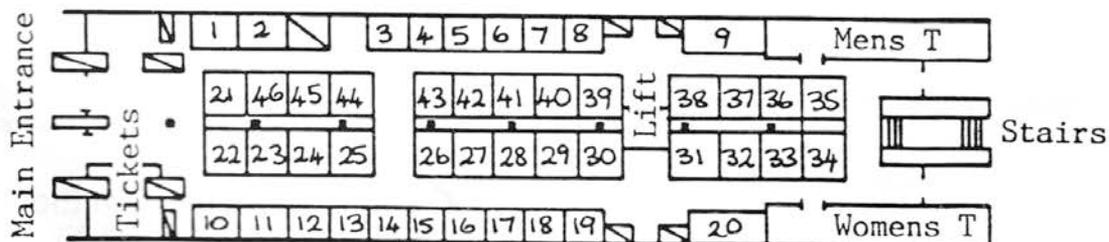
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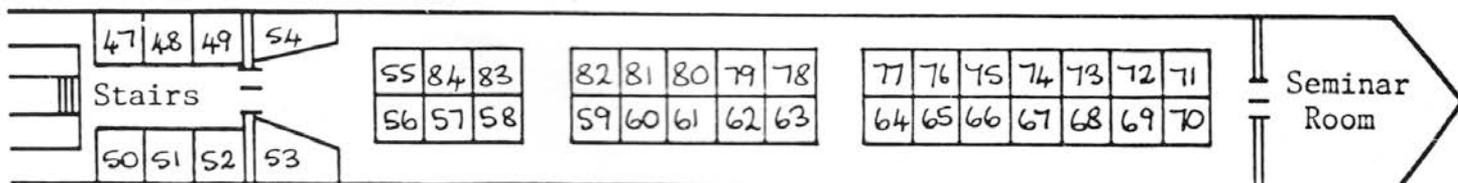
# BITS & BYTES

## STAND LAY-OUT

### DOWNSTAIRS ENTRANCE HALL



### UPSTAIRS



## Amstrad Computers

21 Great South Rd, Newmarket  
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Ph: (09) 504-035, 505-440

**Personnel:** M. Howard, G. Furley, S. Kenyan, T. Perreau, A. Railton, R. Hammer, R. Edgeler.

**Products:** Amstrad PC range – single, double floppies and 20 meg. IBM compatibles. Amstrad home computer. CP6128 and word processor PCW8256.

## Cable-Price Corporation Ltd

P.O. Box 2972, Wellington  
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PH: (04) 783-020, 661-014

**Products:** AutoCAD.

## Canon Data Products

Embassy Theatre Building,  
Majoribank St, Wellington  
Ph: (04) 850-449

**Personnel:** Ray Newton, Keith Williams

**Products:** A200EX computer, IX12 image scanner, LPB 8 A2 laser printer, TX50II retail manager.

## Computer Broking Services Ltd

53 Boulcott Street, P.O. Box 934,  
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**Personnel:** John Story, John Taylor

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**Products:** The full range of EXZEL PC, XT, AT and AT-386 based PCs.

## Computerland Wellington

P.O. Box 3351, Wellington  
Ph: (04) 849-952

**Personnel:** Paul Gilmore, Peter Grainger, Nigel Blair, Chris McKay.

**Products:** IBM products. Personal Series II, Ventura desktop publishing.

## Computers For People in association with Sanyo NZ Ltd

35 Taranaki St, Wellington  
Ph: (04) 859-675

**Personnel:** David Bond, John Duncan, John Foot.

**Products:** AutoCAD 2.6, Floss Doss Dental System, Reali Real Estate Management, 485 Tim Timber System, Breeze Retail Point of Sale, Nimbus for plumbers and contractors.

## Computer Village Group in association with Commodore NZ Ltd

C/- Computer Experience  
James Smiths, Cuba St, Wellington  
Ph: (04) 736-777 Ext 836

**Personnel:** John Brocket, Malcolm Curson, Murray Tickner, Aaron Bird, Dale Johnson, John Funtulis

**Products:** Amiga 500 and 1000 with Touch Screens, Commodore 64, Commodore 128D, Texas Instrument calculators, Casberov chess games, Criterion desks.

## Computerworks Systems Ltd in association with Sanyo NZ Ltd

1st Floor, 85 Queens Drive  
Lower Hutt, Wellington  
Ph: (04) 664-944

**Personnel:** Andrew Baussmann, Judy Archer, Ralph Wilkinson.

**Products:** Sanyo range of computers. Star printers. "Controller" job accounting and costing programme.

## Concept Delta Publishing Ltd in association with Modular Comp. Sys.

24 Blair Street  
P.O. Box 11-619, Wellington  
Ph: (04) 852-867

**Personnel:** Vivian Bernard, Diana Hind.

**Products:** Desktop Publishing Services, CAD bureau service, plotting, drawing, design and draughting services.

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24 Blair Street, Wellington  
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**Personnel:** Nigel Lacey, Margaret Steedman

**Products:** AutoCAD Tablet Overlays. AutoCAD and VersaCAD Training. CAD draughting and design applications – plotting.

## Connector Systems

P.O. Box 3026, Wellington  
Ph: (04) 720-854 (09) 774-945

**Personnel:** Lewis Woodward, Alan Browne, Paul Deveney, Larry Osman.

**Products:** Connectors, cable, thatch panels and various types of data reticulation components.

## Control Microcomputers

P.O. Box 68-474, Auckland  
Ph: (09) 600-687

**Personnel:** Basil Orr, Brian Groen, Peter Harris.

**Products:** Thomson monitors, EGA Ultra Scan & Dual scan & C. ITOH printers – Lips 10 Laser, high speed dot matrix & 24 pin dot matrices printers. Irwin tape drives.

## Delta Business Systems Ltd in association with Modular Comp. Sys.

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Ph: (04) 738-869

**Personnel:** Alan Grant, Harold Booth, Brian Rowe

**Products:** CAD computer systems, DTP computer systems AutoCAD, CAD/camera, auto CAD/AEC, architectural and mechanical, Pagemaker, CBA accounting software business graphics, business computer systems for accounting, Hewlett Packard, Graphtec, IBM compatible systems.

## Government Computing Service

National Mutual Building  
70 The Terrace, Wellington  
Ph: (04) 738-821

**Personnel:** Peter Hendra, Peter Swain, Mike Kerr, Dave Jamieson, Sue Griffiths.

**Products:** Technical Services – Microcomputer retail and lease, package and tailored software and general consultancy. Videotex – host services, terminal supply, micro to mainframe links. Training – wide range of microcomputer courses.

## Hands-On (information) Ltd

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**Personnel:** Troy Chee, Evan Robertson, John Schnellenberg, John Mills, Adam Taylor.

**Products:** Desktop publishing display.

## Impact Technologies Ltd

39-45 Porana Rd, Glenfield  
P.O. Box 33326, Takapuna  
Ph: 444-0760

**Personnel:** Tony Dixon, James Crossley, Roger Foote, Craig Brownlees, John Forster, Steve Shilham

**Products:** Novell networking products including file servers and software, televideo computers and networks, impact laser printers.

## Leatham Electronics Ltd

58 Kent Terrace, Wellington  
Ph: (04) 859-409

**Personnel:** Darrell Thrupp, Mark Roberts.

**Products:** Graphtec A1 and A3 digital plotters, KD4030 A3 digitizers. Psion Organiser handheld computer.

## Logical Methods

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Ph: (09) 398-105

**Personnel:** Jon Vincent, Adrian Abraham.

**Products:** Profax Release 4, Flyfax, Profax XS, Italian computer work stations.

## LogiTech Solutions Ltd in association with Commodore NZ Ltd

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P.O. Box 11-811, Wellington  
Ph: (04) 724-950

**Personnel:** Michael K. Holdsworth, Ronnie Magan.

**Products:** Hi-res Touch Screen Technology in association with Locus Industries. Amiga 2000, Commodore AT, PC 20, PC 10, PC 5 - printer network switches, buffer, sharer, chex and master and slave PEP-NET.

## Magix Computer Systems Ltd

P.O. Box 11-780, 5th floor  
Feltex House, 156 Victoria St  
Wellington

Ph: (04) 843-725 Fax: 856-032

**Personnel:** Lex Wallace, Bruce Sutherland, Keith Girven

**Products:** The Magix Hardware, Operating System, 80386 AT.

## Microcorp Systems Ltd

P.O. Box 9501, 1st Floor,  
PWL Building, 85 Adelaide Road  
Wellington  
Ph: (04) 851-401

**Personnel:** Peter Tse, Tony Rudolph, Tony Palmers, Sara Kerwood.

**Products:** Revelation RDBMS based business software for personal computers and local area network systems.

## Micropost Software and Supplies Ltd

Marac House, 105 The Terrace  
Wellington

Ph: (04) 736-265

**Personnel:** Fred Muys, Rod Saunderson-Harrod, Wendy Falconer, Amanda McVitty

**Products:** Supercalc 4, Superproject Plus, Plus Development Hardcard 40, Aldus Pagemaker for IBM PC Wordstar 4. Plus over \$100,000 of software at bargain basement prices.

## Modular Computer Systems Ltd

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Ph: (04) 787-047

**Personnel:** Paul McQuinlan, Ian Cunningham, Ivan Steinmetz, Lynne Steinmetz.

**Products:** MCS Business Computer Systems, 80386 systems, Local Area Networking, CAD Videotex, communications.

## Philips NZ Ltd

P.O. Box 2097, Wexford Road  
Miramar, Wellington  
Ph: (04) 889-788

**Personnel:** Trish Moseley, Charles Young, Loretta McArley, Warren Meech.

**Products:** Multi user computers, dictation equipment, modems and word processing equipment.

## Pitman Publishing NZ Ltd

28 Fitzherbert Street

Petone

Ph: (04) 683-623

**Personnel:** In conjunction with Whitcoulls

**Products:** Que Publications, HW Sams Publications, Hayden Publications.

## The Professional Computer Centre in association with Sanyo NZ Ltd

Display Centre, Street Level,  
Colonial Mutual Centre,  
Cnr Victoria & Willeston Sts, Wellington  
P.O. Box 13-308  
Ph: (04) 710-691

**Personnel:** Dennis Turner, Craig Tice  
**Products:** Sanyo MBC990 (AT), MBC 16 plus compact XT. Dataproducts LZR 1230 laser printer. OKI Laserline 6 laser printer, ML293 color matrix printer. Microsoft range of software.

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**Personnel:** Alan Osborne, Tom Turner, Mike Ralm, Bernadette David, Geoff Chadwick

**Products:** NEC PC's and Printer, Silenwriter, Pageprinter, Laptop and PC Networks.

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**Personnel:** Checkpoint Computers Ltd, Computers for People, Computer Works, Professional Computer Centre.

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**Products:** NEC computers and printers, Compaq desktop and portable computers, Hewlett Packard laser printers and scanners, desktop publishing, accounting software, word processing systems, databases etc.

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**Personnel:** Kevin Shuker, George Forster

**Products:** Extensive range of ergonomic computer furniture – work stations. Closed units for home computers etc.

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**Personnel:** Peter Uffindel

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**Personnel:** Don Staples, Elaine Steel.

**Products:** Hewlett Packard 7550 plotter/autofeed A3/A4, Draftmaster, Vectra, Laserjet II, Scanjet. 18c – business consultant programmable calculator. 28c – advanced scientific programmable calculator infra red printer.

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Wine  Women\*  Song  
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# COMPUSALES

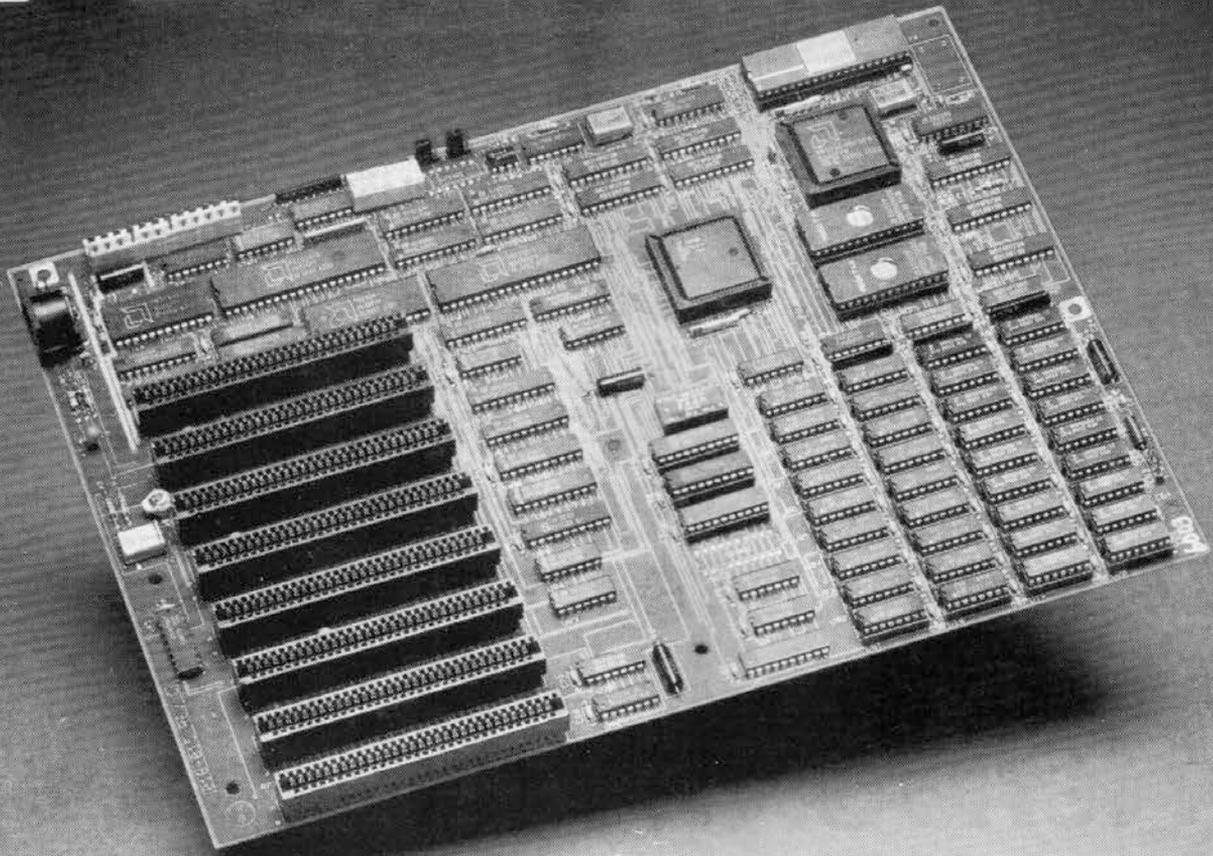
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# Learning to program with Alice

Another version of Pascal makes its appearance, aimed more especially at the beginner programmer. Paul Left wonders



about its claimed advantages and the sense of having an interpreter rather than a compiler.



