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BITS & BYTES

October 1987 Vol. 6 No. 2

ISSN 0111-9826



World premiere of the Paragon 88.
Cover preview page 16.

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BITS AND BYTES magazine is published monthly (excepting January) by Bits and Bytes Ltd, Denby House, third floor, 156 Parnell Road, PO Box 9870, Auckland 1. Phone 796-776, 796-775. Fax 796-655 **EDITORIAL:** managing editor, Gaie Ellis; editor, John King. **ADVERTISING:** Auckland – David Meyer, PO Box 9870, 796-775; Wellington – Vicki Eckford, 753-207. **SUBSCRIPTIONS:** third floor, Denby House, 156 Parnell Road, PO Box 9870, Auckland, phone 796-775. **SUBSCRIPTION RATE:** \$27.50 (incl GST) for 11 issues, school pupils rate \$25.00 (incl GST). Overseas subs are \$35/year surface mail, and airmail rates of \$68 (Australia, South Pacific), \$100 (North America and Asia) and \$125 (Europe, South America, Middle East). **BOOK CLUB:** manager, at above Auckland address, phone 796-775. **DISTRIBUTION INQUIRIES:** bookshops to Gordon and Gotch Ltd, computer stores to publisher. **PRODUCTION:** manager, Louise O'Sullivan, graphic designer, Derek Ward; typesetter, Monoset Trade Services Ltd; printer, Business Print. **DISCLAIMERS:** The published views of contributors are not necessarily shared by the publisher. Although all material in Bits and Bytes is checked for accuracy, no liability is assumed by the publisher for any losses due to use of material in this magazine. **COPYRIGHT:** All articles and programs published herein are copyright and are not to be sold or distributed in any format to non-subscribers of Bits and Bytes.

Where's the Mac II?

The much-vaunted Macintosh II, first announced at the same time as its smaller stable-mate Macintosh SE, has yet to be seen in any numbers in New Zealand, and local distributor CED is reluctant to release it for review in computer publications until the colour version is available.

David Strong, managing director of Apple Australia, admitted the Mac II had some problems during a recent visit to Auckland. "The colour screen is a joint development between Sony and Apple," he said. "There's some delay in achieving the required resolution, but we're shipping some products. It's a real chal-

lenge to get some of those products out into the marketplace."

He saw 1988 as a year of consolidation of the Macintosh II's position, once the colour screen is readily available, and described the IBM PS/2 as "a window of opportunity for us. When IBM does deliver it will be a good product, but Apple aims to be established by them."

The parent company is continuing software development, particularly in what it describes as "stackware", exemplified by the newly-announced HyperCard, which Strong said was designed to make use of future technology, for example in CD-ROM and laser disks.

"You can create the environment you want. It's wrong to look at HyperCard as a relational database - it all depends on what a person perceives. HyperCard is similar in a way to Basic on the Apple II, a base to start development on."

He pointed out that Apple looked at its success by not doing things in the same way as other big computer companies.

"The ability to co-exist is important, as people have personal preferences in PCs at lower levels. We must ensure there is no doubt over integrity of communication between mainframes and lower-level PCs."

Technology company taps world markets

Auckland's Microworld is to take its high technology concept to the market at Vancouver, described as the venture capital of the world.

Directors Kerry Spackman and Dr Lannes Johnson say that New Zealand's isolation is the reason for the planned North American listing. "It's not practical in the long term for Microworld to separate itself from its major markets," they point out.

However, New Zealanders will retain control of the Microworld board. The technology for export carries a New Zealand patent for worldwide distribution and New Zealanders will be able to invest in the company once it is publicly listed. Microworld's marketing plans are aimed at having a micrarium, similar to that which opened in Auckland earlier this year, in every major city in the USA, with spin-off technology around the world.

Amnesty for registered software pirates

Ashton-Tate (NZ) Ltd has announced a two-month amnesty for users of pirate or grey-market copies of its software, starting 1 October. Registration of such packages will be allowed without risk of legal action.

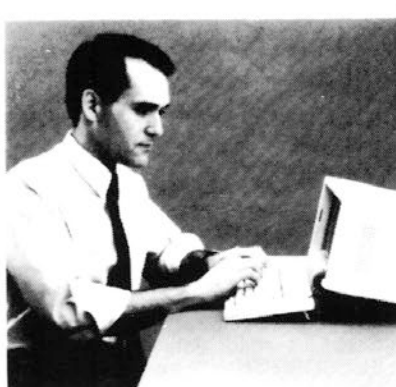

The company's experience internationally indicates that for every legal copy of a major software package, at least four

illegal or pirate copies are in use. "Pirate software users are at a disadvantage," says Ashton-Tate managing director Kerry Baillie. "They are often unable to make full use of the software's capabilities, usually do not have a manual, cannot ask for help and are not offered upgrades."

At the centre of the amnesty is the word

processing package Multimate, for which the major upgrade Multimate Advantage II has been released. Any pirate users can buy the upgrade and be registered as users, with full backup and future upgrade service.

"We have decided to take this step to clean up what we believe is a somewhat untidy situation," says Baillie.

PC-to-FAX

With the GammaFAX board and software in your PC, you can communicate directly with fax machines over phone lines. Simply compose a document using your own word processing or spreadsheet program and type in the phone number of the receiving fax machine. GammaFAX does the rest. At just \$2500.00 GammaFAX opens the world of fax to your PC.


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COMWORTH SYSTEMS LIMITED
133 Wairau Road Takapuna Auckland
Phone (09) 444-1988 Fax 444-9815

DTP bureau established in Auckland

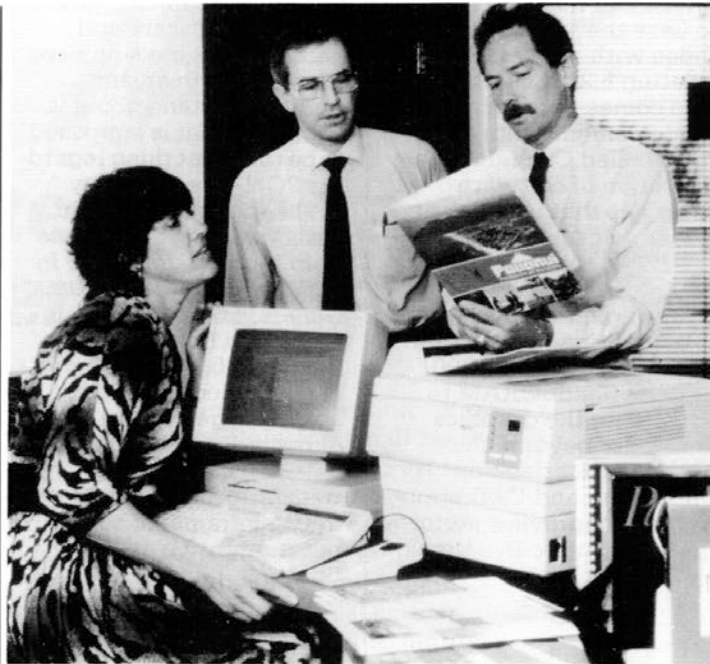
Believed to be New Zealand's first complete desktop publishing bureau is Concept Computer Publishing Bureau, recently set up by Blair Harkness, a journalist and public relations consultant, and Brian Lever, a graphic artist with experience in packaging, corporate and print design.

The two partners think there is confusion in the marketplace over desktop publishing. "A good many people have got the wrong end of the stick," says Harkness. "They seem to think that if they buy the software for their personal computer and invest in a laser printer, they can produce documents with a professional look."

But the computer is just the start, he points out. "To do a really professional job you must have the experience to be able to drive the system properly – and the skills needed include writing, typography, design, graphic art and print production.

"It is essential to understand that even though the present desktop publishing packages are quite amazing in what they can achieve, there is no substitute for hand-drawn graphics, creative writing or print production skills. You can't buy those in a computer package, but we can offer them through the bureau."

After exploring all the options, Concept went the IBM PC compatible way, to be able to take a customer's MS-DOS floppy disks and process them further with graphics and typesetting, and chose the Apricot Xen-i for its larger screen and better mouse. Software is Aldus PageMaker, and use of a PostScript compatible Texas Instruments 2108 laser printer gives the output choice of laser or Linotronic typesetting machine.



Concept Computer Publishing Bureau directors Blair Harkness and Brian Lever with manager Shirley Duke.

DC and New York City area, with later visits to Chicago, Columbus, Ohio, Denver, Dallas, Salt Lake City, San Francisco, and lastly Seattle to view a typical teaching situation comparable to that in New Zealand.

Ministry information systems

The PA consulting group of Wellington has concluded an information strategy study for the new Ministry for the Environment, which is now seeking tenders for hardware and software for the system expected to go live early next year.

The ministry was launched in December last year after the disestablishment of the Commission for the Environment, and has opened offices in the four main centres. A feature of the proposals is the high number of terminals – 45 units for a manning establishment of 61 – thought necessary for the improvement in productivity sought by the department.


Learning about learning

Brian Astill, associate director of Carrington Polytechnic, Auckland, left mid-September for a 45-day tour of the USA on a Fulbright Vocational Development Grant. The main emphasis during his visit to educational institutions will be the use of computers in teaching.