**A**LICE: The Personal Pascal is a programming environment especially suitable for the beginning Pascal programmer. Alice provides a reasonably standard version of Pascal, regarded as an excellent first programming language for students, combined with special educational features.

Pascal is a popular language for learning programming, and there are excellent versions available for microcomputers. A notable example is Turbo Pascal from Borland, which is commonly used on MS/PC-DOS machines. Turbo includes a text-editor as well as the Pascal compiler, and has set an excellent standard for Pascal implementations on micros. The text-editor is relatively simple, and uses WordStar-compatible commands for handling the text of Pascal source code. Once written and saved, the program can be compiled into memory or to an executable file on disk.

Alice is a Pascal environment which provides very close compatibility with Turbo Pascal. Several unique features set Alice apart, however. Firstly, there is no compiler: Alice provides an interpreter to run programs. Secondly, the editor is specifically designed for writing Pascal source code and is quite unlike a 'normal' text-editor in operation. Thirdly,

Alice has extensive on-line help menus and screens relating to its own operation and to Pascal in general. Each of these features provides specific advantages to Pascal programmers, particularly those new to the language.

## Interpreter

Compiled languages offer such advantages, especially in execution speed, that it is tempting to ask 'why interpret Pascal?'

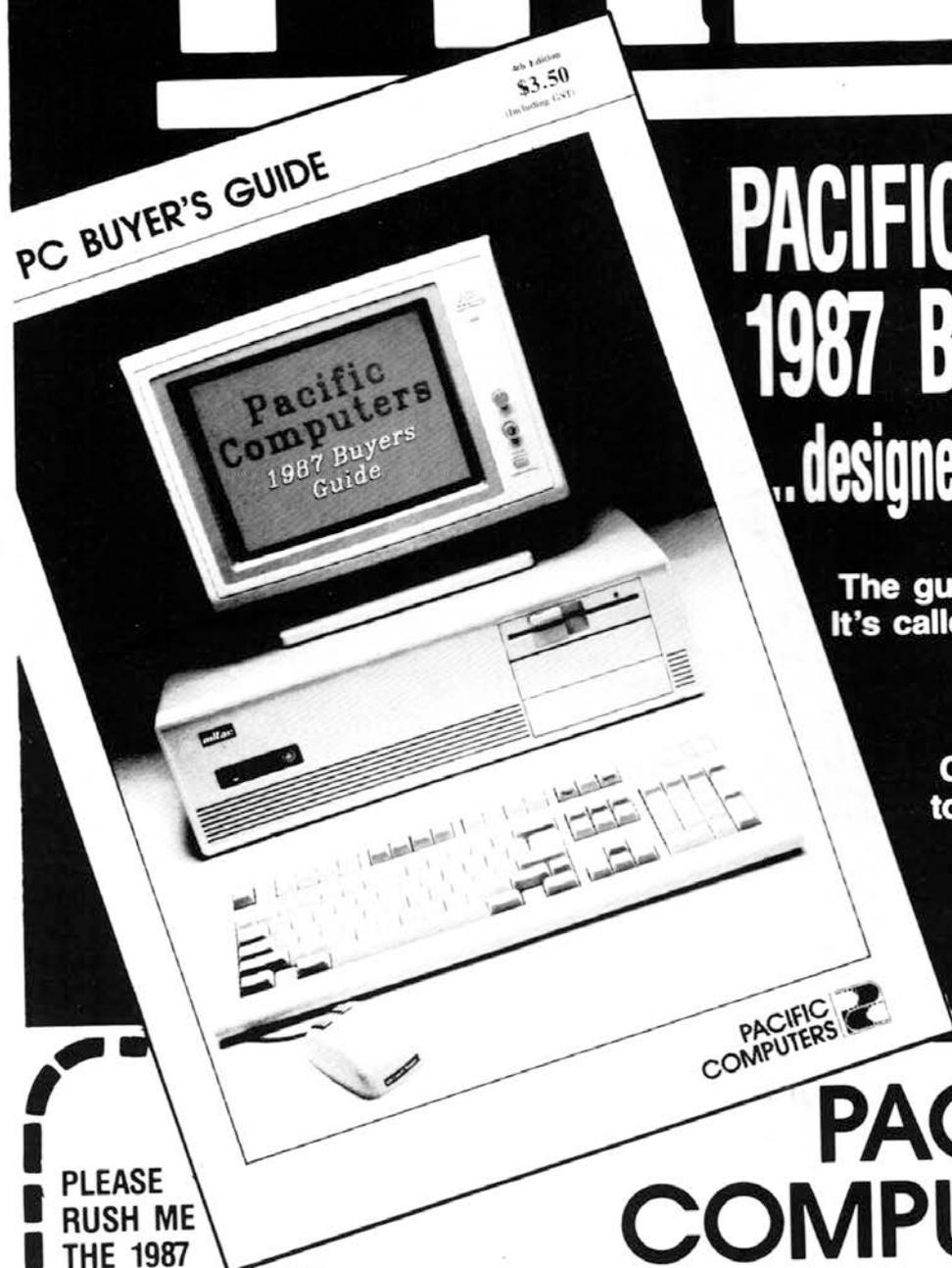
Remember, however, the advantages of an interpreter for newcomers to programming. Compilers generally require lengthy delays between writing and running the code. One factor behind the enormous popularity of BASIC must be the way it encourages learning by experimentation because of the ease with which beginners can create and execute programs. Similarly, Alice will run the source code in memory with a single key-press,

using a split screen to display both source-code and program output. It will allow you to single-step through the program, set break-points to aid debugging, and even enable 'cursor following on' so that the cursor skips through the source code as the commands are executed.

*The emphasis on logical blocks of code rather than lines of text is a healthy one, and encourages an understanding of the structure of a program.*

This can provide an excellent demonstration of the operation of loops, procedures, or Boolean variables. In addition, Alice allows the user to log output of a program to a text file on disk, an easier solution than changing each WRITE or WRITELN statement and recompiling. Alice also allows 'immediate mode blocks' in the program which are executed as they are typed, pro-

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 PC184

viding instant demonstration of the effect of commands. This can be very useful, for example, in seeing the effects of specifying field widths and precisions with WRITELN.

*Alice has extensive on-line help menus and screens relating to its own operation and to Pascal in general.*

The Alice editor is totally unlike any other editor I've seen, and provides many features to aid in learning and writing Pascal code. Writing using the editor involves filling out a template provided by Alice.

For example, when starting a new file, the text in Listing 1 is provided. Each of the underlined words is called a placeholder, and the program is built by moving to a placeholder (using the TAB key) and typing text. For example, typing 'WRITELN('Hello');' over the Statement is a valid entry, although Alice enters the closing bracket and the semi-colon for you. Typing 'WRITELN(hello);' will cause the

word 'hello' to be highlighted and an error message displayed, as the symbol name has not been declared.

Typing 'var ' (note the space) anywhere in the program will cause the cursor to jump to the 'declaration' placeholder and the correct template inserted. You could then declare the variable 'hello', and the highlighting disappears. Note that in this case you would still encounter a run-time error as the variable has no value in the WRITELN statement.

## Syntax

While critics could argue that Alice removes too much responsibility for correct syntax from the user, the authors of the manual claim that their product allows the student to concentrate on the important aspects of programming such as program structure, without having to worry about unclosed brackets, missing semi-colons, and the like. Indeed, these can cause real frustrations and distractions to beginners.

Pressing <ENTER> on a completed statement causes a new placeholder of the same type to be created. If this new placeholder is not 'filled', the interpreter ignores them, and the program in Listing 2, for example, runs with no errors in Alice.

Also, after returning to a previously-entered declaration and changing the symbol-name (that is, the word 'number'), all references to the symbol-name are updated. This feature alone could make the Alice editor a powerful tool for programmers.

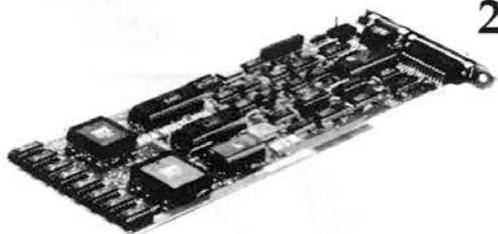
Another useful feature is that when you type the name of a defined procedure, Alice sets out a placeholder parameter list based on the list in the procedure definition, ensuring that the procedure call passes the correct number and types parameters. There are many other features too numerous to detail here, including user-defined macros and the ability to set up multiple work-spaces.

The editor, then, is 'intelligent'. Alice stores the program, not as ASCII text in memory, but as a tree-structure, with each part of the program a node. This allows ALICE to perform many other special tricks.

As an example of the special changes possible, refer to Listing 3. By highlighting the text in the main program loop and asking Alice to build a FOR loop, the text in Listing 4 is produced. Then it is a simple matter to fill in the placeholders and enter a 'var' declaration for the loop index. Various other changes are possible, including REPEAT.UNTIL and WHILE loops and other standard Pascal structures.

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Alice has extensive on-line help screens. These are accessible through the HELP menu, or by typing HELP from the command line. Most help screens include a menu showing further related topics: for example, typing HELP TEXT at the command line gives a full-page screen explaining files of this type, and provides a menu listing READ. READLN,

WRITE, WRITELN, EOLN, and CHAR. Choosing WRITELN from this menu provides another full-page screen, and a menu listing WRITE, FILES, TEXT, FIELD WIDTHS, and PRECISIONS. The publishers claim there are 500 help screens available, enough to provide help on many aspects of Pascal and on the use of Alice itself, as you can ask for help on

most menu items available. These features make Alice a powerful tool for the newcomer to Pascal and/or programming. The emphasis on logical blocks of code rather than lines of text is a healthy one, and encourages an understanding of the structure of a program.

The way Alice works with these blocks as entities has some disadvantages, however. The ability to quickly construct blocks of code of a given type is offset by a decrease in flexibility. Accordingly, Alice may not be appropriate for experienced programmers.

For programming students, however, Alice could prove a very effective learning tool. It provides the advantages of an interpreted language, along with extensive help on Pascal topics, excellent debugging facilities, and an editor which allows the student to concentrate on the logical structures of a Pascal program while removing the necessity to fret over minor syntactical considerations.

And after writing Pascal with Alice, it is then portable as input source code for compilation with Borland's Turbo Pascal.

*Review copy supplied by Computer Store, Milford, Auckland. Price: around \$230 plus GST.*

Listing 1

```
program Program-Name(input,output);
{Comment that says what the routine does}
Declarations
begin
  Statement
end.
```

Listing 2

```
program LISTING-TWO(input,output);
{Comment that says what the program does}
const
  Name = Constant;

var
  number : integer;
  Variable Declaration

begin
  number :=23;
  Statement
  writeln(number);
  Statement
end.
```

Listing 3

```
program music(input,output)
{Comment that says what the routine does}
Declarations
begin
  Sound(300);
  Delay(300);
  Sound(0);
  Sound(400);
  Delay(300);
  Sound(0);
end.
```

Listing 4

```
program music(input,output)
{Comment that says what the routine does}
Declarations
begin
  for variable := start to finish do begin
    Sound(300);
    Delay(300);
    Sound(0);
    Sound(400);
    Delay(300);
    Sound(0);
  end;
end.
```

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# Help!

Dear Sir,

I should be very grateful for any advice you could give me on the following problem.

I have a clone IBM Portable computer –  
twin 360kb floppy drives  
640kb (256kb on motherboard)  
multifunction card  
CGA card  
mouse (short card)

It used to work perfectly but has recently started producing parity errors. These usually occur when there is a graphics screen display, for example in Framework, Fantasy and Bushido. The screen blanks and the top line shows:

Parity Error at: ???? Cont: y/n

(The question marks actually appear. There are no numbers, hex or otherwise, in their places.) When I type "y" the screen shows the strange blinking characters of the IBM character set and I am back in the program although not in any usable way. If I can then remember the key-strokes that clear the screen to a text display it is possible to continue the

program as though nothing has happened (except that the Fantasy graphics screen is sometimes, but not always, corrupted).

The error message is occasionally printed in Greek (or similar) characters, but the same method can be used to get back to the program. Sometimes the computer reboots after the Parity Error at: ???? message without offering the option to cont.

I assume the problem must lie in the hardware somewhere – in the motherboard, the multifunction board or the video board. The machine has been checked over by our local electronics repairman but he can find nothing wrong with it. (He repairs videos, stereos, photocopyers, TV sets, microwave ovens etc and has only recently started looking at computers. This is a small place and there is nobody else available.)

I have sent a computer to New Zealand before (not this one) and it has come back with a hefty freight bill and the problem unfixed, and other people on Rarotonga have had similar

experiences. Also I use the machine in my work and cannot afford to be without it for the length of time which it would take.

I should be very grateful if you could put me into contact with someone who might have some idea what the problem is so that I can order the part or parts which are necessary to fix it. As I have mentioned, there are no hardware experts over here (although the number of computers is increasing rapidly) and your help would be much appreciated.

On a more cheerful note, *Bits & Bytes* is doing a good job and I look forward to getting it each month. I am particularly interested in desktop publishing and found Hylton Tuckett's review of Ventura easy to read and informative.

**Wendy Evans,**  
*Curriculum Advisors Unit,  
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Rarotonga,  
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**U2. RAMDISK.** Very good ramdisk creator – like a memory-resident disk drive.

**U3. WINDOW TOOLS.** Mini Sidekick with memory-resident editor, timer, ASCII reference.

**U4. FAST DISK.** Speeds up activity and processing of many programmes.

**U5. FILE MANAGER.** Excellent general purpose file manager that copies, deletes, views, etc. Many features.

**U6. DIRECTORY LISTER.** Creates directory lists for comments. Saves to disk.

**U7. DIRECTORY PATHS.** Lets programmes write to other directories.

**U8. KEYBOARD DEFINER.** Redefines keyboard to suit own needs.

**U9. SPACE.** Shows the amount of free space on disk in thermometer style.

**U10. SUPERIOR DIRECTORY.** Shows disk directory with file attributes which are active. Also sorts by name, date, size, extension. Accurate for hard disk.

**U11. BACKED UP.** Indicates which hard disk files have not been backed-up.

**U12. NEW FILES.** Lists files that you created today.

**U13. SPEEDKEY.** Increase speed of cursor.

## FILE PRINTING/EDITING

**U101. PRINTER SWAP.** Swaps line printer assignments for easier printing.

**U102. WORDSTAR CONVERTER.** Superior converter of wordstar to ASCII and reverse from document file.

**U103. DISK COVER DIRECTORY.** Prints directory in size suitable for pasting on disk jacket.

**U104. COMMAND EDITOR.** Very good editor of operating system commands.

**U105. BANNER.** Prints wide banners on your printer.

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**U107. PRINT CONTROLLER.** Gives extensive control of printer settings – bold, italics, compressed, etc. Epson compatible.

**U108. NOT PRINT.** Redirects computer output to the screen.

**U109. DARKEN.** Overstrikes a text file to obtain darker print.

**U110. MERGE.** Merge sorted files into one sorted file.

**U111. TEXT FORMATTER.** Processes text files for printing with special features imbedded in output – bold, italics, etc.

**U112. SEARCH/REPLACE.** Search for and replace characters.

**U113. CUT & PASTE.** Allows movement of parts of documents between files.

**U113. NOTEPAD.** Ready at hand notepad. Memory resident.

**U114. TEXT INDEX.** Indexing for text files. Mark words for listing.

**U115. WORDSTAR INDEX.** Indexing system for Wordstar.

**U116. UNDERLINE STRIPPER.** Strip underline from Wordstar files.

**U117. KEYBOARD DEFINER.** Keyboard redefiner for Wordstar.

**U118. WORDSTAR COLOUR.** Adds colour to Wordstar.

**U119. WORDSTAR NUMBERS.** Add and remove numbers to paragraphs in Wordstar files.

**U120. WORDSTAR CHARACTERS.** Character look-up programme.

**U121. EXECUTABLE PATCHES.** Standalone Wordstar patches.

**U122. WORDSTAR GREEK.** Obtain Greek characters in Wordstar documents.

**U123. PROGRAMME EDITOR.** Editor for programmers, with multiple windows.

**U124. TEXT EDITOR.** Editor with major commands, without frills.

**U125. LAST LINES.** Types the last specified number of lines in a file.

**U126. FAST LISTING.** Fast listing of files by extension.

**U127. SQUEEZE LIST.** Lists squeezed library files.

**U128. COUNT.** Counts characters, words, lines, pages in a textfile.

**U129. PRINTER PATCHES.** Extensive collection of printer patches for wordstar.

## FILE LOCATING

**U201. SMALL FILE FINDER.** Locates files in subdirectories. Small tightly coded.

**U203. FILE SEARCH.** Memory-resident. Locates files in subdirectories.

**U204. CHARACTER SEARCH.** Searches disk for character or string.

**U205. FILE FINDER.** Locates and lists files, allows deletion of unwanted files. Act from within programme.

**U206. NEW GREP.** Matches file patterns. Has 'C' source.

## FILE READING/DISPLAY

**U301. TEXT READER.** Excellent text display utility with many features. Scrolls, reads one page at time, goes to end, beginning, etc.

**U302. READ SQUEEZE.** Read squeezed files without physically unsqueezing.

**U303. READ BACKUPS.** Read backup disks of your hard disk. Needs Basic.

**U304. TREE DIRECTORY.** Displays a tree directory of files, including sub-directories.

**U305. TRACK READER.** Reads sectors and tracks in hex and ASCII.

**U306. BROWSE.** Examine files with 4 way scrolling.

**U307. DUMP.** Gives an ASCII/HEX display of any file.

**U308. DIRECTORY READER.** Read a directory from or to a certain point.

**U309. KEYBOARD BUFFER.** Keyboard buffer of 160 characters.

**U310. SYSTEM SHELL.** Operating system shell that interfaces with Crosstalk, 1-2-3, and Multimate.

## EQUIPMENT HANDLING

**U401. DRIVE CLEANER.** Runs the drive for head cleaning disk.

**U402. CORELOOK.** Gives memory content in HEX and ASCII.

**U403. SCREEN SAVE.** Blanks screen if not used for several minutes. Saves screen wear.

**U404. DISKPARK.** Positions the hard disk head key for safety when travelling or moving computer.

**U405. COLOUR CONVERTER.** Displays colours as shades of grey.

## FILE MOVING

**U501. SWEEP.** Famous file-handler. Reads, mass copies, deletes, etc.

**U502. REDIRECTS** output to a disk file.

**U503. NIMBLE DISK.** Helps you move more easily around a hard disk.

**U504. SECTOR RETURN.** Recovers deleted first sectors.

**U505. SELECTIVE COPYING.** Copy programme using menu system.

**U506. SELECTIVE DELETION.** Programme delete using menu system.

**U507. ENHANCED COPYING.** Copy several unrelated programmes with the same command.

**U508. NEW MOVE.** Rename and move programme to another directory without copying.

**U509. TOTAL ERASURE.** Totally erases disk, including format.

**U510. NEW DISKCOPY.** Good diskcopy with extra features. Copies whole disk. Sidesteps and signals faulty sectors.

## FILE ORGANISATION AND CHECKING.

**U601. ARCHIVER.** Superior file compressor and library creator.

**U602. FILE CORRUPTION.** Fast checker for detecting corrupted files.

**U603. DISK SQUEEZE/UNSQUEEZE.** Squeezes and unsqueezes all files on a disk.

**U604. PROTECT/UNPROTECT.** Avoids accidental erasure of important files.

**U605. SECRET FILES.** Make, go to, or remove a secret directory.

**U606. SQUEEZE/UNSQUEEZE.** Compresses files to save space. Also uncompresses.

**U607. LIBRARY CREATOR.** Combines files into libraries. Adds to, deletes, extracts files.

**U608. LIBRARY DISPLAY.** Displays the directory of a library. Related to above programme.

**U609. NEW NAME.** Changes volume name of a disk.

**U610. FILE COMPARISON.** Intelligent file comparison programme which detects differences between files.

## SPECIAL FEATURES

**U701. CALENDAR.** Display of any month or year.

**U702. NEW DATE.** Changes date of file entry in disk directory.

**U703. BYTE CONVERTER.** Converts all bytes to 2 byte (7 bit) for serial transfer.

**U704. COMPILING AID.** Simplifies, automates compiling and linking.

**U705. ALARM.** Sets time for alarm to sound.

**U706. NEW TIME.** Sets system time and clock.

**U707. DOS HELP.** Assistance with dos commands displayed on screen.

**U708. GET TIME.** Simplifies getting time and date.

**U709. CLOCK.** Shows time on screen while you work.

**U710. CALCULATOR.** Memory-resident for convenient access.

## FILE ALTERATION/RECOVERY/REPAIR

**U801. FILE RECOVERY.** Retrieves a programme you have just erased.

**U802. DEBUG TIPS.** Tips on using debugging programme effectively.

**U803. DISK PATCHER.** Reads and patches disk contents. Altering files, repairing corruptions, allowing unerase and creating files from memory.

**U804. LOCK/UNLOCK.** Protects files from unauthorised access with simple encrypting technique.

## ORDERS:

The service charge for each programme is \$3. There is a minimum charge of \$18 (six programmes) plus \$3 for postage and packaging. Add 10% GST to total. ORDERS MUST BE PREPAID.

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106	107	108	109	110	111	112	113	114
115	116	117	118	119	120	121	122	123
124	125	126	127	128	129	201	202	203
204	205	206	301	302	303	304	305	306
307	308	309	310	401	402	403	404	405
501	502	503	504	505	506	507	508	509
510	601	602	603	604	605	606	607	608
609	610	701	702	703	704	705	706	707
708	709	710	801	802	803	804		

# Package with a difference

The winner of the 1987 Personal Computer Software Awards is not just your everyday accounting package. Originally written in CP/M for the Amstrad, The Trader Series by The Computer Suite has been completely revamped for the MS-DOS market using Turbo Pascal, and although only recently released in this version has already been sold into a number of sites.

"The Trader Series has introduced a level of friendliness to business software that has not existed before," was the judges' opinion. "Aimed at the small business user, its ease of operation and the simplicity in moving between options using pull-down windows were considered the outstanding features of the program. We believe the market will await the release of further modules, planned to complete the series, with some eagerness."

Behind it all, in the Kiwi tradition of modest size, is one man. Steve Peacocke comes from a farming background in the Rotorua district, and opened a hobby electronics store there in the late 1970s, at the same time as starting programming in Basic. An Apple dealership was followed by a branch into Epson hardware and commercial programming with Bruce Simpson, "a little debtors' ledger" as he describes it, then into consulting on his own.

"I did a program for an electrician working at home. Once a week he kicked the kids off the machine and did his accounts. More updates followed, and I found I had a larger audience and eventually sold over 300 of those."

The move to Auckland, in May 1986, was a good one, says Steve. "Auckland is a totally different area. It's very hard to make a living down in Rotorua. Nobody takes you seriously unless you come from Auckland."

Working on contract, using "everything from dBase to DataFlex to Pascal", he was able to prove himself and save up enough money to stop working for others and do the updates to the MS-DOS version of The Trader Series, which was started in October last year. Such a decision is not easily taken: "To program in a way that would be usable and saleable is another matter altogether."

But the results speak for themselves, and Steve Peacocke's thoroughly modern software package seems eminently saleable. The answer to his programming worries was Nicklaus Wirth's Turbo Pascal.

"Pascal is ideal," he says. "There's no such thing as a sticky problem — it's half-a-dozen easily-solved prob-



Steve Peacocke (centre) after being presented with his Gold Award. With him are Gaie Ellis,

Bits & Bytes managing editor, and Bob Tizard, Minister of Science and Technology.

lems.

"Everything like pull-down windows looked an overwhelming task, but taken one at a time they weren't too bad. I'm very tempted to go to Modula 2, also designed by Nicklaus Wirth, which is more powerful than Pascal. Pascal is like a little sports car — you can toss it around corners, but when it comes to the really heavy work you need something extra."

The proprietor of The Computer Suite has two stickers on his computer: "Leave it until the update" (or get it finished first); and "Keep it simple". He is a man happy in his work. "To make a computer do absolutely

everything you want it to do — there's nothing else like it." The only problem, of course, is that while he's at home pounding away on his keyboard, he's not out there in the marketplace selling the product.

The Trader Series is being extended with such things as stock control and general and creditors' ledgers, and further things are in mind for the future, including job costing, order entry and bill of materials. In line with previous Software Award winners, who have progressed well both here and overseas, Steve Peacocke's future looks bright.

## Hard-hitting keynote speech

In his keynote address before presenting the 1987 Software Awards at the Kingsgate Centre, Auckland, the Rt Hon R.J. Tizard, Minister of Science and Technology, pulled no punches in chastising the computer industry for expecting government handouts, particularly when it came to the question of education.

Facing an often hostile and heckling audience, he said he wanted to see the computer industry more involved in the technical training stage. "I want to see it shoulder some of the cost, instead of taking on young people who have already been trained by the government. And I want to see the industry, without any

more prompting from the government, give young people the chance to see what is required of them, what they can become and opportunities that will follow."

Mr Tizard pointed out that it was the responsibility of both the public and the industry to help improve the infrastructure for science and technology.

"Education is an important issue," he said, "and I would urge you all to have an input into the current major reviews of education. The curriculum review makes the point that there are many courses of study, and it wants to introduce more, but we must realise that children are not so many

bottomless pits for throwing more and more knowledge into. They can only absorb so much.

"If they have more of one thing, for example more maths and science, then there will be less time for something else."

At the same time, Mr Tizard said he was pleased to see an award being presented for the best software written by a person under 18 years of age (which was won by Andrew Cato of Auckland Grammar). He also noted that the formation of the Information Technology Association of New Zealand was an important event, because it would assist overseas marketing as well as providing a unified voice for the industry.

A DSIR report had concluded that local software companies were stronger on technical skills than on their marketing skills, and Mr Tizard indicated that the report, "plus the increasing experience of local companies in world markets, has led to a greater appreciation of marketing, its importance in the business world and other basic business skills.

"Issues highlighted in that report include a lack of public awareness and declining educational standards in science and technology," he said. "Industry is at fault through its considerable underinvestment in science and technology in the past - and there has been some tendency for people to point just at government to solve these difficulties."

The Minister's comments caused much discussion among his audience afterwards, particularly from those computer companies having what they see as considerable investment in education, with full-time staff - and not salespeople - employed solely in that field. Others pointed to the num-

bers employed in the computer industry straight from school or tertiary training institutes, which they said recognised the worth of those people and also represented their own investment in staff.

But it has been admitted that if the higher echelons of the government are not aware of what the computer industry is achieving, then that is indeed a marketing - or wider communication - weakness on the part of the industry itself.

"This greater market awareness is practically supported by various government organisations, one example that comes to mind being the Market Development Board which is taking a

strong interest in the software industry."

He pointed out that it was government policy to create the right economic environment for business to operate efficiently, and for investment to occur with as little government interference as possible. However, the government still had a commitment to training in relation to new technologies, and the Beattie Committee was formed last year to carry out a wide-ranging survey of New Zealand's needs in the areas of science and technology. Mr Tizard invited computer industry comment on the Beattie report which was still being considered by the government.



Mr Tizard congratulates the under-18 Software Award winner, Andrew Cato.

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This program was written with the assistance and guidance of two of Auckland's leading Real Estate Salesmen, and combines their ideas drawn on many years experience in the field.

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# Concept Budget: Silver Award winner

by Koos Baars

In the previous issue of *Bits & Bytes* I gave my thoughts on some changes in the current farming scene which may influence the purchase and use of a microcomputer on the farm. My main assertion was that farmers should make a reassessment of the costs and benefits of owning a farm computer for financial control.

How pleased I was to see a package entered in this year's Software Awards competition, written by a farmer, which is a most relevant financial management tool and at the same time has the user's wishes in mind. The package has been designed and written by Ian Campbell, a computer consultant from Masterton.

The program is intended for use by farmers and consultants to quickly set up financial budgets and record actual transactions as they occur. It is not a full accounting program, but is intended to provide up-to-date management information.

The most difficult and cumbersome part in budgeting is setting up categories and doing and repeating the calculations. Ian obviously realises the difficulties many farmers and consultants are having in completing this job, quite a few still preferring to use a scrap book and simple calculator. Although a number of spreadsheets are available to facilitate the job, it has to be recognised that many users are having difficulties in mastering the intricacies of these tools.

On the other hand, full accountancy packages are often too complicated and expensive for the average farmer, and many also do not have enough simplicity and flexibility. In a way similar to many business-orientated packages, new standards have to be established, and we are now seeing packages emerging which make use of windowing and popup menus. Comparable to the Trader series, winner of this year's Software Award, Concept Budget sets new standards in friendliness and ease of use. Other users may require the menu-driven full accountancy packages, but different classes of users must be satisfied.

Cash flow budgeting is – or should be – an essential part of farm management. Budgeting always involves breaking down income and expenditure into months. This is very tedious and laborious and often the task is passed on to others, but for a budget to be of any real value it should be prepared by the farmer himself, then

it should be criticised by others. This package makes the job far less complicated. In fact you can set up all your categories from scratch in five to ten minutes. Updating and sorting your transactions is very easy indeed.

This package is very suitable for the average farmer, which is not surprising as Ian Campbell has been one of the early computer users in the Wairarapa. He is a Masterton-based Romney breeder turned computer consultant, and has used microcomputers for breeding schemes and feed budgeting since 1977. The daily care of his farm is now left to a farm manager and he runs Computer Concepts & Systems Ltd, based in Agricultural House in Masterton, selling hardware and software in the agricultural and horticultural fields. His main occupation is programming and consulting local businesses, and his early interest in microcomputers, programming and farming background has resulted in this fine package.