"These places are said


to be at the forefront of computer technology in learning," he said before he left. "It opens up prospects of distance learning. Some pretty innovative development is taking place, and I'm dead keen to see some of these to see how we can use them."


Most of his time will be spent in the Washington



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Following the OS/2 path

"The days of the stand-alone PCs are over," stated Ed Kuerner, manager system software of ITT XTRA Business Systems when introducing the new range of workstation systems last month.

He said that both the new 400 and 700 models were targeted at OS/2 and will run that system when it is introduced, XTRA having a licence with Microsoft. "We fully intend to support that operating system. DOS is nearing the end of its useful life in that you can't add too much to it, and we believe that OS/2 will become the next generation operating system. It will remove the constraints of DOS in a LAN environment."

An addition to the range is the XTRA/386 Multi-User System, with a multi-terminal subsystem using an Intel 80186 8MHz 16-bit coprocessor to support a total of 32 terminals or printers. It was designed with Xenix System V in mind, said Kuerner, "Xenix rather than Unix because it was architecturally designed as an 80286. Microsoft and ATT are merging. Microsoft will continue to develop Unix, while ATT still holds the design rights."

The XTRA family is equipped with the new

standard of 3.5-inch floppy drives and has Databridge to ease the transition for those with all their data on existing 5.25 diskettes. It also comes with an enhancement to its MS-DOS, called CachePAC, a collection of software solutions that use disk and directory caching, advanced read/write techniques and print buffering.

In addition, the top-line 80386-based model 700 uses its ShadowRAM to accelerate the graphics controller beyond basic capability for desktop publishing and CAD applications, improving performance by up to five times.

The final link

Data General's DG/PC*I, given its New Zealand introduction in Wellington recently, was described as representing "the company's strategy for integrating personal computers into a processing architecture that provides distributed corporate processing solutions." It was also said to be the final step for Data General, tidying up the range giving complete integration and answering

the demand to link PCs to mainframes.

"It integrates all IBM compatibles," said Trevor Forrest, "as well as Data General machines, utilising standard software and hardware. There's no need for any new gear, and nothing startling about it."

"In fact that is supposed to be the great thing regarding PC*I - its simplicity."

The first New Zealand order for the system came from Victoria University in Wellington, to link its Data General MV/400 DC mainframe and Data General Dasher 286. The Dasher is used for electronic microscope image capture and digitising, which with DG/PC*I can then be transferred at high speed to the mainframe for computer-intensive applications.

Mixing text and graphics

Said to bring near-typeset quality to more than 100 dot matrix and laser printers is software package LePrint version 2.0, which allows the integration of graphic files, generation of lines and boxes, and the typing in of foreign languages. It offers 16 type styles and is style-based rather than font-based, printing letters from 4 pt to full-page size.

Software-based multi-user system

Chevron Software has introduced the Multi-T II in New Zealand, an operating system which, once loaded on to a hard disk, will allow terminals to be plugged into the host's serial ports and run as a multi-user system. It will accommodate two users on a normal XT, three on a turbo XT, six on an AT compatible or up to 16 on an 80386-based machine.

OS/2 development kit available

The New Zealand release of Microsoft's OS/2 Development Kit has been announced by Brimaur. The 32kg package contains a pre-release version of the OS/2 system kernel, technical specifications for the MS OS/2 LAN Manager, new versions of Microsoft's macro assembler and C language compiler, and other associated development tools.

The necessary support will be provided directly by Microsoft in Seattle using electronic mail, and the \$8,900 kit is available only to software developers.

AST Premium/286

"The Premium/286 is without a doubt the best-looking and best-performing system with a 10MHz rating."



P.C. MAGAZINE APRIL 28 1987

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EXZEL Newsline

30 Minutes to sell a Computer – Guaranteed

The answer is simple, all that is required is to repeat the success formula of Computer Imports Ltd. According to Mr. Grant Hackett, Marketing Manager of Computer Imports Ltd they have sold the equivalent of one EXZEL computer, every 30 minutes of every working day since they opened their doors in 1984. This represents an installed base of over 12,000 EXZEL computers. Installations range from Government departments and large corporations such as the Broadcasting Corporation and the Treasury, plus almost all of New Zealand's universities and other

Tertiary Institutions through to medium and small businesses. "In fact, with the ever decreasing cost of technology, EXZEL computers are now affordable to an increasing number of individuals and home enthusiasts", stated Mr. Hackett. "And what of the future? Well, as 12,000 computers represents only 1% of all adults in New Zealand, there is room left for growth yet," commented Mr. Hackett.



EXZEL Corporation Appoints New Head

EXZEL Corporation (Taiwan) has appointed Computer Imports employee – Mr. Murray Potts in charge of their exporting operation. Mr Murray Potts whilst still employed by Computer Imports Ltd has been contracted to EXZEL Corporation in Taiwan. Mr. Potts' background includes the running of his own business plus extensive experience in the areas of importing gained whilst working for Computer Imports in New Zealand.

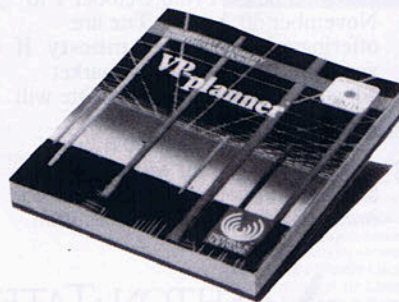
Technical Institutes Say "Yes" to EXZEL

New Zealand's Technical Institutes have said "Yes" to Computer Imports Ltd and their EXZEL range of computers. For the second year in succession, Computer Imports have been awarded the prestigious Technical Institute's Composite Micro-Computer Tender. Last year the contract represented a record breaking 900 computer systems. This year's tender, was initially expected to represent less than half this total, but once the results were released, the numbers taking advantage of the tender swelled to a new record breaking level of over 1,100 computers. "This is believed to be New Zealand's and possibly Australasia's largest computer order ever", stated General Manager, Mr. Philip Ellis. Mr.

Ellis further stated that the total value of the tender is well over NZ\$3,000,000 (three million) dollars at a retail level. In questioning Mr. Ellis as to why he felt Computer Imports had been awarded the contract

for a second term, he stated, "Whilst our competitive pricing no doubt helped, one of the main reasons was the overall satisfaction with the company over the past twelve months".

VP-Planner Outsells Lotus 1-2-3?



With over 2500 copies of VP-Planner installed in New Zealand, it is believed that the product is not only outselling Lotus 1-2-3, but has a larger installed base than Lotus. Most of its success comes down purely and simply to price; it offers the same or similar features as Lotus but at up to 80% savings in cost. "In addition the product provides the security of being offered by the largest IBM compatible supplier in New Zealand – Computer Imports Ltd", stated Mr. Bernard Bailey of Paperback Software, the New Zealand distributor of VP-Planner.



Computer Imports Ltd

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167 Gloucester St, P.O. Box 13-403, Christchurch. Telephone (03) 50-709. Fax (03) 61-826.

Computer design and control



Lego products are a familiar sight in New Zealand, and Barson Computers has taken the distribution rights for Lego's Technic Control module, developed in the UK for the education market. The module gives students a task such as designing a car or ferris wheel, and they have to use a computer to drive it. The product can be used by pupils individually or in groups, and comprises the same components as the traditional Lego blocks.

CAD design aid

Eagle Technology, the New Zealand distributor for AutoCAD, has announced the AutoCAD AEC (architecture, engineering and construction) Mechanical package for PC/XT/AT-compatible systems, a design aid for mechanical engineers who plan mechanical building systems.

While it is a standalone product, it is compatible with AutoCAD AEC Architectural and can use its generated floor plans as a basis for mechanical systems diagrams. AEC Mechanical features a template with standard symbols for heating, ventilation and air-conditioning equipment; pipe and duct layout and risers; fire protection equipment; and control and metering devices, and also includes an interface to third-party duct analysis software.

New company Revealed

The marketing and support of the database management package Revelation and the newly-released Advanced Revelation form the basis of a new Wellington company, Tech-Tonics.

Revelation, from the American software company Cosmos, has been on the New Zealand scene for several years but has not had a high profile. "That's about to change," states Mike McDermott, Tech-Tonics managing director.

"Advanced Revelation will further establish PCs as competitive alternatives to mini and mainframe solutions."

Keep that printer

Announced by Viscount Electronics is a device to allow Commodore 64 users with Commodore printers to connect them to their PC-compatible machines through the standard parallel port. It comprises a cable, with 6-pin DIN and standard parallel connectors on either end, and a printer driver disk which converts output to a Commodore compatible format.

AMNESTY AMNESTY AMNESTY AMNESTY AMNESTY AMNESTY AMNESTY AMNESTY

MULTIMATE PIRATES



There are only three disadvantages with pirated software. First, you're breaking the law and are liable to prosecution. Second, you're on your own — expert backup is not available. Third, you don't get to take advantage of upgrades — and that's the rub.

Ashton-Tate have just released the ultimate Multimate Upgrade-Multimate Advantage II. More than an upgrade it's a rewrite of a best seller. It's as good as any and better than most.

Licensed users are being offered Advantage II for \$195.00 and for their money they get a whole new package — discs, manual, handbooks, licence, support and all.

So how about you?

It's good news. From October 1 to November 30 Ashton-Tate are offering a **Multimate Amnesty**. If you have a pirate or grey market copy of Multimate Ashton-Tate will provide you with Multimate Advantage II for **\$395.00** (normal retail \$995.00). You will save \$600.00 and you will be guaranteed immunity from piracy prosecution.



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The result for you will be a much more useable word processing package, back-up, future upgrade offers and, of course, a clearer conscience.

To take advantage of the **Multimate Amnesty** simply phone Ashton-Tate on (071) 393-309.

By the way — for you the amnesty extends to other Ashton-Tate software too. So don't worry if you have more than Multimate — you can upgrade and register the others as well.

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Appointments

Roger Redfern, formerly national marketing manager with Wang New Zealand, has been appointed to the new position of national marketing manager at Digital Equipment Corporation (NZ) Ltd. He has 18 years' experience in the local computer industry.

New Zealand product manager for UK-based computer services company Hoskyns Group plc is **Des Krause**, who will be involved in the marketing of Hoskyns' newly-acquired Jobscope system, designed specifically for make-to-order or project-oriented manufacturing and contract service companies.

In a change at the top of the local IBM management, **Basic Logan**, IBM New Zealand managing director since 1974 and chairman of directors since 1983, has been appointed assistant general manager of the company's Asia Pacific Group in Hong Kong. His duties will cover a wide range for the 17 countries in the group's sphere of activities, and his place in New Zealand will be filled by **Herb Hunt**, currently director of operations for IBM New Zealand, who joined from IBM Canada in 1978 and has held a number of positions in marketing in the local company.

Bruce Ford, who has been with Mitsui Computers since 1979, is now branch manager in New Zealand, responsible for the offices in Auckland and



Bruce Ford

Wellington and Mitsui's complete product range.

Replacing **Tony Hough** as managing director of Case Communications (NZ) Ltd is **Nelson Siva**, until recently New Zealand manager of STC. The local Case company is part of a worldwide organisation with headquarters in the UK.

Three new marketing appointments in Austral Standard Cables are **Dave Bell**, export manager; **Robert Kereopa**, marketing manager; and **Mike Moran**, the market development engineer.



Herb Hunt



Nelson Siva

Clever card outshines magnetic strip

A New Zealand organisation is leading the way with its so-called smart card, a standard-size plastic debit and credit card containing its own microchip which permanently records all transactions. The Asset Card's parent company has an arrangement with Post-Bank and the major retail chain LD Nathan, giving cardholders a wider option of use in purchasing and banking transactions.

It works in three ways: as a normal MasterCard credit card; for purchases charged directly to an Asset working account, from which withdrawals may also be made; or for charging purchases directly to a PostBank account for the same effect as writing a cheque.

Normal cards will hold 200 transactions initially, but those for higher frequency users may contain 400 or 800. Terminals, which will also accept standard magnetic strip plastic cards, will be connected to the network by Pacnet, but can continue to operate individually even when the network has failed, updating the central transaction information at a later stage.

"We're making EFTPOS far more friendly because we're doing it all through a retailer," said Asset Card Ltd executive director Robin Mudgway at the system's announcement last month. "It will also result in a significant reduction of cash on the premises."

Asset hopes to interest other trading banks in the system, but it could lead to further fragmentation of the banking industry. Consumer resistance is being felt to the all-embracing use of cards with PINs, which the banks are countering with charges for large cash transactions and advertising campaigns against cheque-writing.

For cryptic communications

Racal-Milgo has introduced an integral encryptor option for its Omnimode and RM-series of modems, offering synchronous or asynchronous (with optional async-sync adaptor) communications capability at up to 16.8kbps. The

integral encryptor is programmable from the modem's front panel for either central or remote site operation, and uses the Data Encryption Standard (DES) algorithm to render information unintelligible during transmission.

The company has also been named as a participant in IBM's Open Communications Architecture (OCA), to develop a series of products to link IBM's Netview and Netview/PC with Racal-Milgo's CMS control systems. OCA allows the transfer of critical network management information between IBM host computers operating in System Network Architecture (SNA) - which covers more than half the large corporate networks in the US - and communications equipment from various suppliers.

Enhanced graphics now standard

A new model of the Olivetti M28 PC has a new colour graphics screen controller compatible with the industry-standard EGA, located off the motherboard. Its base configuration includes a 40Mb hard disk and 512kb RAM, expandable to 1Mb, with an optional 14-inch colour monitor.



Roger Redfern

The Unisys Griffins relationship goes back a long way. 30 years in fact.

Yet today, that relationship is just as fresh. Because Unisys has continued to meet the challenges presented to us by Griffins.

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Instead with our LINC information processing system, we've given Griffins a system

that allows their own small but highly cost-efficient data processing team the ability to write their own programs in direct response to users' demands, and with a full working knowledge of Griffins business and operational structure.

"Of course, we're always there to help, such as at the recent mainframe upgrade exercise. But Griffins themselves can manage modernisation of systems, development of new ones, very effectively, within their own 'family'."

LINC has also enabled Griffins to respond quickly to demands such

as those set by Griffins parent company, and allowed Griffins management team to look at whole new areas of potential information systems development, knowing it won't cost a fortune to put them in place.

"Griffins, in spite of its international connection, is still very much a New Zealand company, and has always worked to find its answers within its own four walls.

With Unisys help and of course, LINC, they can."

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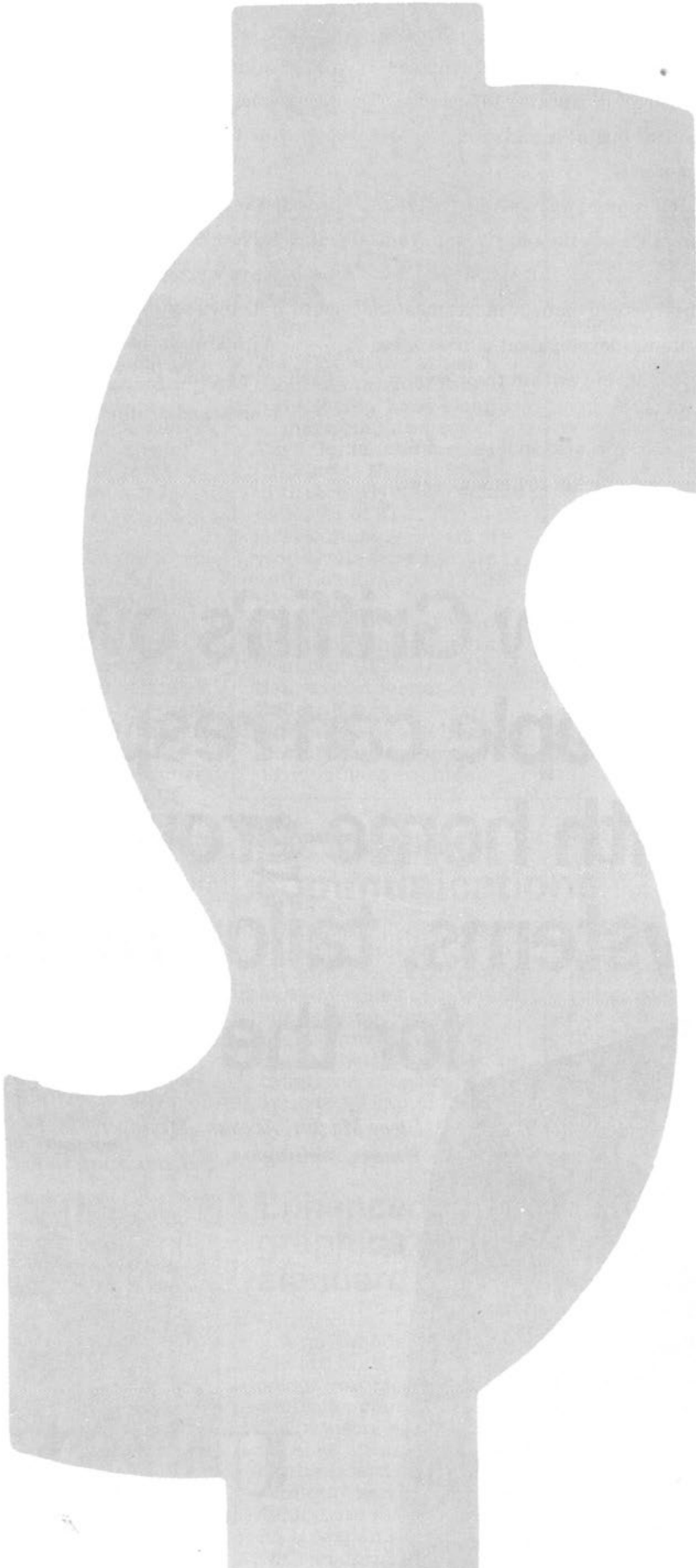


"Now Griffin's own people can respond, with home-grown systems, tailor-made for the job!"