## Description

The program has been written in Turbopascal and is available for both MSDOS and CP/M operating systems. The various options a user has available at any one time are displayed on a command line at the bottom of the screen. The software responds immediately to the 10 function keys, and the only other essential keys are Escape and the arrow keys.

Choice of a command is made by pressing the function key associated with the command, or by moving the left or right cursor keys and pressing Return. Further nested options are then displayed and commands chosen or information displayed in a number of windows on the screen. Additional windows are used effectively to view existing codes for transactions etc, and to remember which codes have been used so far. Information can then be entered as required and the cursor keys used to move to any position on the screen.

Whenever a numeric entry (as indicated by square brackets) is expected, simple calculations can be made on the screen. The system reminds me of spreadsheets. At any stage you may return to a higher level menu by pressing the Escape or F10 key. A 42-page manual comes with the program with clear descriptions of the program's capabilities, with pages in different colours for each section for easy reference.

Specific features are:

- Open ended stock reconciliations and budget categories.
- Any category coding system can be used.
- Stock and budget categories can be added or erased at will.
- Budgets can be written in broad terms or showing more detail.
- Provision for low, likely and high budget prices. Budgets can be created without losing the original data.
- Transactions can be analysed to any level required without the prior setting up of income or expenditure.
- The overall cash position is displayed on the screen while budgets are being written.
- A wide range of reports can be produced. Budget, stock reconciliation, cashflow, transactions (by code, by month or as entered), schedules or GST can be printed. Any sequence of months can be printed, with allowance for printing of a summary of the transactions that relate to GST, the total input and output tax together with the GST amount to pay or to be refunded. Of course, summary reports are also possible and they are most useful, with returns per stock unit and per ha and most things a user wishes to have.
- A nice utility is a window facility which makes it possible to set the codes used by different printers for such things as bold type.

## Summary

It is clear that the software has been developed by a farmer for farmers. At present Concept Budget sells for \$360,000 plus GST, and is available from Computer Concepts & Systems Ltd, Masterton. About 26 farmers in the Wairarapa are using the package.

It is possible to do farm budgeting on spreadsheets or using other software, but this package sets a delightful standard in ease and simplicity of use with considerable flexibility for financial farm software. This package may also be very suitable for farm consultants, but I see its main place for existing or future computer users on the farm. Farm budgets should be done by farmers themselves to give them the up-to-date management information they now require.

# Hail the Lips 10 laser~

New from C.Itoh: the LIPS-10 Laser Image Printing System for office computers. It's a real sprinter. 10 pages a minute instead of only 8. Faster warm-up – just 30 seconds instead of 120. Faster print – you can have your first page printed just 40 seconds from switch-on. C.Itoh's LIPS-10 is a speedster that's built for marathons. Built to last 5 years at 500 sheets per day. That's a long way ahead of 150 sheets a day for less than 3 years. There's less

servicing too. Instead of just 3,000 sheets, the LIPS-10 supplies kit lasts 15,000 sheets. So overall you reduce maintenance and achieve much lower running costs. To allow unattended operation the LIPS-10 paper cassettes and output tray both hold 250 sheets. And face down collation saves sorting time.

And it does it all quietly and in style. LIPS Flexible Fonts provide dynamic character scaling, rotation, italics, bolding and justification. The LIPS Command Language provides business graphics, forms, logos, bar codes and easy merging with text. Extra fonts are available in cartridges or by downloading.

Fitted with both centronics and RS-232-C ports, the LIPS-10 Laser printer is compatible with the IBM-PC range, compatibles and most minicomputers. It emulates the Diablo 630 daisywheel and Epson FX-80 matrix so you won't have to modify your word processing or software.

If you're looking at what's best – and cheapest – in the long run, you'll award your gold to the C.Itoh LIPS-10 Laser Printer. The marathon sprinter. Contact us now for a stockist near you.



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# it sprints marathons!

# 1987 Software Awards

It was a privilege to be asked to judge the 1987 Software Awards, particularly in light of the number of entries in the business software section and the calibre of those entries. It was no easy task comparing products designed to control vastly different business situations, though by allotting points according to how well they met the criteria, we were able to jockey the leading products into first, second and third.

We were certainly liberal with the marks where we felt entries were refreshingly different or innovative,

particularly in the area of the user interface. Few of the products beckoned the user to get involved or were a real thrill to drive. The Apple Macintosh and its software rewrote the definition of user friendliness. We had hoped to see a great deal more software developed taking that concept further.

In a market where MS-DOS accounts for practically all small business computer sales and through network shells has a sizeable chunk of the multi-user market too, it was surprising to see perhaps six entries that

were non MS-DOS machine dependent.

In retrospect, out of the 20 business products we reviewed, other than the prize winners there were two other systems that deserve mention:

- Stop/Go, a decision making assistant
- Remarkable Payroll, described as being fast and functional and consistent in operation.

Both products were entered by Dunedin-based Remarkable Enterprises.

## Sybiz – where art thou?

Remember when three years ago all significant microcomputer leaders throughout the country each received a bottle of wine and quartz clock couriered to them by someone or something called Sybiz? In 1984 Sybiz hit the business software scene and made an immediate impression.

Sybiz was different. If demonstrated well, it seemed more logical to the computer illiterate and it was all integrated.

A restructuring of Sybiz took place last year, whereby City Computers assumed the marketing role and Sybiz became a software producer allowing Paul McLuckie to step out of the limelight. We would be grateful if someone would contact us and bring us up-to-date with the current state of Sybiz, as it has almost become a child on the missing persons list.

.....

## Accounting for non-accountants

Migent in the US has written In-house Accountant, an integrated MS-DOS package featured to control debtors, creditors, invoicing, sales analysis and general ledger.

It has been released in New Zealand unadulterated and at a very cheap price which belies and in some ways detracts from the product itself. Our evaluation of IHA leads us to believe it is an excellent low-end market product. It is professionally packaged and superbly documented.

Naturally, potential purchasers are going to ask the inevitable question, "Does it handle GST?" Our response is that it accommodates GST rather than specifically handling it. That is, there is provision to set up a line item

called, 'Goods and Services Tax at 10%' and this can appear on the last line of your invoice. The calculation, however, is a manual one, although this is simplified, for those who cannot divide by 10, by the facility of an on-screen calculator.

The general ledger, that area non-accountants would gladly ignore, can be simply set up so that all integrated systems post automatically to it. It is easy and should not confuse even the user who scrambles his or her debits and credits.

Those of you looking for a single user, DOS-based financial accounting solution and are buying on price, IHA will stand up to a close inspection.

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## The networking options multiply

Scarcely a month passes without the release on to the market of another networking option. Aside from all the communication board options that run under Novell's operating system Advanced Network, and Vlan would appear the flavour of the month, there are non-Novell options too. 3Com is regarded as the other main contender in the quest for market share.

Aside from the orthodox linking of intelligent PCs there are multi-tasking LANs (that do not offer true multi-user capability). Multi-tasking allows users to share the same disk so long as they run independent tasks concurrently.

More recently a LAN called Multi-Link has become available which will support dumb terminals as screens as opposed to intelligent PCs. Our understanding is that there is a very definite maximum configuration before the system absolutely dies, and we are told that is two screens

and a printer.

It is a cheap alternative at \$1,495, and it works. Just be aware of the upgrade restriction from Multi-Link and note that the host needs 640kb memory to support it.

A further alternative is PC Slave from Alloy in the US. Again dumb terminals can be linked to a AT with each terminal having its processor board in one of the AT's available slots. We say AT as you are not going to successfully network any terminals with anything less.

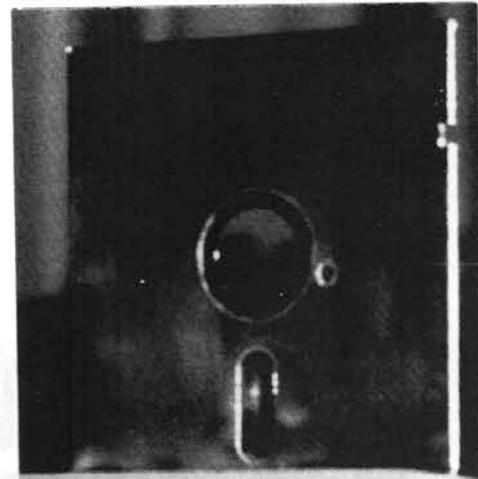
The Alloy solution is being evaluated by dealers looking for a cheaper networking option that doesn't have upgrade restrictions.

If you are needing expert networking advice, we have always found Impact Technologies to be very helpful.

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*MicroLab is Coopers & Lybrand's micro computer consulting arm providing independent advice on business systems.*

*Through this column MicroLab offers a commentary on developments in the computer industry as they affect the business person.*

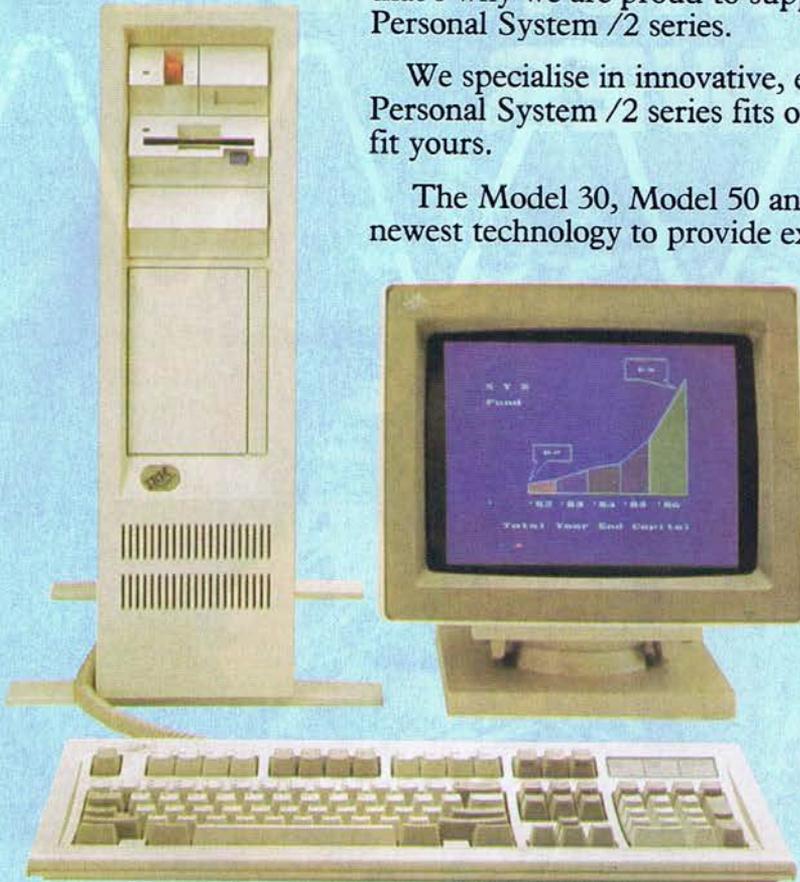


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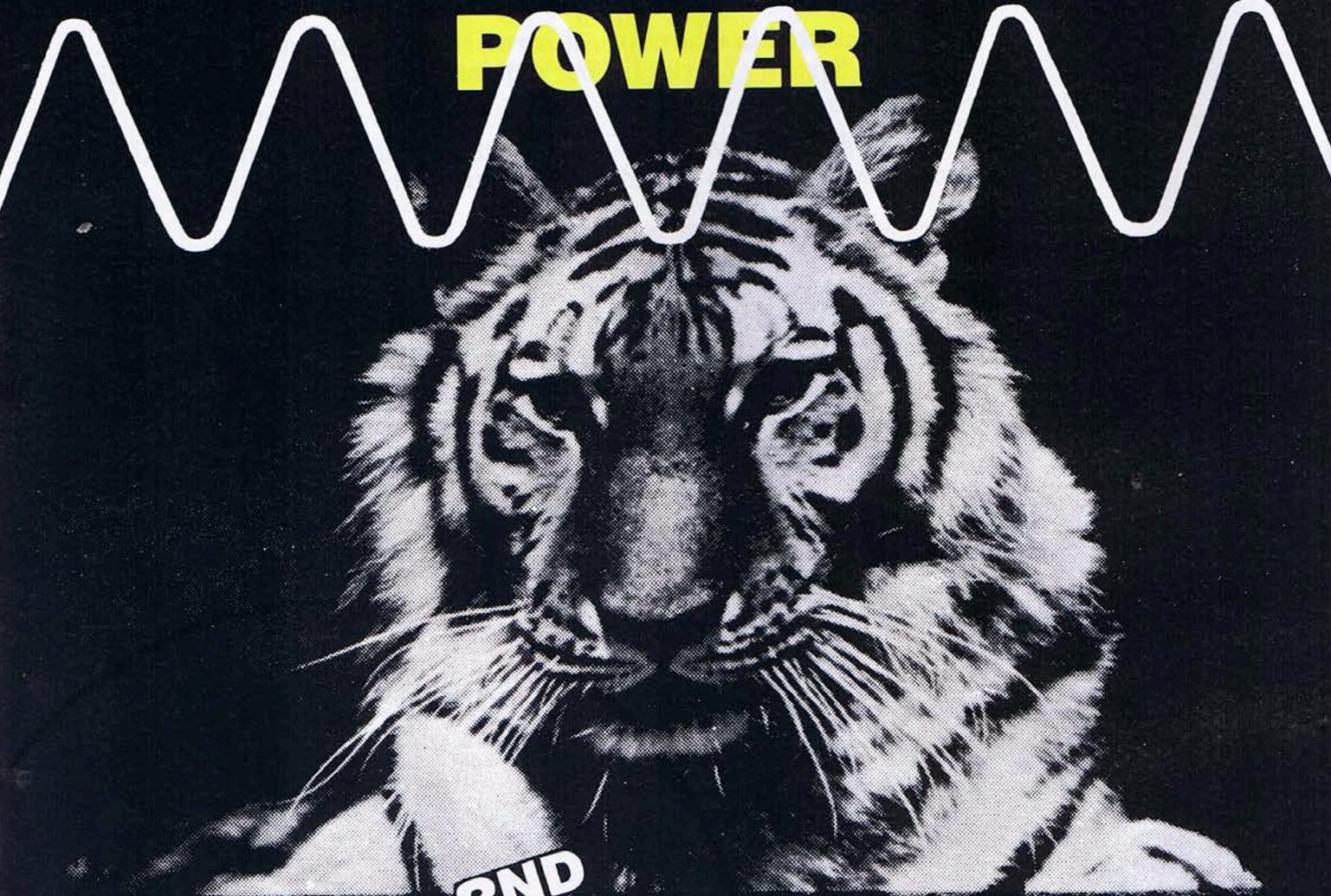
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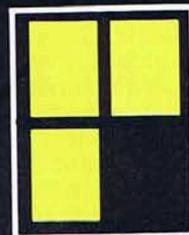


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# Without a doubt

Large accounting firms are not necessarily noted for their colour, and Bill Heritage, computer systems consultant with Auckland's Bowden, Impey and Sage, has long been content with black-and-white printers. But will he ever be the same after trying the C. Itoh C-310 and C-315 range?