*Steve Martin, Account Manager,
Unisys, Wellington.*

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Any



Computer companies and the Inland Revenue Department look set for prolonged battle over the IRD's demands for back-dated taxes on overseas software brought into New Zealand. The IRD is trying to enforce a little-known clause in the Income Tax Act which requires a 10 or 15 per cent "non-resident withholding tax" on all overseas software.

Back-dated taxes of up to \$10 million are thought to be involved, and the department is looking for companies' tax arrears from as long ago as 1980.

But software outlets are in no hurry to comply with the IRD's requests. They say the department has yet to clearly state what the tax is, what it is for, and who owes what. And until the department gives a clearer picture, they have no intention of paying up.

However, despite the rhetoric, the tax is a potential time-bomb for the computer industry – particularly because of its back-dated nature.

"It comes to the department's attention that some companies were not aware of their obligation to pay the tax."

"I don't know of any software company prepared to back-date payments," says Suzanne Walker, of Paperback Software (NZ) in Hamilton. "They just can't expect us to do that."

Paperback Software, which has been open just over a year, wouldn't be as badly affected as some of the longer-running software outlets. "But it would still be a financial burden for us," she says, "and one that we certainly don't want."

Crippling

She points out that when the Australian authorities imposed a 20 per cent software tax on retail sales, this was offset by an immediate across-the-board 20 per cent rise in prices.

objections?

A tax bombshell has been dropped on software suppliers by an unexpected adversary. Vic Francis backgrounds a tricky situation.

But the unknown and back-dated nature of the New Zealand tax is likely to cripple the industry.

Tim Manning, of MOS Computer Software and Supplies in Auckland, speaks for most software suppliers when he says that back-dating the tax "could put quite a few companies out of business. There's not that much money in computers." MOS hasn't directly been approached by the IRD, probably because it gets most of its software from New Zealand companies who, as distributors, import it from overseas.

But one company that is directly in the firing line is Brimaur Computer Services, which imports software from several countries – particularly the UK, Australia and USA.

Managing director Brian Eardley-Wilmot says Brimaur has "written to our principals overseas, asking for confirmation or otherwise about the software supplied to us under the terms suggested by the department." He says no money has been paid to the department yet, and won't guess how much his company is likely to owe in back-dated taxes.

"At this stage it's such a woolly thing," he explains. "It certainly would appear to be a real can of worms. I just don't know what is going to happen."

Eardley-Wilmot warns that the tax could have widespread repercussions throughout the computer industry. "Software has implications in all areas, hardware as well."

Eycke Zimmerman, of Computer Store in Auckland, says the tax has "wider ramifications".

"If I buy a book, I buy a book – and that includes the paper, the printing, the ink, the binding and the contents. But if I buy software I have to separate it into individual values for all sorts of things. Now we have extra problems. Does the withholding tax, for example, apply to the media and the manual as well? Nobody knows. The whole thing is murky and messy."

Draconian

Despite the Draconian appearance of the IRD's demands, it does appear to be acting within the law. The department's demands are based on the fact that software sales are often not

sales at all – they are simply licences to use certain software packages. The licence agreement stipulates that title to the software system stays with the supplier, and the right to use it cannot be transferred or assigned. The term of the agreement may be indefinite, or for periods of up to 99 years.

So the actual ownership of the software apparently stays with the supplier, which in New Zealand's case is often a foreign company. This makes the payments made for the software to be royalties – which are subject to the non-resident withholding tax.

Or, as the IRD puts it: "Payments made for the supply of standard software packages pursuant to a licence agreement are deemed to be royalties in terms of Section Two of the Income Tax Act 1976. If the software has been purchased from an overseas software supplier, then any payments become liable to non-resident withholding tax."

That tax is set at 15 per cent, which is reduced to 10 per cent when the countries involved have double tax agreements with New Zealand. Examples of these countries are the USA, France, UK and Germany.

The IRD says the act requires people making a payment "consisting of non-resident withholding income" to deduct withholding tax from that payment.

In a letter to software outlets in July, the IRD requested:

- a list of the types and brand names of the software packages marketed by each company;
- the names and addresses of the companies who supply each company with this software, and
- details of all payments made to any overseas companies during each of the financial years ending in March 1985, 1986 and 1987, and details of non-resident withholding tax deducted.

David Belchamber, of the IRD's international tax section in Wellington, says the reason the department hasn't vigorously sought the non-resident withholding tax before was because "previously there was not much [money] involved." Therefore, it wasn't worth the department following it up.

"But now we're talking about millions," he adds.

The deputy commissioner of Inland Revenue, Robin Adair, says the department has "no statistics regarding the taxes owing." He points out that the provisions of the Income Tax Act relating to the taxation of royalties have operated from April 1, 1980. The department's campaign to see these taxes paid began after it "came to the department's attention that some companies were not aware of their obligation to pay the tax. It is up to the department to apply the law so that every person pays the correct amount of tax."

"Does the withholding tax apply to the media and the manual as well?"

He says the onus in deducting the tax is on the person who pays the royalties (in other words, the company which imports the software). The IRD is issuing a public information bulletin to advise people of their obligations under the tax. That bulletin confirms that each payment for computer software is a royalty, and insists that there "has not been a change in the department's policy."

"Random audit checks" will be used to verify that the tax is being deducted where appropriate, Adair says. "While Inland Revenue prefers to obtain voluntary compliance with the tax laws, prosecutions may have to be taken in appropriate cases of non-compliance. The question of prosecution will have to be dealt with on a case-by-case basis."

He recommends that companies unsure of their obligations to pay the tax "seek professional advice, or contact the local Inland Revenue Department. Future compliance actions by the department will depend on a number of factors, including the level of voluntary compliance attained."

Adair confirms that the tax does apply to payments for manuals, as well as the software package.

Meanwhile, Belchamber says the department has had legal advice to ensure its demands are in accordance with the law – "so if anybody objects to it we know we are on the right grounds." ■

Let the battle begin

The Personal System/2 was developed, so it is said, to rescue computer users from the turbidity of the MS-DOS world, and it was only a matter of time before the clone manufacturers joined in. First off the mark is Mitac, whose Paragon 88's international release heralds the new wave.

We asked two people to look at the pre-release Paragon 88 and give their opinions in a preview, not a full product review.

Hail the conquering hero!

by John Wigley

The Paragon of Virtue was the hero who rescued sweet innocent maidens of the 19th century romantic novels from the clutches of evil villains. How does the Paragon of 1988, by Mitac, measure up against such a fanciful background?

Over the coming weeks a barrage of advertising is set to bring to the public the next Clone Killer. This preview, not a review, is intended to give an indication of what the latest from Pacific Computers has to offer.

The first impression is of a neat and tidy small-footprint main box with a Reset button on the front, along with an 8MHz light and the on/off switch. Even the keyboard plug is at the front, while the keyboard itself is the latest model with 12 function keys.

The monitor, mounted on a swivel base, is paper-white, a combination I prefer. Set the machine going and the 8MHz light comes on. This can be set as the default or, if preferred, the slower alternative speed of 4.77MHz can be the default.

The Phoenix BIOS is used, a well-tried product without any major quirks. The machine does its little thing and tells the operator that it has a virtual RAMdisk, set up without using any of the precious 640kb available to MS-DOS, by having a separate 128kb for the VDisk.

The VDisk did not conflict with any of the programs run. Very few people seem to use the VDisk, which is a pity

as once you get used to the speed of it everything else seems slow, especially when using floppy disks only.

So you have switched on and started to run the program, when you notice that it requires a CGA card. Normally this spells disaster. No problem with the Paragon 88 – merely flip a switch at the back, reboot and you are now in CGA, with the monitor responding in shades of white in lieu of colour. Very neat.

The policy is to sell a package: the computer with monitor and printer and cables, all ready to go.

Want to contact a Bulletin Board? Plus your modem into the built-in serial port, a proper RS232C port, and away you go. If you have only the IBM type serial connectors, Pacific Computers can sell you the conversion plug.

Now it's time to download a file from the Bulletin Board and print it out. Using the built-in printer port you switch on the latest Star NX-1000 and start printing. At this stage you decide to change the type font.

Again, no problem – take the printer off-line, use the controls on the front to select a new type and font, put it back on-line and hey presto! the new type style.

Pacific Computers' policy is to sell you a package: the computer with monitor and printer and cables, all ready to go. They will even give lessons on how to use it. That's the sort of service the public should get.

Where does the Paragon 88 fit in the market? I see it as a sophisticated, well thought out, compact package. You get a computer with built-in serial and printer ports; built-in graphics card with Hercules and CGA compatibility; a choice of two of either (or both) 5.25 or 3.5 inch floppy disk drives; the all-singing, all-dancing First Choice software package with its eight built-in applications (actually this one package should be sufficient for most people); and the Star NX-1000 printer which has the ability to change pitch and font styles from the front panel – all for \$2,995 including GST. This has to be a bargain.

Then for those who need a hard disk, there is all of the above except for one floppy disk (again, a choice of 5.25 or 3.5 inch), and a 32Mb hard disk drive, actually a hard card disk, for the sum of \$3,995 including GST. This has to be an even better bargain.