If you are content with merely legible reports on stripey paper and speckled printing on your invoices and statements then you will not be interested in this family of top quality dot matrix printers.

On the other hand, if you have a use for fast, quality printing and can use the extra features like colour, then read on.

## Text printing

The review printer arrived just as the biggest print job in the office was ready to run. This normally takes about 85 minutes on the 180cps printer. The C.Itohs are enigmatically rated at "up to 300cps". Make of that what you will, but the C-315 XP finished the job in 53 minutes, which will do me. And the print quality at that speed was more than satisfactory.

The quality has held up well too. A printer that looks tacky with a brand new ribbon and a brand new print head will surely look awful when it gets older. In the time available for a review it is impossible to assess wear properly, but a month later it is difficult to distinguish today's output from that first jumbo report.

The C.Itohs have two grades of enhanced text printing, but both result in a very substantial loss of

speed. Near Letter Quality slows output to 50 cps and Letter Quality trickles out at 33 cps. After getting used to the very pacy draft mode these speeds did irritate, but they are comparable to the LQ speeds of other dot matrix printers and the quality of the characters formed did impress.

Is Letter Quality truly so? It depends on the standards you demand. In my office only full character printing is acceptable for correspondence, but a spreadsheet report printed in NLQ or LQ modes would be perfectly good enough for presentation to any client.

## Special features

While it is important that basic report printing is done well, it is in the special features that these machines really impress.

Take paper loading. There is a choice of rear or bottom loading; friction or tractor feed. Indeed, the tractor feed mechanism can be used to either push or pull the paper through. I got in a muddle at first trying to load the paper for a conventional "pull"

tractor. The recommended "push" position has the double advantages of:

- automatically feeding the paper through the platen which makes it the easiest desktop printer I have ever loaded, and
- allowing cut sheets to be fed in without disengaging the continuous stationery from the tractor feed unit.

Having wrestled a good deal with changing paper to and fro in one of our existing printers (an exercise that involves removing the entire tractor feed mechanism) I am quite charmed with the latter arrangement.

All the common print pitches (Pica, Elite, Condensed and Proportional) and character types (including Superscript, Subscript, Underline and Overscore) are available. Paper may be fed forwards or in reverse. Line spacing can be toggled between 6 and 8 lines per inch using the control panel, but is software selectable to the nearest 1/216 inch in Epson FX 80+ mode.

I haven't mentioned this before, have I? These printers operate under two command sets: either Epson FX 80+ or IBM Proprinter. These are toggled using the control panel, and the choice will depend on the printer drivers supplied with your software or the features you wish to use. From the command summary cards there seems little to choose. Proprinter mode supports overscore; FX 80+ will print in italics. Both will allow the use of a two-bin sheet feeder.

## Graphics

The only graphics software I have

## Print Samples

### C. ITOH ProWriter

#### C-310/C-315 Dot Matrix Printers

Pica Pitch (10 CPI)

Elite Pitch (12 CPI)

Condensed Pitch (17.1 CPI)

Proportional Printing

Near Letter Quality Printing

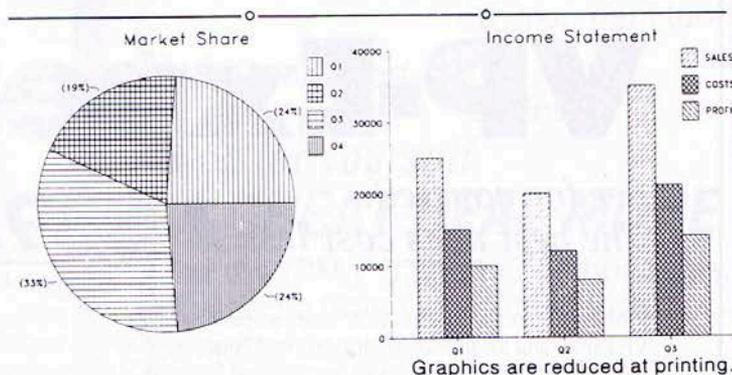
Letter Quality Printing

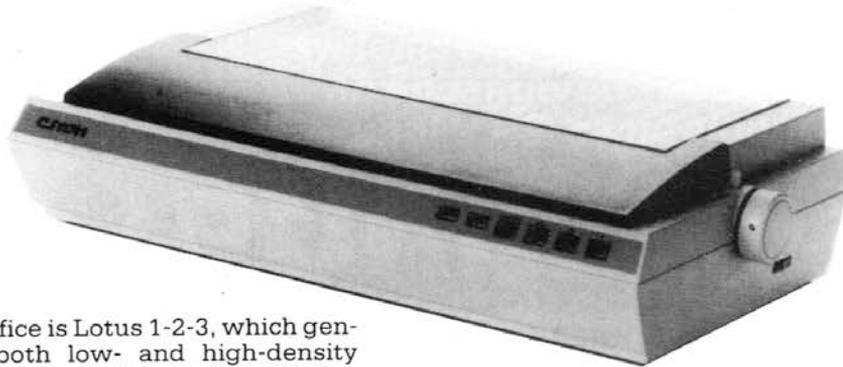
Double Width

Double Width Condensed

Emphasized & Double Strike

overscore (I-mode) & Underline  
SUPERScript and SUBScript  
Italic (E-mode)





in the office is Lotus 1-2-3, which generates both low- and high-density graphs (equivalent to draft and letter quality text printing). I whipped up a table of figures and created two types of graph: stacked bar and a pie chart.

Printed all in black, the horizontal lines were excellent, but the low-density vertical lines wavered a little and diagonal lines were distinctly rippled. Likewise the text tended to be a bit wobbly.

The high-density charts took longer to print, of course, but the improvement in quality was marked. Vertical and diagonal lines and text were much sharper, and the extra time taken was well worth it. Curved lines were amply good enough for business graphics, but I doubt whether they would satisfy the more stringent demands of a drawing office, where a smooth and true circle seems to be *de rigueur*.

## Colour

I hang my head in shame when I

think how long it took me to get any colour printed. I tried both Proprinter and FX 80+ modes to no avail. Was there something wrong with my software that it only offered Henry Ford's choice of colour? The answer of course is in the manual, in the appendix on Colour Printing which I had arrogantly ignored.

The command code for colour printing is compatible with a different Epson, the JX-80. The FX series are monochrome printers and I dare say the Proprinter is too, which would account for the lack of colour control in those printer drivers.

But eventually all was well. The colour ribbon has bands of the three cardinal colours, red, blue and yellow, and a fourth, black, stripe. These primary colours can also be combined to print violet, orange and green.

Coloured text was produced using Wordstar 2000, coloured graphs from Lotus.

Text is the same quality in blue or green as it is in black. A one-page letter printed just as quickly (17 seconds) in blue, but took longer (45 seconds) in green because mixing the colours requires a second pass of the print head. All print features work normally, except that NLQ/LQ was not software selectable. I had to pause the print and use the printer control button.

Coloured charts are an eye-opener. It's like television — once you try it you will never want to go back to black-and-white. On holding the original bar chart up against its multi-hued twin, there is no shred of doubt which catches the eye.

I printed both charts with coloured shading and the bar chart again in solid colours. I found the shading to be very effective, but solid colouring has a striped look about it. The red reminded me of 1950s pyjamas, but a passing colleague disagreed. She was much more impressed by the solid colour.

High-density printing gives you more intense colour, but it darkens it too. If you happen to prefer the almost pastel shades of the low-intensity style then you are stuck with less well-formed characters for the title, legends, etc.

The impact gained with colour is enormous, but it is not without its

# We've Changed the Rules!

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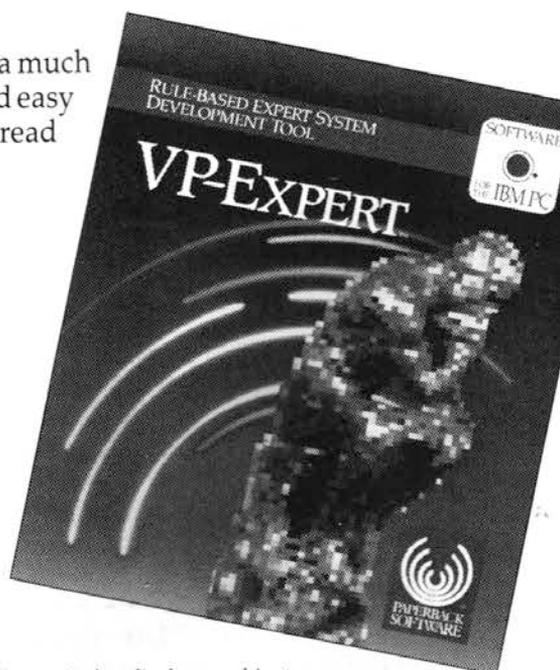
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costs. First there is the money cost. A printer with colour capability will cost you more than one without.

Then there is the time it takes to print a colour chart. I neglected to put a stop watch on the various options I tried, but believe me they were **slow!** I suspect that the stacked bar chart printed in high density solid colour took well over an hour. Even a low-intensity graph locks up the printer and the PC for an age.

## Conclusion

This printer has a lot going for it. It is fast in draft mode and quite classy in letter quality. It is easy to load and packed with features. By copying the command codes of three widely-used and well-established printer types, C. Itoh has largely avoided the bugbear of the printer your existing software won't recognise.

Coloured text is fun, but coloured graphs are a real winner, whether it is your customer or your boss you are trying to impress. This printer is slow churning out colour charts, but speed is relative. Other printers may be even slower. Make sure you try before you buy.

*Review printers courtesy of Control Microcomputers, Auckland.*

## Printer Summary

	C-310	C315
Model	C-310	C315
Manufacturer	C. Itoh & Co Ltd, Japan	
Print method	impact dot matrix	
Print head	9-wire	
Print speeds	up to 300 cps DP mode 50 cps NLQ 33 cps LQ	
Line feed speed	3.2 ips	
Form width	10.8 - 27.94cm	10.8 - 39.37cm
Receive Buffer	up to 8kb	
Character set	96 char ASCII, 16 international char sets, 4 graphic char sets	
Character matrix	9x9 dots DP mode (long sized 11x12) 27x17 LQ (long sized 23x24)	
Graphics matrix	60/120/240 dpi horizontally, 72 vertically	
Paper handling	forward or reverse, friction or push tractor feed	
Interface	Centronics parallel or RS232	
Dimensions	44.2x34.6x12.8 cm	56.8x34.6x14.3cm
Ribbon	13 m black cassette or 4-colour	
Prices (\$NZ plus GST)	\$1750 (\$1850 colour) font cartridge (3 extra fonts) \$130 black ribbon cassette \$18 4-colour cassette \$39	\$2295 (\$2395 colour)
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# Fungi or fractal?

by James Palmer

Mathematics is great for some things. Maths allows us to count, describe quantities and even represent regular shapes such as circles and squares.

But how can we use everyday maths to describe natural objects? Clouds and coastlines are simply not well represented using normal mathematics.

Fractals are a group of complex geometric shapes that are infinitely detailed, possessing an unlimited number and variety of curves, twists and corners. The term fractal was coined by Benoit B. Mandelbrot who has been responsible for opening up this branch of mathematics. Fractals have been found that represent atmospheric turbulence, blood vessel patterns, soot, star groupings, and water diffusion as well as more everyday features such as mountain ranges and coastlines.

The Julia curve is probably the best known of all fractals. Figure 1 was created using the short program in listing 1. Changing the value of C will effect the final shape. Very briefly, for the more mathematically minded, the shape is formed using:

$$z_{n+1} = \sigma_n \sqrt{z_n} - 3/4$$

where  $z_n$  is a complex number,  $\sigma_n$  is a random sequence of  $\pm 1$  and  $z_0 = 3/2 + 0i$ .

## Pseudo-fractals

Rather than considering only

```

100 REM JULIA CURVE
110 DEG
120 GRAPHICS 8
130 COLOR 1
140 A=1.5:B=0:C=0.95
150 PLOT 160+A*60,80+B*60
151 PLOT 160-A*60,80+B*60
152 PLOT 160-A*60,80-B*60
153 PLOT 160+A*60,80-B*60
160 A=A+C
170 IF A=0 AND B>=0 THEN AA=90:GOTO 220
180 IF A=0 AND B<0 THEN AA=-90:GOTO 220
190 AA=ATN(B/A)
200 IF A<0 AND B>=0 THEN AA=AA+180
210 IF A<0 AND B<0 THEN AA=AA-180
220 AA=AA/2
230 R=SQR(SQR(A*A+B*B))
240 O=1
250 IF RND(O)>0.5 THEN O=-1
260 A=O*R*COS(AA)
270 B=O*R*SIN(AA)
280 GOTO 150

```

Listing 1

shapes that would fit a strict mathematical definition of the term fractal, it makes more sense to consider computer-generated shapes that simply look 'natural'. By not restricting ourselves to fractals, we are faced with endless possibilities for generating shapes. The most useful tool for creating random, natural-looking shapes is probably the random walk.

Very simply, consider a dot on a straight line. Now toss a coin and go up one step if it was heads or down one step if it was tails. A typical result is figure 2 which could itself easily be mistaken for the cross-section of an island. By varying the probabilities of going up or down, different characteristics and patterns are possible.

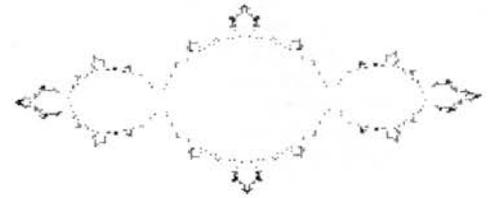


Figure 1: a Julia curve



Figure 2: a one-dimensional random walk

Random walks in two and three dimensions use the same concept, except of course extended into the extra dimension(s).

The way you go about generating your shapes, or indeed the shapes that you wish to simulate, are limitless. Experimenting and adjusting variables until things look "right" become very important. To give you some idea of how to go about simulating nature I'll briefly outline the approach I took to create a coastline and a 'fungi-like' growth. But by far the best way to get the hang of this form of computer art is through your own trial and error.

## Coastlines

The simplest way to create an almost instant island is to start with a dot in the middle of the screen. Now let it repeatedly move randomly N, S, E, or W. In no time at all a small irregular island will appear, as in figure 3.

Another approach is to 'roughen-up' an existing shape. Figure 4 shows the growth of a couple of dots and a line. At each generation the screen is scanned and each dot extends itself to the N, S, E, or W. Figure 5 is the result of a much more complicated creation procedure, and is formed by a series of random walks each related to the one before.



Figure 3: a random island

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# Keep in touch

by Chris Draper

This column is dedicated to Bulletin Board Systems (BBS for short). Its aim is to aid the exchange of news, ideas and experiences in electronic communications. Over the coming months, I hope to share with you the fun and frustration of running a bulletin board, and some of the things we get up to. If you have something you would like to contribute, just log on to my system and upload!

What is a bulletin board system? A BBS allows you to use your computer as a terminal over the phone. You can leave a message for someone, check your mailbox, join a discussion group, and upload or download a program or two.

In short, it allows anyone to communicate with other users through a central clearing house. BB systems are normally run by enthusiasts and while most have no charges, you pay for any toll calls. Anyone can join in; all you need is a modem and a terminal program for your brand/model of computer. Check with your local club or dealer, as most popular computers have public domain (free) comms programs available.

Now, let me introduce myself. My job involves computer sales and support. The company I work for kindly lets me use its equipment after hours to run my BBS. I use a PC-XT with a hard disk and Hayes compatible modem.

The BBS is free and available after hours on (075) 81-333. Because it's a call-back arrangement, dial up, let it ring once or twice, hang up and ring straight back, when the modem will answer immediately. When you hear the tone, switch in your modem, press Enter or Return two or three times slowly and wait for the first question. That enables my system to pick up what baud rate etc you are set to and modifies its own parameters to match (hence the delay).

If you run a BBS, drop a line stating phone number and access details and I'll publish them. I would be interested in your comments on networking some information between BBSs to help keep users' toll bills down!

That's all for now. I look forward to your comments.

Figure 5

## Fungi

Start with a single particle at the centre of a circle. Now release particles, one at a time from the circle's

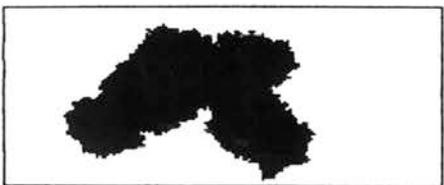
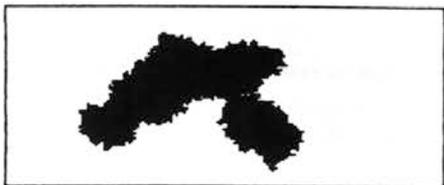
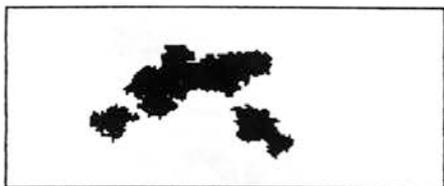
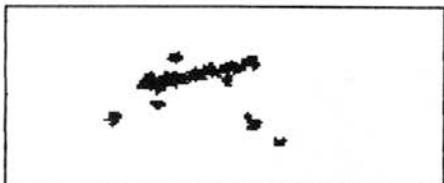
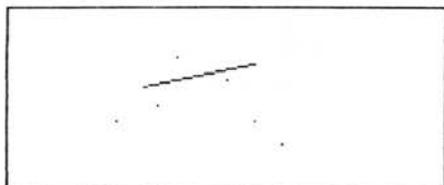


Figure 4: growing islands

perimeter, and let them wander toward the circle's centre by means of a semi-random walk. When the first wandering particle comes within one particle diameter of the original one, it 'sticks' to it. Another particle is now released, and so on. The resultant shape, figure 6, takes on a fungus-like form.

## Summary

Nature can be simulated with relative ease. Fractals and similar shapes form a modern and very interesting branch of computer-based mathematics. Apart from their computer art type applications, these shapes are helping to provide a better mathematical understanding of nature.

There are no strict rules for creating natural forms on your computer. The important thing to keep in mind is your final goal. The experimenting and trial and error that goes in between your initial idea and the final computerised graphic masterpiece is only secondary to the final result. So don't be afraid to try something new.

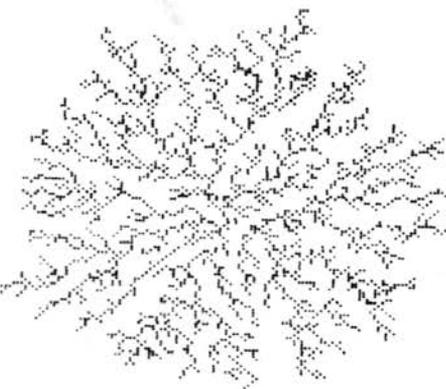


Figure 6



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# The system uncovered

by Selwyn Arrow

For this month's column I will answer the question: "What constitutes the DOS system?"

First of all, the DOS system comes as a set of three files on the original DOS disk supplied with your computer. The most obvious of the three is of course COMMAND.COM which I covered in the first of this series way back in December 1986. The other two files are hidden away from prying eyes, being either IBMBIO.COM and IBMDOS.COM on a PC-DOS disk, or MSDOS.SYS and IO.SYS on an MS-DOS disk.

These are the files which are copied from your DOS disk when you use the FORMAT command with the /S (system) switch, ie FORMAT B:/S. If you are using PC-DOS then COMMAND.COM is not copied, only the other two, whereas some versions of MS-DOS have been known to copy all three.

In both cases the DOS startup procedure requires IBMBIO.COM/IO.SYS to start at the beginning of the data area on the (floppy or hard) disk. Both files must occupy the first two directory entries.

All three of these DOS system files are required on any disk you want to boot your computer from. For instance, if you want to be able to turn your computer on and go straight into your favourite word processor you will need these three system files copied onto your WP disk, as described above using FORMAT A:/S, before copying your WP files over to the disk.

An alternative method, if you have already formatted a disk but have not yet copied any files onto it, is to copy the system files across using the SYS command. This will work only if there are no files presently on the disk, or if the system files presently on that disk need replacing, usually with a later version of DOS. Don't forget to copy COMMAND.COM over as well or you will get the message "Command Interpreter bad or missing".

Now that we know how to copy the system files to a disk, let's have a look at what they do for us.

## ROM BIOS

Each PC has some essential

software permanently built into a chip called the ROM BIOS (Read Only Memory, Basic Input/Output System).

This is a collection of machine language routines that provide support services for the PC's continuing operation. The ROM BIOS programs must first supervise the PC's start up, including a quick check to make sure all is functioning properly, initialise the other chips and standard equipment attached to the PC, check to see what optional equipment is attached, including disk drives, and then load the operating system from the boot disk.

This latter function is called the *boot-strap loader*, a short program which attempts to read the boot record from any disk's system tracks, and if successful, then passes control to the program it has just loaded, usually DOS. If unsuccessful, then a suitable message is displayed by the ROM BIOS. It does not need to be a DOS boot disk to start up your computer; remember some games do have their own boot tracks and command program so they must be started from scratch. This is usually done to make them uncopyable.

It will now be obvious why IBMBIO.COM/IO.SYS must be first on the disk, as it is the first routine in this program which is loaded to start up our DOS, the remainder forming the Input/Output link between the equipment and DOS. From here the system programs interact with the ROM BIOS, which in turn controls the equipment inside (and outside) the PC.

This explains why you can usually use any of the versions of the MS and PC DOS family in any of the IBM or compatible computer family; it is the on-board ROM BIOS which knows about and takes care of the specific hardware, while IBMDOS.COM/MSDOS.SYS has overall control of the entire system and it remains primarily hardware independent. It issues generalised directions to the ROM BIOS which in turn translates them into directives for specific pieces of equipment to do their functions.

You could think of the ROM BIOS routines as the lowest-level system software, as they perform the primitive but fundamental input and out-

put operations. The IBMBIO.COM/IO.SYS routines quite often include additions and corrections to ROM BIOS as well as support programs for any new devices, eliminating the need to replace ROM chips.

The IBMDOS.COM/MSDOS.SYS routines are rather more sophisticated as they occupy the next highest level up. These are the DOS service routines and give access to the DOS interrupt functions, an essential part of the operating system. They include all of the standard disk processes such as reading, writing, formatting, file opening, closing and deleting, and searching directories which are used by such programs as COPY, FORMAT and DIR.

The most important and well known part of DOS is of course COMMAND.COM. It contains routines which interpret commands that we enter at the keyboard while we are in the DOS command mode. These are compared with a table of command names to differentiate between commands internal to COMMAND.COM such as DIR or DEL, or external commands such as SYS or FORMAT. See the December 1986 DOS column for more in this subject.

Then at the topmost level are our own programs and applications which quite often call various DOS service routines in IBMDOS.COM/MSDOS.SYS, again through a set of interrupts. This is the recommended way to operate the system, but there is always someone who likes to use shortcuts on the grounds of more speed or more efficient file handling, etc.

They go directly to routines in the Rom BIOS, but unfortunately this often leads to major problems when the ROM BIOS is changed or updates in the IBMBIO.COM/IO.SYS are ignored, and then the program and our system crash as the required function is elsewhere. We then have to resort to the big black switch and perhaps a variety of curses.

So there we have the short answer to what constitutes DOS. For further information on this subject I would recommend Peter Norton's *Programmer's Guide to the IBM PC* which I hope to review in this column sometime.

# String on the screen

by Joe Colquitt

This series of articles was written with Commodore 64 6502/6510 in mind. Other 6502 machines (Apple, BBC, Atari, VIC 20 etc) will run examples if corrections are made to addresses. The C64 calls ML with SYS, while other BASICs may use CALL, USR etc.

To continue along the lines of last month's coverage of loops, this month's topic is using loops with strings and other data. All programs have some sort of screen display, and knowing how to produce a fast and tidy one will enhance any that you write.

When in BASIC, the three common ways of putting data on the screen are (fast to slow) PRINT, PRINT#, and POKE. PRINT is probably the easiest to use, and that's the case with ML PRINTs. At ML speed, a screen can be displayed in a split-second, giving a program a much better 'feel' to an end-user, which wouldn't be the case if there were delays for POKE loops or PRINTs.

Example 1 is typical of a simple loop to print a string. It doesn't specify where printing is to start, and prints continuously unless a carriage return [CHR\$(13), #0D] is printed. The string to be printed is stored as ASCII codes with a 0 as an end-of-string marker, done with a routine like Example 1a. If a 0 isn't found, the loop will keep executing until 256 elements have been printed.

The JSR\$FFD2 can be replaced with JSR\$F1CA, because FFD2 is an address in the 6502 jump table which holds the instruction JMP\$F1CA. Jump tables in ROM are to make future ROM rewrites compatible with old software. Anyway, using JSR\$F1CA saves you three instruction cycles' time, a few micro-seconds which don't make that much difference when writing to the screen, but can if storing a lot of information on a disk.

There is a ROM routine at \$FFFF which can be used to either set or read the position of the cursor, and Example 2 shows the ROM listing of it. Printing from within a BASIC program invariably has cursor commands, TAB or SPC associated somewhere along the line. These are all taken care of at \$FFFF.

To put a string at a certain place on the screen, just set X and Y to the coordinates, clear the carry flag, and execute the print loop. Example 3 shows how.

You can perform \$E50C-\$E510 within your own program for recursive type operations. If, for instance, you wanted to set up a screen, one which had a series of titles down the left-hand side, a counter could be used for the titles, and X/Y for the print position. The titles are assumed to be less than 16 characters long.

The TXA TAX and ASL commands haven't been covered before, and are needed because 2\* multiplication can be done only on the accumulator. X is thus used twice: in the range 0 to 4 for setting the cursor, and 0 to 64 for getting data.

An alternative to writing your own code for locating a string is to call the routine at \$AB1E. The prints a string which starts at the address held in the accumulator and Y index. It also requires that the data be terminated with a 0.

#### Example 1: string print

```
C000 LDX#000 ;set index
C002 LDA#C100,X;get element
C005 BEQ#C00D ;if 0, exit
C007 JSR#FFD2 ;else print
C00A INX ;bump index
C00B BNE#C002 ;loop
C00D RTS ;exit
```

```
:
: data
:
C100 93 11 11 1D 0E 61 4E 20
C108 45 58 41 4D 50 4C 45 20
C110 4F 46 20 6D 6C 20 50 91
C118 9D 52 49 4E 11 9D 54 00
```

#### Example 1a;BASIC loader for string

ref Appendix C in User Guide. eg #93 is clear screen, #05 is white, #11 is crsr down and so on. You won't be able to enter these with INPUT, so use A#="..." and include them in the string that way

```
10 INPUT A#:A#=#CHR#(0)
20 INPUT AD
30 FOR I=1 TO LEN(A#)
40 POKEAD+I,ASC(MID$(A#,I,1))
50 NEXT
```

#### Example 2;read/set cursor position

```
FFF0 JMP#E50A (jump table again)

E50A BCS#E513 ;if carry=1, read
E50C STX#D6 ;set crsr line# from X
E50E STY#D3 ;set crsr colm# from Y
E510 JSR#E56C ;set addr of current line
E513 LDX#D6 ;read line#
E515 LDY#D3 ;read colm#
E517 RTS
```

#### Example 3;set position and print

```
C000 CLC ;'set' mode
C001 LDX#005 ;line 5
C003 LDY#00A ;column 10
C005 JSR#FFFF ;set
C008 LDX#000 ;print routine
C00A LDA#C100,X
C00D etc, etc
```

#### Recursive printing

```
C000 . ;data
C001 LDA#000 ;store count
C003 STA#C000 ;
C006 LDX#C000 ;set cursor position
C009 LDY#000 ;
C00B CLC ;
C00C JSR#FFFF ;
C00F TXA ;transfer X to A
C010 ASL ;*2
C011 ASL ;*4
C012 ASL ;*8
C013 ASL ;*16
C014 TAX ;shift A to X
C015 LDA#C100,X;print string data
C018 BEQ#C020 ;
C01A JSR#FFD2 ;
C01D INX ;
C01E BNE#C015 ;
C020 INC#C000 ;increase count
C023 LDA#C000 ;
C026 CMP#005 ;if <5 loop
C028 BNE#C006 ;
C02A RTS
```

```
C100 54 49 54 4C 45 31 13 0D TITLE1
C108 .. .. .. .. ..
C110 54 49 54 4C 45 32 13 0D TITLE2
etc
```

#### Example 5;print string at C100

```
C000 LDA#000 ;address low
C002 LDY#C1 ;address high
C004 JSR#AB1E ;print
C007 ... ;rest of program
```



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*The drive in peripheral products*

# Two new MacProducts

by Grant Cowie

One of the frustrating things about living in New Zealand is the remoteness from the centre of things, which in the case of computing is the United States. Although I try to keep in touch with new software products by reading magazines such as *Byte* and *MacWorld* (particularly the advertisements), it is irksome to read about exciting new developments and not to be able to view them first hand. This week I thought I'd tell you about two products, Reflex and Trapeze, that have been advertised heavily overseas and which are available locally (both are supplied by Imagineering).