What has not been mentioned is that the Paragon 88 is a PS/2 clone,



equating to the Model 30 of the new IBM range. The machine is made by Mitac, a company which aims at the upper end of the market. Quite by chance I was looking at a Mitac CP/M machine of a few years ago, which was well-made. Mitac has been in business for some time, which is an added bonus.

I did some speed checks on the Paragon 88 against its IBM Model 30 rival, and generally those times worked out to be about the same. The Paragon was one-third faster on hard disk access but a little slower in calculating, which could have been caused by running in CGA mode. Overall there was little difference.

The Paragon 88 looks to be a computer for all people. The twin floppy

disk package will satisfy the home computer buyer, and the VDisk and 8MHz speed mean that programs such as the First Choice package included run as quickly as required. For the business user the 32Mb hard disk version will run all MS-DOS software, has ample storage and saves the expense of buying at AT clone (which IBM is dropping anyway).

It is also compatible with the PS/2 Model 30, the latest from IBM. When Big Blue introduced its new PS/2 range the Model 30 seemed an oddball machine, but having looked at that one and used the Paragon 88 it is obvious to me that it fills a gap and sounds the death knell for the PC clones. With its mono/colour switch,

built-in ports, Reset switch, NX-1000 printer, choice of 5.25 or 3.5 inch floppy drives and bundled software,

It fills a gap and sounds the death knell for the PC clones.

the Paragon 88 does indeed measure up to our romantic hero and is the 1988 equivalent in the computer world.

It lives up to its advertised role of Clone Killer.

Small but full-sized

by Jim Barclay

An urgent phone call on a Thursday night to review a hush new computer had me in suspense, but I had to bide my time to the following Wednesday for the agent to allow me into the SECRET room with glass windows covered over with brown paper.

There I was left to preview the new

Mitac small footprint computer. This could only be a limited preview as software could not be made available in time to enable a full assessment to be made of the new equipment. However, I was able to read the preliminary manual for the computer, officially called the Paragon 88, look

inside the computer and try out the new Star NX-1000 printer.

The computer comes in the new small footprint enclosure and is basically a turbo XT with hardware integration. The front panel has a power switch, power indicator, Reset switch and speed indicator; not km/

MAN BUYS INBOARD 386; ENDS UP ON DESERT ISLAND.

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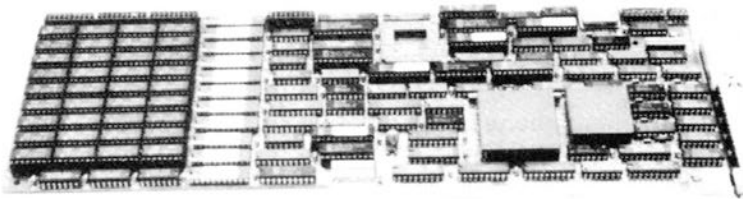
According to *PC Week*, "The Inboard 386 proved perfectly compatible with a standard IBM PC AT and every software product we tested." It's compatible with advanced software, too, including 386 control software for multitasking. And lots of developers are already using Inboard to create OS/2[®] applications.

But maybe the real question is can a \$4500 system be more reliable than a \$8500+ one? The answer is yes. Because it's built by the same company that designed the 80386 microprocessor and it's backed by a five-year warranty.

If you still need more information on which system is best, call us at (800) 538-3373. Or contact your local dealer.

Then we suggest you find a nice quiet place, clear your mind of all distractions, and think it over.

Maybe someplace like Bora Bora.

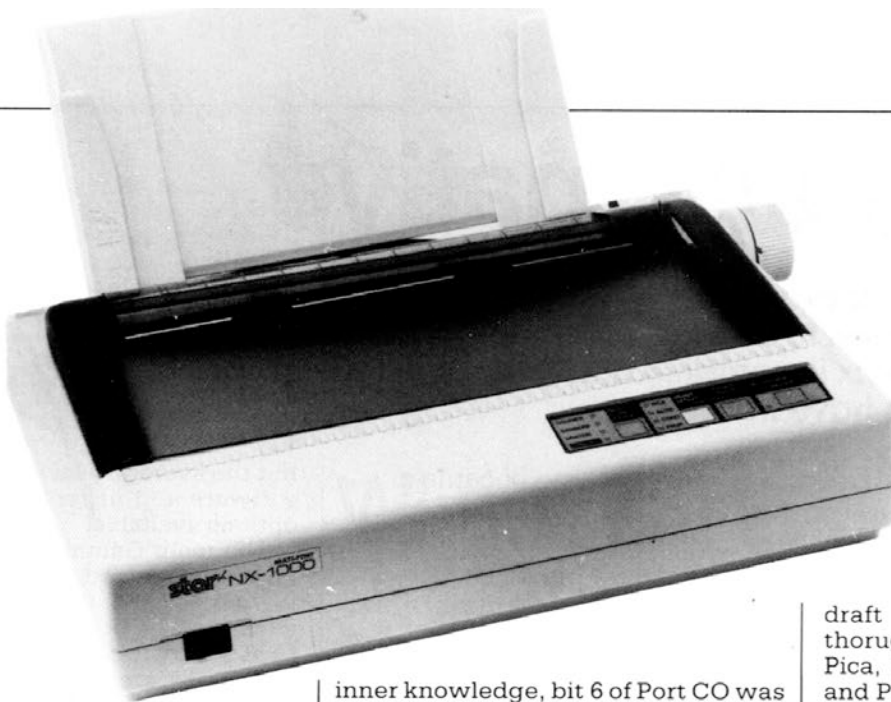


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h, but an LED when the computer is in the 8 MHz mode. There is provision for two stacked half height floppy drives; one 5.25 inch drive was fitted, but I was told a 3.5 inch drive will also be installed. The hard disk was a 32Mb hard card in one of the five expansion slots on the motherboard.

Fewer expansion slots are needed because a number of previous add-ons are now incorporated on the motherboard: clock, serial, and video driver. The rear panel has a switch that allows the user to choose between a monochrome and colour output from the video driver, and a user may bypass the onboard video driver and install a compatible display adapter, such as an EGA card, in one of the expansion slots. In that case it is simply a matter of moving a jumper on the motherboard when the new card is installed, to disable the on-board driver.

Fewer expansion slots are needed because a number of previous add-ons are now incorporated on the motherboard.

The computer power comes from an 8088-2 CPU, running at either 4.77 or 8MHz. There is 768kb of RAM on the motherboard, arranged in three banks of 256kb chips. Of this memory 640kb is available to DOS in the normal address space while the remaining 128kb is banked and available to the user. It can be used for instance as a RAMdisk and on this computer was set up as drive D: (For those with

inner knowledge, bit 6 of Port CO was used to select between the banks at 80000-9FFFF.)

Only two ROM sockets are fitted, but these are now configured for the 128kb and 256kb ROMs (or EPROMs), so there is no loss of capacity compared with earlier computer boards with eight smaller ROMs. The one EPROM fitted has the Phoenix ROM BIOS version 2.51. The computer took about 37 seconds from turning the power switch on to being ready for use, and I could not detect any difference in time when using the Reset switch on the front panel, as it appeared to take 37 seconds also.

The small footprint area is obtained by shifting the power supply from the base of the cabinet and reducing the number of edge connectors to five. Straddling the motherboard is a rack on which is mounted the power supply and the floppy disk drives. The 135-watt power supply is a compact unit and has about half the volume of earlier power supplies.

A full size keyboard is provided, with 12 function keys and separate numeric keypad etc. Although the keytop had a solid feel to it, the key action felt more rubbery at the end of its travel and for my two-finger typing did not provide the right feedback. Two Control and Alt keys are fitted, one either side of the space bar. The keyboard curly cord goes to the socket on the front panel of the computer enclosure.

So what does the computer offer the user? A small footprint area, 8 MHz speed, 32Mb hard disk storage and integrated video, clock and serial ports.

To be released with the Paragon 88 is the Star NX-1000 printer, a 10-inch dot matrix printer that provides NLQ in six different styles. There are three NLQ fonts: Courier, Sanserif and Orator; and each of these may be standard or in italic. When these are selected from the front panel seven key depressions are required to cycle through the six NLQ styles and the

draft mode. Another key cycles through the six pitch combinations of Pica, Elite, Pica or Elite condensed and Pica or Elite proportional.

The NLQ mode is not restricted to the Pica pitch as in, say, the NX-10 printer, but the NX-1000 appears to provide NLQ for all print pitch combinations. The three font styles are sufficiently different to provide adequate contrast between them, while the italic variations provide realistically shaped characters.

A 9-pin print head is used, together with a travelling ribbon cartridge, and the printer has both sprocket feed and friction feed. The sprocket-fed paper is fed in through a slot in the rear of the printer, while the single-sheet paper is placed against a light plastic guide on top.

The three font styles are sufficiently different to provide adequate contrast between them.

The new feature of this printer is that it is not necessary to remove the sprocket-fed paper if you wish to use some friction-fed paper. Loading the single-sheet paper requires care in alignment, but the loading lever has a very gentle action when compared with the NX-10.