## Reflex

Last year in *Byte* I came across what appeared to be an interesting database product for IBM PCs. It was called Reflex, was marketed by Borland, and had some novel features which I wanted. I didn't buy Reflex because I don't have a PC, but when Borland announced Reflex for the Mac I ordered it immediately, sight unseen. This was a mistake, as Reflex for the Mac is an entirely different product from the PC version: a black mark for Borland for marketing it under the same name.

Every cloud has a silver lining, however. Reflex (from now on I'm talking about the Mac version) has proved unexpectedly useful for a wide variety of tasks, and has certainly repaid my investment in it several times over. I definitely have a love-hate relationship with it, however – sometimes it's absolutely great, and other times it's terrible; in some ways it's amazingly powerful, and in other ways frustratingly weak.

Reflex is a simple but powerful relational database system. It was originally marketed as Lattice, but Borland bought the rights to it last year. It has a very Macintosh user interface, which makes it extraordinarily easy to use (most of the time). Files for example are defined graphically, so that a database schema is easily viewed on the screen. All files must have a key, and this must be unique throughout the file. Relations can be formed between files by dragging one field onto another, and can be one-to-one, one-to-many, or many-to-one. Files can also relate to themselves, which is very useful for doing bills of materials and the like.

The design of data entry forms and report layouts is simple and straightforward, being done with the mouse. Fields in a data entry layout can have inbuilt checking, and pictures can be pasted onto both entry forms or reports for enhanced layouts. The real analytical power of Reflex lies in the report generator. Unfortunately this is probably the hardest part of the system to understand, but there is an English-like query language for pulling out selected records in a report.

Some restrictions in Reflex limit its usefulness. There is no underlying programming language, so database updates can get complicated. In addition, a data entry screen can refer to only one file, so that you cannot have (for example) an invoice header and invoice line details on the same screen.

Any limitations in Reflex must be matched against its price. At \$295 (including GST) it is very good value, and I strongly recommend it to anyone who has simple database problems or who wants to find out what a relational database is all about.

## Trapeze

Trapeze is advertised as the spreadsheet without limits. This is certainly true – the theoretical limit of a Trapeze spreadsheet is in the trillions of cells, but you'll run out of Macintosh memory long before that!

The significant difference between Trapeze and other more traditional spreadsheets such as Excel or Lotus 1-2-3 is that Trapeze is not a cell-oriented spreadsheet. Instead, data are stored in named blocks, which can be of any size. Because all formula references are done by name, the blocks can be anywhere on the spreadsheet, and can be rearranged without mucking up the formulae. A Trapeze block is a collection of items that are all the same type (numbers, words, charts, pictures, text or graphics). In addition a database block is made up of fields which can be numbers or words.

For calculation purposes a block can be viewed as a matrix, so that at its basic level Trapeze is a great system for manipulating matrices. For example, one block could be called Ham, and another Eggs. It is then a simple matter to create a third block and give it a formula Ham+Eggs,

which causes a matrix addition to be done. The blocks can be autosizing, so that if the size of Ham is changed, the size of Ham+Eggs will be adjusted accordingly.

In keeping with the matrix theme, there is a whole host of matrix functions, including those for finding the determinant, solving a system of linear equations, matrix inversion, linear regression and so on. Trapeze is therefore an enormously powerful tool for playing with matrices, and as such should appeal to engineers, economists, statisticians (there are numerous statistical functions), physicists and the like.

However, if the concept of a block is Trapeze's strength, it is also its weakness. Because a block can contain only one type of data, you cannot mix formulae and constants within a block. Thus I suspect that Trapeze would be somewhat restrictive in the traditional spreadsheet areas of financial planning and budgeting where it is not uncommon to mix formulae and constants in one row. And if you are already experienced with spreadsheets, you may find the block-oriented approach of Trapeze somewhat difficult to master at first.

A big plus, however, is the flexibility that the block orientation gives in laying out reports. Because a block can be located and moved anywhere on the spreadsheet, you can change report layouts at will with absolutely no risk of inadvertently changing the spreadsheet results. Furthermore, different blocks can be different fonts and styles.

And if that isn't enough, Trapeze has fairly powerful graphing facilities, so that you can have data and charts (and pictures and free flowing text) on the same spreadsheet (a sort of poor man's Pagemaker). All these capabilities mean that Trapeze is far superior to the more traditional spreadsheets for report preparation and layout.

If you're an engineer or the like then you ought to have a good hard look at Trapeze. It will also function readily enough for financial work, but may not be quite so effective as Multiplan or Excel (there are no macros for example). However for preparing reports and presentations it leaves these for dead. With a local price of \$750 (including GST) Trapeze may be an appropriate solution to your spreadsheet requirements.

# The MSX standard – here to stay?

by Nigel Burrell

The subject of this month's column is the MSX home computer standard and how it has been received both locally and overseas. I'd like to go through the good and bad aspects of the standardisation to proclaim why MSX has not been as much of a success as the original designers might have hoped it would be.

Years ago, manufacturers of home computers always developed their own unique version of the system Basic which the computer was to understand and therefore execute. As you can imagine, incompatibility between each computer brand was predominant, Commodore 64 games not being able to run on an Atari computer, etc, although computer salesmen very rarely told potential buyers of the incompatibility between each brand. Perhaps it was one of the more technical aspects of the computer that not very many people were worried about or interested in knowing about, but whatever the reason, incompatibility seemed to be here to stay.

That is until Steve Ting (nicknamed Sting) arrived on the scene. He was determined to design a standard for all home computers. This standard (MSX), released in 1984, was to have the biggest software support market ever produced. The Spectravideo SVI-728i and SVI-738 models were produced with this inbuilt standardisation. Other computer manufacturers followed by producing MSX computers that were later released, and MSX now provided a world-wide list of compatible software.

Unfortunately, even with the backup of 23 other computer companies and an unknown number of software houses, the catalogue list of MSX software never totalled more than 10,000 titles. Was this due to a downward turn in the home computer market, or wasn't the prospect of standardisation attractive enough? No one knows for sure.

It is obvious, however, that the home computer market has dropped somewhat over the last few years. Business computers have since become more affordable and people have tended to go for these more powerful machines to suit their required applications.

Another point that may not have favoured the MSX standardisation is that bigger, more established, home computer companies like Commodore, Atari, and Amstrad never wanted anything to do with MSX

once it was presented to them by Steve Ting. It was obvious why – they had already mastered the home computer market without the assistance of any standardisation.

One must also never forget that six months in the computer business is like five years in any other, as the progression of technology is so dramatic. New developments in CPUs, operating systems and input/output devices are being continually upgraded.

And the big question is: how is an MSX standardisation going to cope? The obvious answer to this question is that it can't. New home computers with better colour, sound, and I/O facilities are being designed all the time which will only in effect leave MSX behind.

Some of the computer companies that adopted the original MSX standard later on brought out extra models with upgraded features and labeled them as MSX2 machines. MSX3 was also released shortly afterwards. This meant that the original purchases of MSX1 computers were now incompatible with the catalogue list of MSX2 and MSX3 software, which has neutralised the meaning of the standardisation in the first place.

Even publicity for MSX was lacking. Therefore many retail establish-

ments had never heard of MSX computers let alone sold them. That pitiful picture of the MSX state of affairs still exists today.

Don't get me wrong, MSX computers have been sold in large quantities and have been reasonably successful, especially in countries like Australia, Europe, and South Africa. With MSX being a world-wide standard, I have been witness to some excellent top-quality games. Only the very best software tends to survive on such a world market basis, which complements its very existence.

As mentioned earlier there has been a noticeable increase in sales of business computers on the domestic market. People are attracted by the increase in facilities offered with business computers. That's why IBM compatibility has survived for so long and will continue to do so: its consistency has been so dependable, while MSX has followed a less definable path.

All in all, home computers and business computers provide their own particular needs while MSX represents a concept in home computing that is still evolving. On the other hand, business computers are tending to cater for those who are seeking somewhat more sophisticated facilities.



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# Pretty radical, eh?

by Pip Forer

In these pages and elsewhere I have often argued that the 16-bit era could prove a dangerous distraction to much of education. Certainly many pundits have stated that the 'new generation' of machines would provide a much better model of what an educational computer should be than the current 16-bit ones. What I did not expect was to see a full 32-bit school machine available, and at a reportedly low price, so soon. Nor did I expect it to be a European machine, or one **not** using a 68020 or 80386 as its processor.

What follows describes this machine. It is not a full review of the product; half a day is not enough for that. However, it is a fair description of a prototype due for volume release in September, which I have examined, checked for cables or infrared links to a mainframe under the table and found very impressive.

This machine is a full 32-bit micro with a standard monochrome screen resolution of roughly 1000 by 1000 points, or a colour screen of 256 simultaneous colours from a palette of 4096, at a resolution of 640 by 512 pixels (without any snappy tricks like juggling colour palettes from line to line). It is expandable and open architecture. It is downward compatible with its 8-bit predecessor, which has a large school presence and a bundle of software. It has an interpreting BASIC which runs programs at a speed I didn't believe until I listed the programs, edited them and validated them. Its cost is not yet released, but is pretty close to affordable even by schools for class sets.

Its raw performance is the most impressive aspect. From the BASIC interpreter it can replicate the well known Amiga bouncing ball demonstration or run a multiple windowing system, juggling active windows and opening new programs. It does this smoothly and well, and I am most unforgiving of clunky WIMPs interfaces. More to the point, and I stress, it runs its WIMPs environment demo from interpreted BASIC. The code for this is in a form that can be very easily examined and understood for development.

At another scale the benchmarks I sighted (and did not run myself but have no reason to doubt) suggest the following comparisons:

Benchmark:	Speed Increase
Interpreted Basic vs an IBM-PC-AT (PCW benchmarks),	x10
Interpreted Basic vs an IBM-PC	x30
LISP vs a 32016 processor (CWS)	x12
LISP vs VAX 11/780	

minicomputer

x4.2

There is even a comparison of some compiled systems code benchmarks which have the system on the same graph as a massive IBM 3081 (which to be honest does benchmark two and a half times faster... and just what the specific system code used is very unclear). When you think that the 32016 in a Cambridge workstation is remarkably cost effective against a shared mainframe, and that this new system is maybe half the cost and ten times the power, you begin to get a form of computing vertigo.

People have been pointing at the possibility of a Sun-eater, a cheap machine with specifications to match the expensive Sun and Apollo workstations. In many ways this might even be it. It is open architecture, scheduled to run Unix and certainly meets many of the other criteria for a Sun eater. The problem is that no-one expected it quite so soon, and no-one expected it from a range that will be marketed from primary schools to universities.

Who makes this machine? It is the predicted upgrade from Acorn, based, in spite of some early denials, on their own proprietary RISC (Reduced Instruction Set Computer) chip, and called the Archimedes. It comes in two series: a badged BBC series (the new BBC micro) and a scientific series (under Acorn's name).

What can it be compared with? Its natural running mates are that innovative quality trio: the Amiga, Macintosh and Atari 1024. Like the Amiga, the system's processing chip links to three other chips, one of which handles the graphics and (eight-voice stereo) sound.

However, the resolution and normal palette options are better. In some ways the first impression of the operating system reminds one of the Atari 1024, which it seems likely to be cost-competitive within the UK and which is least radical in its software architecture.

Comparisons with Apple are interesting. Like Apple between the II and the Macintosh, Acorn has skipped a chip generation in order to capitalise on new advances, but has been less radical in that much software compatibility is retained. The result is not as elegant or physically portable as the Macintosh, but it is not as expensive as the Macintosh II (which it would be interesting to benchmark it against).

The Archimedes certainly presents some attractive options, not least of

which would seem to be compatibility for existing BBC users. In its simplest 512kb form it will run all well-behaved BBC B and Master programs, will have a full 6502 emulator and the obligatory MS-DOS emulation option (whether with the obligatory slowed performance is not clear).

The enhanced models will offer Unix. The graphics rival the best on any standard machine, but also offer complete compatibility with the original BBC display modes. It can have its own hard disk or it can network on to Econet. Anything peripheral you can put on the BBC can be linked in to the Archimedes through an optional backplate.

Its BASIC is excellent. BASIC V is an enhanced BBC BASIC, including further structured programming enhancements, and the operating system has built-in icon and window managers of apparent elegance and simplicity in a 512kb ROM. The operating system extends the traditional BBC options, so providing the chance for current BBC users to develop from an easy base. At first sight it also appears a very attractive development environment for non-Acorn users. Languages initially available include all of the eight or nine most commonly used languages.

Where does such an original system stand in the market? The low-end models will in fact be targeted at schools and may be useful on networks as a resource which can be easily shared between machines, as well as in their own right. That targeting will be greatly enhanced by the way that Acorn has kept faith with its existing user base by providing compatibility, while the high-end models will provide many of the needs of CAD/CAM and graphics workstations in education.

So what are the catches? In terms of power, robustness and price the system looks outstanding. However, those are not always sufficient ingredients for success. I saw a prototype without any documentation on the operating system or evidence of software base. The former is important in terms of development potential, the second in terms of the needs of users.

There are some hard questions there that must be posed and will need time to answer. A more detailed review will be possible later (and a machine should be on show at the NZCES conference in Christchurch, 30 August).

# Commodore recreation

by Timothy Howell

Whether you will admit it or not, virtually all Commodore 64 owners would have at some stage used their computers for playing games. As you would all know, there is a tremendous number of games produced for the C64 and it is becoming increasingly difficult to choose a good game from the many that are available.

The game scene has developed a great deal in the last two years. Whereas computer owners had previously been satisfied with relatively simple stuff, we are now being bombarded with games featuring hundreds of screens, 17-minute mini-symphonies and high-class graphics. These luxuries make it increasingly difficult to choose a game that looks good and is also enjoyable to play. Certainly these extras may seduce us into buying a game, but at the same time the all-important gameplay element may be missing. After all, would you like to pay \$40 for a game which looked great but you couldn't play for peanuts?

This makes it very difficult for the average computer user to choose a game he or she will enjoy. In buying a

game you should consider what you want from it. If you are a 'thinking' type of person there are two main types of games you could get: arcade adventures or 'normal' adventures. The former usually involve using a joystick to pick up and move different objects to special places. They often have hundreds of different locations and require a good memory (on your part!) and lots of patience. 'Normal' adventures are much the same as arcade adventures, but instead of using a joystick you use the keyboard to enter your commands.

For the younger and/or more destructive player, the shoot-em-up is an ideal (but rather pointless) type of game. The shoot-em-up is a fast moving sort of game and requires the player to shoot as many things (usually alien spaceships and suchlike) as possible before they shoot him (or her). Fast reactions are needed for success here.

For the more sporting-minded there are games featuring nearly all of the popular sports. Soccer, cricket, snooker, basketball and volleyball are just a few of the many types availa-

ble. You could even compete in the Olympics!

Other types of games available are those of strategy in which the player commands a country in a war or some other situation. This type of game is very complex and usually requires a lot of practice before success is achieved. Simply, you will get as much success out of this sort of thing according to the amount of effort that you put into it (and in fact this is true of virtually all types of games).