Because the sprocket-fed paper uses the rear of the printer it was necessary for Star to move the printer socket from the normal location, and it is now fitted on the right-hand side of the printer near the front. The top cover is not required to be present for the printer to operate, and the noise level is satisfactory.

The new printer is a significant step forward as it provides new features that are needed and can be used by many users. The new computer, however, will be judged by potential purchasers on the basis of price and low footprint enclosure, before its other technical features. ■

A viable alternative

At first glance, adding a board to a PC to let it run also as a fax machine is the answer to anyone's problems. David Smith finds the Gammafax is complex and not particularly friendly, but it does have its uses.

It is only a couple of years since the facsimile machine became a common sight in New Zealand offices, and now many businesses use it in preference to telex and electronic mail systems such as Star-net. The proliferation of the fax can be seen in the advertisements in *Bits & Bytes*—two years ago there was not so much as a mention of fax, while in the last issue 15 advertisers quoted their fax number.

The desktop personal computer has had an even greater success as an accepted business tool. While the IBM PC was first introduced with a limited range of add-ons, there is now a vast range of plug-in boards which will convert the humble PC into anything from a Digital Storage Oscilloscope to a Music Synthesizer. Two applications that I have eagerly awaited are the PC FAX board and the PC Datascope board, both of which are being released on the local market this year.

The Gammafax facsimile board fits any IBM PC, XT or AT. It is a three-quarter length board and comes with a lead to plug into a telephone BT-style jack point, and is complete with a 150-page composite manual and two diskettes. The Gammafax requires a PC with a minimum of 256 kb and one disk drive, but this is the bare minimum, and in most applications the user would need 640kb, a hard disk drive and DOS 3.0 or higher.

Far from captivating

Before installing the Gammafax board and software I took the manual home to read. This was a mistake. The style in the manual is far from captivating and its author is always keen to impress the reader with the amazing power, the large number of extra features and the complexity of the system.

I was rather daunted by the heavily underlined warning on page one of the Gammafax reference manual which read, "This Reference Manual assumes you have a clear understanding and experience with MS/PC-DOS Batch command files and their operations." I have only a cursory knowledge of MS-DOS, but during the whole review process I didn't have to refer to the DOS manual at all. A far better approach would be to install the board and try some of the introductory procedures described in the user manual.

Having a dual floppy machine, I found that I needed to copy certain files from the Utility diskette to the Program diskette whenever a new feature was to be tested. This usually involved deleting previously used utilities, as these programs are quite big. Before a data file can be transmitted, it has to be converted to a fax format, where basically it has to be converted to a bit-mapped image. Thus a simple A4 page document that occupies 4kb in your word processor can become an 80kb file once converted into fax format, and with space on the floppies already at a premium, there is little room for fax files.

The Gammafax software is very comprehensive, with a feature for every need and an option for nearly every possible contingency. To learn each and every feature of each program would take many hours of study,

but the average user would set up the software and never use some of the options available.

The main Gammafax program has been customised for New Zealand. Listing all the Gammafax features would not be possible in this review, but I will try to cover the main points.

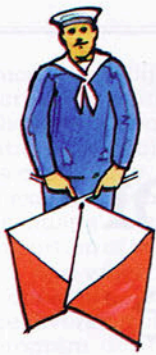
Facilities are provided to convert an ASCII file from a word processor, spreadsheet or other source to a fax file. The user can use the software to dial a number or a series of numbers, either immediately or at preset times, and transmit or receive files to any Group 3 facsimile machine. Similarly, the computer can be set up to auto answer other fax machines and send and receive files automatically, but the computer cannot be used for other work while set up to await incoming calls.

Delight and frustration

The fax files can be printed to a graphics printer or to the screen. Most dot matrix and laser printers are supported, as are all the commonly used graphic adapter boards. Those users who enjoy working with



The addition of the Gammafax board (shown in front of the monitor) to a PC gives it the capability of the facsimile machine at right.



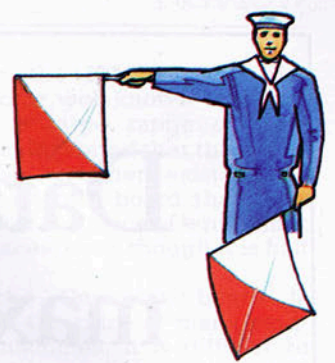
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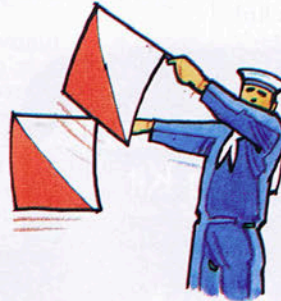
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graphics will delight in the power of the screen and printer edit options, but those who look for simplicity in operation are liable to be frustrated by the complexity.

For example, when magnifying the screen image there is no clue as to which portion of the page is being displayed, and when requesting a complex operation, such as the 180-degree inversion of the screen image, the program does not indicate that the request had been accepted. The display just freezes until the process is complete.

The software is very comprehensive, with a feature for every need and an option for nearly every possible contingency.

The makers claim that higher definition of text is possible on Gammafax than an ordinary fax machine. To read text and graphics into your computer, ready for transmission by the Gammafax, the Canon IX-12 scanner can

be used (reviewed in the August edition of *Bits & Bytes*). Facilities are also provided for conversion of fax files to ASCII files, and the Gammafax board can be used as a high-speed modem to other machines similarly equipped.

As many prospective fax users already have an MS-DOS personal computer and a graphics printer, the Gammafax board is a viable alternative to a standard fax machine. The price of the board and software is \$2500, which is half that of a budget fax machine, but while a fax machine can be easily operated by almost anyone, the Gammafax does require a degree of expertise.

The Gammafax would be a most suitable addition to many desk-top publishing installations. In situations which demand versatility and where computer expertise is available – for instance in universities, research establishments, government departments and large businesses – the Gammafax would have its place; but probably most small to medium businesses will opt for the standard fax machine.

Customer resistance

As previously mentioned, there are a great many specialist adapter

boards for the IBM PC. A sales engineer for a well-known company marketing a large range of such boards recently stated that there was considerable customer resistance to buying an adapter board that does half the job of the piece of equipment that it replaces, even though it is half the price.

While the Gammafax board is exactly half the price of many standard fax machines, it is difficult to judge what percentage of the job it actually performs. The New Zealand agents, Comworth Systems Ltd, sell the Gammafax board with a 30-day full cash refund option, which means that they can be assured that all users of the Gammafax board are happy with their purchase. It is not often that a supplier has such faith in its product to offer such a refund option, and full marks to Comworth Systems on this! Are other suppliers going to follow this example?

So we can expect the Gammafax board to find its niche in the New Zealand computer scene. I believe that niche would be bigger if the price was more realistic and the manual was rewritten in a clearer and more imaginative style. ■

Review board supplied by Comworth Systems Ltd, Auckland.

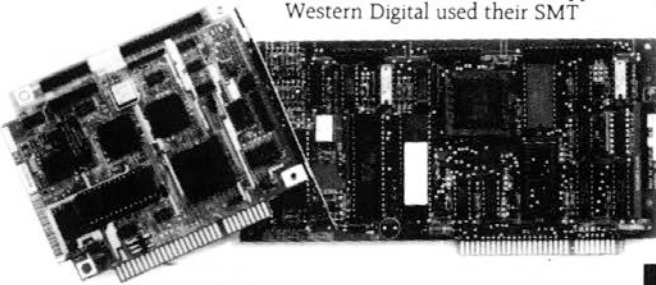
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- WD1003-RAH — Industry Standard AT Controller (RLL)
- WD1003-RA2 — Industry Standard AT Controller (RLL) with floppies
- WD1005-WAH — AT Controller (ESDI)
- WD1006-RAH — AT Controller (RLL) up to 16MHz system clock speed
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In-house payroll for PCs

Provided the hardware is reliable, there's no reason why a company can't run its payroll system on a microcomputer. Jenny Peacocke of Coopers & Lybrand's MicroLab goes through The Remarkable Payroll, a locally-developed package.

While not being a big fan of in-house payroll systems, I am forced to admit that more and more companies are running efficient systems on their PCs.

Remarkable Enterprises has combated one of the bigger worries – security. Privacy is a big problem in many payrolls, but Remarkable has built in an extensive password system. Different passwords can be set up to allow different levels of access – none, enquire only, enter information or change system parameters. Operators can have different levels of access depending on the area they

are in, for example data entry for timesheets, enquiry only for employee details and none for Private Ledger.

This doesn't solve the problem of a computer going down on the day the payroll is being prepared, but this problem is becoming less common as computer hardware becomes more reliable. For a company running an in-house payroll system, the need to

purchase a well-supported, reliable machine is more critical than for probably any other software. Invoices might wait for a day or two while the computer is being repaired, but employees are notorious for wanting to be paid on time.

Extensive defaults

For people like me, who believe that the less typing you need to do the better, Remarkable has built in an extensive range of defaults. You may define different employee types with default information about pay rates, frequency, and standard allowances and deductions. When you add an employee and classify him or her to be this type the system enters these defaults to be accepted or changed. <Page Down> acts as a quick 'accept screen' key if none of the defaults needs changing.

Remarkable has built in many innovative features not found in other payroll packages.

Remarkable Enterprises has built in many innovative features not found in other payroll packages.

Agent codes and commission percentages are allowed. This is the only payroll where I have seen this feature, and agents are becoming a fairly common way of replacing salespeople.

While not a full job cost system, time sheet information can be posted to job codes giving full time cost information. This feature is necessary for anyone charging time to clients.

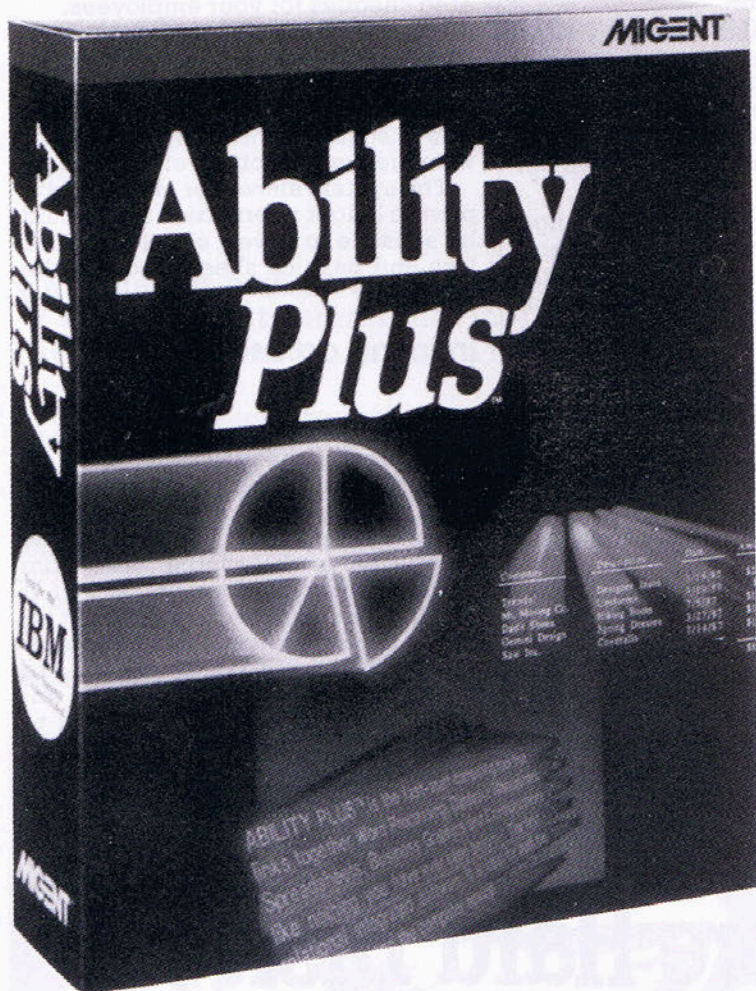
The program has standard payslip and cheque layouts for printing, but users may change and redefine these if they are not happy with the layout.

When adding timesheet information for an employee, an insert on the screen shows up-to-date details of what will print on payslips. This is very helpful for quick checking of en-



Illustration by Lindsay Marks

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The reason, it seems, is security, and to minimise the chance that cheques will be printed out of sync with cheque numbers available. Paying a few hundred employees with the wrong pack of continuous cheque stationery could be a major disaster for the accounting records.

The manuals are clearly written and very easy to follow.

To be fair, Remarkable says it developed the date constraint from experience with users. By closing out non-period transactions, interference with existing payroll records is eliminated, and most users have built-in clocks or use the date and time commands. The manager's password enables dates to be changed via the extended options menu, to avoid going back to the operating system again, but it still irritates me.

The overall system works well and the help screens available at every step are a definite plus. It is very tidy and becomes easy to follow in a short time.

The manuals (two came with our system) are clearly written and very

easy to follow. To relate back to the security mentioned at the beginning, it would be a good idea to have a separate liftout for managers covering password information. I would suggest that this type of information be removed from the manual and filed in the manager's office.

Remarkable Enterprises are very like their name. They are a very enterprising group of people who have produced some extremely good software that sells well, both locally and internationally.

The company's software is on the whole user friendly and reliable. I am looking forward to seeing more of its offerings in the future.

Review system supplied by Remarkable Computers, Dunedin.

Remarkable Enterprises Ltd
TRP date 10/06/87

LS/DEDS/JOB HISTORY SUMMARY REPORT
Example Payroll

Code 000 to ZZZ

Code	D	N	A	T	L	R	Description	GL Code	Project TD	Year TD
373	D	N	F	ACC Levy, Engineering G	GOMM-02-01				33.37	33.37
394	D	N	F	ACC Levy, Spray Painting	GOMM-02-01				4.75	4.75
800	D	N	F	ACC Levy, Clerical	GOMM-02-01				1.30	1.30
BTS	A	T	L	Boots allowance	OAMD-04-01				36.00	36.00
FOO	D	T	L	Meals Deduction	OAMD-04-01				35.00	35.00
J01	J	T	P	Wiget machining	JOBS-01-01				483.75	483.75
J02	J	T	P	Wiget assembling	JOBS-01-02				1464.88	1464.88
J03	J	T	P	Wiget painting	JOBS-01-03				232.50	232.50
TLS	A	T	L	Tools allowance	OAMD-04-01				30.00	30.00

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MARKABLE ENTERPRISES
LOANANCES/DEDUCTIONS/JOB REPORT
Example Payroll

Code 000 to ZZZ

Code	D	N	A	T	L	R	Description	\$/h per Pay	GL Code	Tax Box
373	D	N	F	ACC Levy, Engineering G	GOMM-02-01			1.600	GOMM-02-01	
394	D	N	F	ACC Levy, Spray Painting	GOMM-02-01			0.700	GOMM-02-01	
800	D	N	F	ACC Levy, Clerical	GOMM-02-01			0.400	GOMM-02-01	
BTS	A	T	L	Boots allowance	OAMD-04-01			12.000	OAMD-04-01	
FOO	D	T	L	Meals Deduction	OAMD-04-01			2.500	OAMD-04-01	
J01	J	T	P	Wiget machining	JOBS-01-01			100.000	JOBS-01-01	
J02	J	T	P	Wiget assembling	JOBS-01-02			100.000	JOBS-01-02	
J03	J	T	P	Wiget painting	JOBS-01-03			100.000	JOBS-01-03	
TLS	A	T	L	Tools allowance	OAMD-04-01			15.000	OAMD-04-01	

Remarkable Enterprises Ltd
TRP date 10/06/87

COUNTS REPORT
Example Payroll

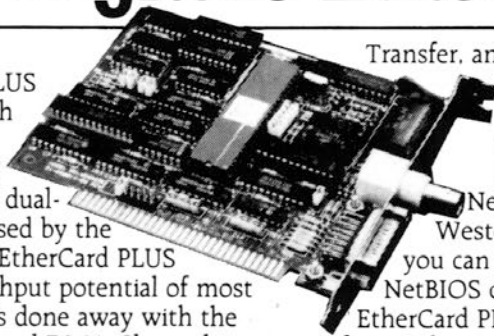
Accounts 0000-00-00 to ZZZZ-99-99

Account Number	Account Description	Account Totals	Sub Heading Totals	Heading Totals
AGENT	AGENTS			
AGENT-01	AGENTS - OFFICE STAFF			
AGENT-01-01	Alfredo Maroz	0.00		
AGENT-01-02	Duck Underflow	0.00	0.00	
AGENT-02	AGENTS - CONTRACTING			
AGENT-02-01	Paint notes	-45.45		
AGENT-02-02	Programmer power	0.00	-45.45	-45.45
	Agencies \$			-45.45
	GRAND TOTAL \$			0.00

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Now, for so much less cost, Western Digital's EtherCard PLUS gives complete conformity with IEEE 802.3 and Ethernet Standards. It features a unique shared memory architecture, a dual-ported 8K buffer directly accessed by the PC, just like its own memory. EtherCard PLUS more than doubles the throughput potential of most competing systems because it's done away with the need for a hardware-implemented DMA Channel Data



Transfer, and it has an on-board Thin Ethernet Transceiver.

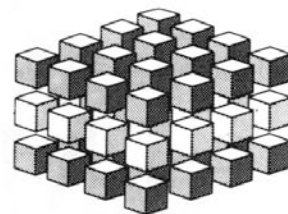
EtherCard PLUS runs standard network software like Novell's Advanced Netware, plus Western Digital's ViaNet Network Operating System too! By using Western's NETBIOS/OSI Interface Programme you can run IBM PC Network, MS-NET and other NetBIOS compatible applications. Western Digital's EtherCard PLUS is the adaptor card for your network, from Solstat!

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More effective in operation

Database management programs often call themselves powerful and high-speed, but Peter Taylor takes a walk through one which features a built-in one-step compiler and does seem to offer extra speed and enhancements.



VP-Info by Paperback Software is a command driven system which can be used either interactively, for setting up, maintaining or querying data files, or else through applications programs developed using command files. Its language is based on dBASE II with many features and enhancements not available in any other program.

Among those enhancements are a fast one-step compiler and powerful new commands, which provide added flexibility in relating files to one another and for formatting displays and reports. Also included are a variety of new functions that simplify mathematical operations.