The above descriptions are of the main types of games available for the Commodore 64 owner, but in no way is it a list of all the types of game programs, as there are many which feature combinations of the above elements as well as some that are completely different.

In later months I hope to go into each game category in detail, as well as other interesting recreational areas (such as graphics programs etc.), and give you an idea of some of the better games that are available – a sort of mini-review section.

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# The end

by Joe Colquitt

This final part of the adventure series explains the modules. For those who wish to incorporate machine code, see the ML column for ideas. An upcoming article will deal with sub-strings.

The first thing the game does is to set whether it's raining or not, which determines the necessity for a raincoat later on. Next the player is put in room 1 (CP=1) and the dog is randomly put in one of the rooms. A random element is always a good idea, so that the game has some element of chance every time it's played.

Line 40 (which should read "[home][down] YOU'RE";LO\$(CP)) prints the description of the current location. 50-70 print any directions that the player can go.

Line 75 moves the DOOR between locations 9 and 10, so that you can see it from either room. Line 100 prints a message if you're outside in the rain without a coat, while line 110 tells you to shut an open door.

The main program loop starts at line 120. Then follows the testing of verbs and nouns. Line 135 is for a direction response, 140 is for unrecognised nouns, 145 is for single word answers that aren't directions, and 150 is also for unrecognised words.

UP and DOWN are checked for at lines 160-162. Directions are sorted out in lines 165-180, with jumps made if a direction is not found. The new location is set in line 190, and 210 is the final line of the main loop, where

branches are made according to the value of the noun.

**Inventory:** a loop is performed to determine if an object is held by the player. When GET object is entered, the object's location is changed from CP to -1.

**Look:** this is similar to the INVENTORY command, except that instead of checking whether an object's location is -1 (the player), it sees if it is at the current location.

**Help:** an optional routine to print messages, in this case only in room 2.

**Get, take:** ZZ can be set here to limit the carrying capacity of a player. First the routine checks to see if you have the object (OB%(NO)=-1). If the noun is DOOR, a message. If it's DESK, a message. Then, if the object's location is the same as the current position, you've got it, otherwise it's not there. Next, check for the coat, and the lead, collar and dog.

**Drop:** operates like GET, leaving OB%(NO) equal to CP.

**Open:** if you don't have the lead, collar and dog, and you try to open the door in room 10, you can't leave. If the door does open, the connection is made between rooms 9 and 10 (line 6015). If you don't have the keys, no open door. An attempt to open anything but the door won't succeed.

**Close:** a series of checks, as for OPEN.

**Examine:** used instead of LOOK, just to make things awkward for the player. If you examine the keys

(NO=3), or the desk (NO=8), a message.

**Score:** returns the number of turns.

This game could have been much, much longer if copious messages and information routines had been added. To be really cruel, you needn't have any (eg Hacker). I think you should choose one of those options.

## Backchat

It's possible to have a good 'conversation' with an adventure (eg Dennis through the drinking glass), and a good selection of remarks from the game stops time dragging for the player. You'll have noticed that I used YET in the game. It gives the player the (misguided) hope that something may be revealed as the game progresses.

You could try making a multi-player game (eg Spy v Spy), which may or may not have the players meeting each other as in role-playing games.

Hazards are helpful to keep the player's interest up, but don't make them insurmountable or unrealistic. Players will get fed up if they die too often. It pays to have someone try your game as you develop the plot, as it is quite easy for the author to become accustomed to the game and avoid obstacles or situations which an uninformed player would find impossible.

Keep an eye on silly responses like EAT DOOR, allowable perhaps if you have a message for it. A game I once played checked for swearing, and said IF YOU DO THAT AGAIN, I'M GOING HOME, so I swore at it again. The program then looked as though it did a reset, leaving the usual blue screen seen at power-up. After five seconds though, it restarted with I WILL NEXT TIME. A very cute and original alternative to the I DON'T KNOW THAT WORD.

When a player drops something, if it's breakable, break it. Make 'em weep. Have an alternative like PUT or LOWER or PLACE for fragile goods like vases, mirrors etc.

If you wanted to, you could make a marathon game (perhaps not too difficult) that had 500 locations, split into areas of 50 and stored on disk. A new set of rooms would be loaded when the player stepped outside the bounds of the 50 in play. Variables could be stored and retrieved for use in the new set of rooms.

I guess it's time to let you do some thinking. If you want some text adventures, drop me a disk-tape. Joe Colquitt, 6 Martin Ave, Mt Albert, Auckland.

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# Who needs videotex?

by Colin Windsor,  
chairman, Videotex Association

With digital data networks, interactive ASCII services, file transfers and so on – who needs videotex?

We are continually reminded that we live in the Information Age; that information is the life blood of the modern-day body corporate. If this is true – and I do not dispute it – then it is equally certain that computers are its heart and communication networks its arterial system.

The proliferation of packet switched networks, the moves towards Digital Data Networks (DDNs) and Integrated Digital Services Networks (IDSNs) are all reflections of the need to move high volumes of information around at high speed.

The initial thrust in this arena came from the big players: the government agencies, multi-nationals and large conglomerates and the like. The "need to know" is, however, not limited to just the large, the powerful and the wealthy, as more humble concerns have had an impact too. Everyone, it seems, has recognised the value of information – not just information held somewhere in a file or on a computer for later inclusion in a hard-copy report, but information that is immediate and available at the desks of the decision-makers.

The establishment of Local Area Networks, the Automated Office revolution, the development of Query and fourth generation languages are all symptomatic of the hunger to acquire and disseminate information rapidly; to make information available where it is most needed in the shortest possible time.

No one, it seems, is immune to this desire to be in touch if the numbers of bulletin boards and electronic messaging services for hobbyists are anything to go on. (At the Videotex Conference in Sydney in 1986, VIATEL claimed that 80 per cent of their users were in the domestic sector and were principally hobbyists.)

While many companies still survive on telephone, telex and facsimile-based communications, this is more a function of their size and/or marketplace than it is of the need for immediately available information.

In part, this problem is being solved by entrepreneurs. This makes sense since the forex dealing room cannot have the world on-line to it any more than can the stock and futures exchanges.

In the United States the last five years have seen a growing number of

banks offering remote banking services to attract or retain customers. In the main these have involved interactive ASCII services. The banks, who own the databases of accounts, transactions, balances, applicable interest rates and so on have created the capacity and the network to allow users to dial-in and extract the information they need.

Similarly videotex-based services are being offered in this country. Here the banks are also being entrepreneurial in that they have provided a link to those other agencies already discussed. They are on-line to the dealing rooms, futures exchanges and so on, and thus are able to provide information on what is happening now.

Databank, on behalf of the trading banks, provides the links, the network and the central computing power that enables vital information to be communicated to anyone who wants it. The user does not need to expend capital on in-house computer gear, and does not need to know the first thing about computers to be able to be, in effect, on-line to the information required to control the company's financial destiny.

But why videotex at all? Why mention videotex in the same breath as communications? After all, isn't videotex – and particularly Prestel – a bit simplistic and limited? Surely we cannot really consider it appropriate in the modern era of Communications?

Wrong! It does have a role to play, it does have particular strengths, and it is currently proving all that in Australia and New Zealand in some of the largest and most influential companies in this part of the world.

So, what has it got going for it?

Simplicity is the most obvious attribute – literally anyone can use it. Presentation is another. Why should information be dull? Packaging has long been considered a vital aspect in the presentation of any product. Why should this be less so for information?

Given the choice of looking at the hourly, weekly or monthly trends in the exchange rates of two currencies in either graphical or diagrammatic form, or across 80 columns of figures packed row on row on the screen, I know which I find both more attractive and simpler to interpret.

The catch in all this is that to communicate information you must first acquire it. This is not always straightforward.

For example, a multi-national com-

pany, operating in many countries and in as many currencies, needs to know exactly what exchange rates are at any specific time. With most currencies floating, the situation is dynamic. There are fortunes to be made or lost in picking the right time and place for international transfers of funds.

Similarly dynamic are the futures exchanges and stock exchanges of the world, while cash management has become an increasingly important facet of management. The costs – and the potential savings – involved with managing one's financial situation can be immense. This holds true for the purely domestic situation as well as offshore.

The problem here for the company is that question of acquisition. How does one get hold of details of what is happening – minute by minute – in foreign exchange dealing rooms, in the money market and so on? How does one know one's actual overnight position across an array of banks and accounts and, possibly, countries?

Speed is no longer an issue. Videotex has long been fully interactive. It is not only simple to use but is elegant, attractive and inexpensive. The information it provides can be presented in a format that is both informative and pleasant to read.

While the traditional data processing professional and the dedicated, single-minded microprocessor buffs have long disparaged videotex, the fact is that it is finally gaining acceptance in the marketplace as a valuable communications medium. In its birthplace, it was until two years ago a failed technology. Not today. It is seeing a resurgence of interest and a divergence of applications that was hitherto undreamed of. (Perhaps that is why there are now 16 PTTs operating public videotex services around the world.)

Please, don't just take my word for it – or decline to take it, as the case may be. Come to Videotex '87 in Auckland this month. Let users tell you what they are doing and how they are benefiting from videotex-based services.

Come along with an open mind. After all, if you are not there to look and listen we cannot show or tell you. In the debate on the place of videotex in communications, the ability to sway you one way or the other is, after all, just a question of communication.

# Crossword No. 1

compiled by David Cass

This is the first in a sometime series of crossword puzzles with computer-related clues. Answers will be published next month, but the first three correctly completed entries to be opened on Monday 13 July will each receive a Golden Kiwi Lottery ticket. Complete your crossword now and send to:

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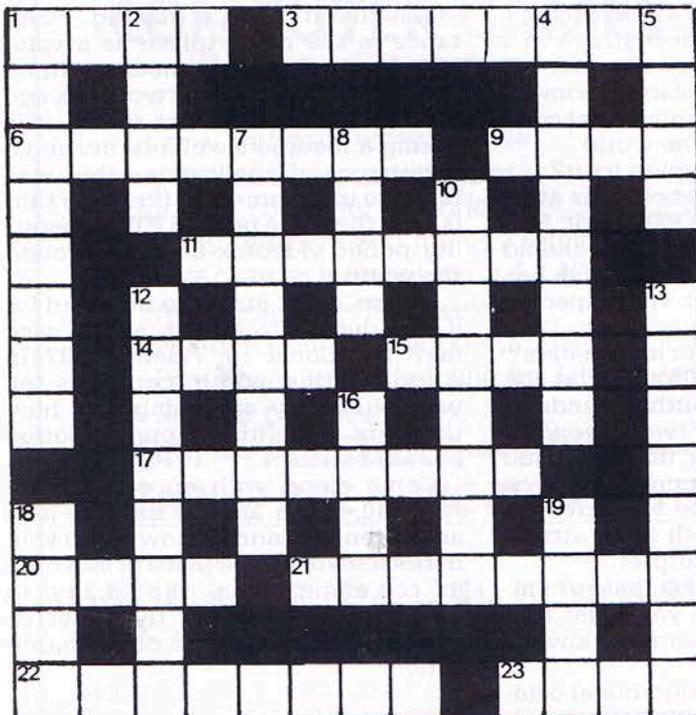
## CLUES

### Across:

1. Take your ----: a multi-user relational database management system, and operating system. (4)
3. This sort of port or interface allows simultaneous processing or transmission of all data elements. (8)
6. Memory that cannot be user-changed or altered by program. (4-4)
9. Contraction of "Binary Digits", used to signify the smallest units of data. (4)
11. Model name of microcomputer made by Tatung. (8)
14. Important U.S. Industry Association, that sets technical standards for the electronics industry. (Abbreviation) (4)
15. To print a series of records, without calculation. (4)
17. One of the basic word-processing operations, removal from one location to set into another. (3/5)
20. American firm that specialises in supercomputers. (4)
21. Major U.S. software house, producer of Wordstar and many other programs. (8)
22. Systems of interconnected components or stations, joined by telecommunications links. (8)
23. What the "O" stands for in the abbreviation "ROM". (4)

### Down:

1. Descriptive of micros that can be carried, or programs usable on more than one system. (8)
2. The piece of material removed when a code hole or notch is punched into paper tape or a punch card. (4)
4. Surname of a pioneering scientist in data-processing history. (8)
5. A high-level language, used as a method of processing data in the form of lists or strings, often used in text manipulation applications. (4)
7. European office equipment and micro manufacturer (M24, M24SP), and currently owner of Acorn/BBC. (8)
8. Advanced Apple product, that popularised the Mouse interface. (4)
10. Part of the cpu, that tracks what is where in the cpu, or a location in memory, of specific capacity, for specific purpose, on a temporary basis. (8)
12. Graphic representation of statistical shares - looking good enough to eat? (3/5)
13. Tangible, readable output from transient screen display. (4/4)
16. The proprietary mouse-driven front end supplied with Epson PC compatibles. (4)
18. A symbolic or pictorial representation on screen of a program command. (4)
19. Suitable for further expansion, as in "---- Architecture". (4)



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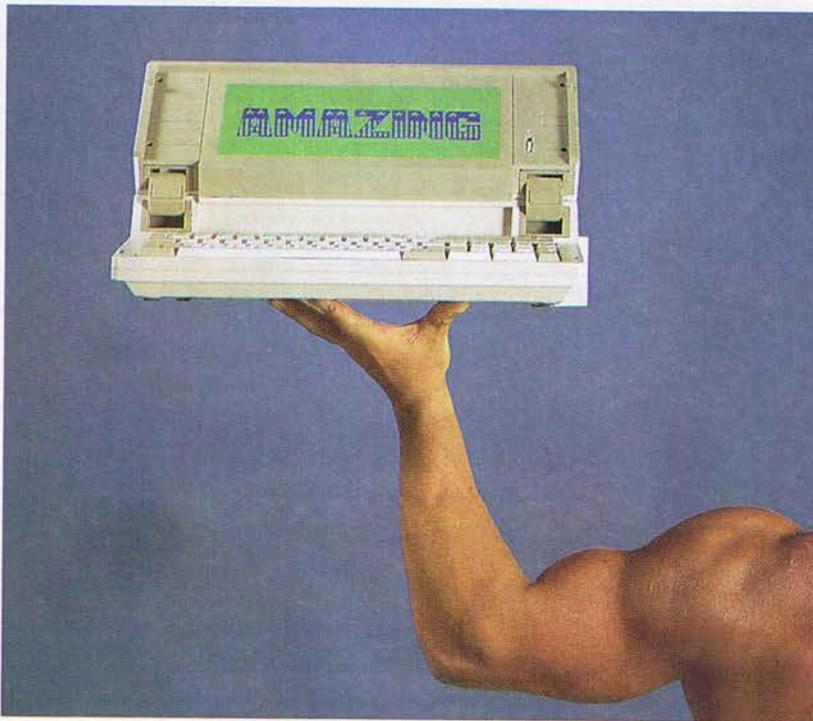
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