One of the most significant differences between VP-Info and other database managers is its built-in one-step compiler. This feature allows

applications created in VP-Info to run many times faster than their counterparts in other database languages.

The built-in compiler makes VP-Info more efficient in a number of ways. For a start, the compiler converts command files into a more machine-oriented form before running them, thus speeding the processing of applications. Also, since VP-Info is designed to be a compiling language, its commands and functions are written to take maximum advantage of the compiler, which makes it much more effective in operation.

Greater speed and flexibility

VP-Info's language is an extension of that found in the dBASE family. The syntax is the same, while the

additional commands provide greater speed and flexibility in retrieving, formatting and presenting data. As far as compatibility is concerned, it can read, write and create data files in the same formats as those used by dBASE II, III and III Plus, as well as its own unique format that allows up to 256 fields per record. VP-Info recognises all these data file formats automatically, and all three can be used at the same time, which means that the user can manage a complex database containing a combination of the three dBASE types and VP-Info simultaneously. The result is an easy way to translate all files in these formats.

Other enhancements beyond the capabilities of dBASE II, III and III Plus include:

- Built-in networking capability.

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StarLAN's family includes StarCard PLUS, a single station PC adaptor board; StarLink, a PC adaptor board with an integral hub; and StarHub, a 10-port hub.

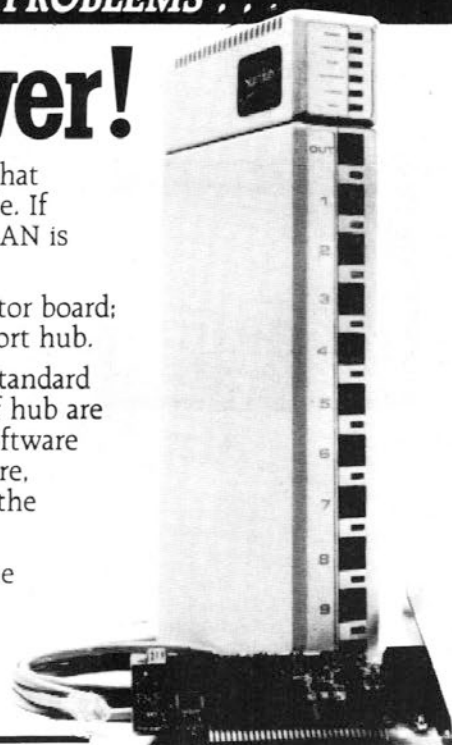
StarLAN from Western Digital conforms to the IEEE 802.3 draft standard with a performance far beyond its minimum requirements. 10 levels of hub are supported with network fault recovery built in. You have a choice of software options including Western Digital's version of Novell Advanced NetWare, ViaNet, and StarLAN's compatible with IBM's PC Network by utilising the NetBIOS emulator.

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Whether sold under the TVM brand name or as OEM products, our MD-System monitors offer a welcome contrast to the otherwise depressed PC industry.

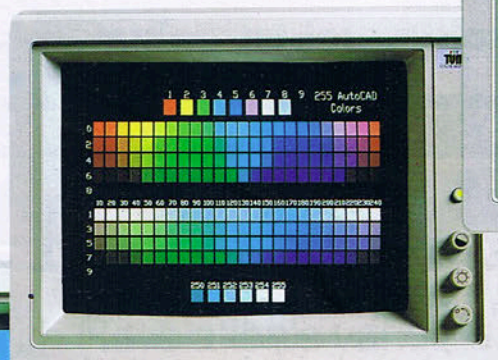


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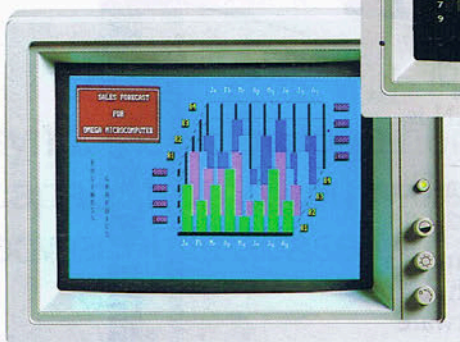
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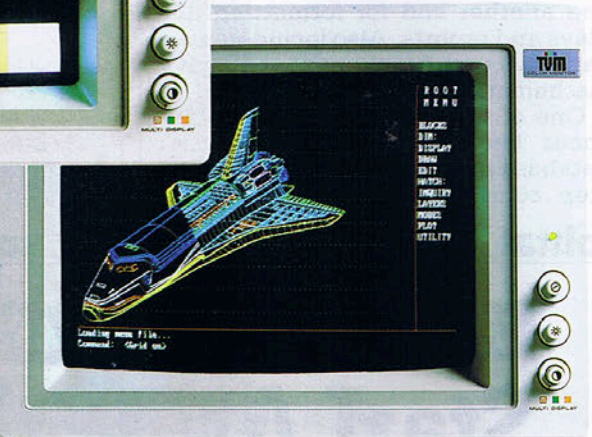
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The drive in peripheral products

Networking can be implemented simply by purchasing one copy of VP-Info for each computer on the network. Most command files can be used by all on the network with few changes.

- Elaborate display and reporting features, with read-write capability between VP-Info and dBASE and Lotus software making it a report writer for both the others. Improvements in this area also include a Text command which allows the storage of screens or reports on disk files. Text can include commands to control input and output data in any format.
- An ON FIELD structure allows error checking on data as it is being entered and allows rearrangement of the order in which input is accepted.
- A SCREEN command stores the current screen or sends information to a background screen in memory for instant display at any time.
- A WINDOW command gives pop-up menus, Help or any other data the user needs while using an application.

Conversational way

The large paperback manual,

which has a heavy cardboard back cover in which the disks are sealed, is well laid out. It opens with an eight-part section for beginners and introduces the concepts in an easy conversational way, which should enable most first-time users to get into the program shape quickly and learn to move around easily.

It recognises all of these data file formats automatically, and all three can be used at the same time.

The tutorials in the manual are designed to introduce the possibilities within VP-Info and don't attempt to cover every single feature within this extensive program. They do, however, provide an in-depth approach to setting up and developing applications for any size of database using this system.

The Beginner's Guide does provide a most helpful introduction to the techniques of setting up data files and moving around in them, plus an explanation of how to produce

reports from them. The Advanced Techniques tutorial goes to good depth with the use of relational (multiple data file) capabilities in VP-Info and on developing applications using the powerful programming and manipulation commands. It describes techniques for creating data entry forms and for linking together several data files for greater flexibility and control.

The reference sections fully cover all the program commands and functions, while the topical reference area gives an overview of the many features, by subject. It compares and contrasts the various commands and functions and helps the user choose the most effective for the application.

The explanations in the alphabetical listing are helpful and contain a complete and useful syntax of each command and function, and an update readme file on the disk covers further improvements since the publication of the manual.

No trouble

All information necessary to set up and configure an installation is provided in the manual in an easily readable manner. I found no trouble in setting up and operating a simple database, which gradually grew and

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became more complicated as I sought to extend my experience with VP-Info.

Being able to use C (character), N (numeric) and L (logical) fields throughout the data records, all easily interfaced through the menu controls, and also being able to stop and look at other areas and return to carry on again is a flexible resource indeed. It's exciting to find that ability to relate things together in all sorts of ways and yet maintain their original integrity.

The additional commands provide greater speed and flexibility in retrieving, formatting and presenting data.

VP-Info requires a minimum of 256kb of RAM, DOS 2.0 or higher, and two disk drives, one being a double-sided floppy and the other a fixed, RAM or floppy disk drive. Most compatibles will run this software, although Tandy 1000 owners will need 386kb because of video use.

The software is copy protected, but a single-user licence may be obtained

from Paperback Software by returning the package along with \$30.25 (including GST). This will result in a non-copy protected version for loading on to a hard disk.

There will be a good number of users who will find in VP-Info the kind of program that will certainly meet their needs, and show them many

ways of developing their uses of such programs as they come to understand their wider applications. Get a copy and prove it for yourself. ■

Suggested retail price \$395.00. Review system supplied by Paperback Software (NZ) Ltd, Hamilton.

Topics covered in the VP-Info manual, as indicated by the Contents.

Introduction

BEGINNER'S GUIDE – PART I

- 1 Creating a data structure
- 2 Building and viewing a data file
- 3 Editing data files
- 4 Indexing
- 5 Creating Reports
- 6 The FOR clause
- 7 Operations and Functions
- 8 Special features and time savers

ADVANCED TECHNIQUES – PART II

Using Relations and Command Files

- 9 Basics for Multiple Files
- 10 Introducing Command Files
- 11 More Control Structures
- 12 Orchestrating the Database
- 13 Linking Data Files

14 Duplicating Data between Files

15 Input and Output

16 Tying it all together – Windows & Menu

17 Programming Strategies

VP-INFO REFERENCE – PART III

- 18 Topical Reference
- 19 Alphabetical Command Reference
- 20 Alphabetical Function Reference

APPENDIX

- A Compiling
- B dBASE Comparison
- C Networking
- D VP-Info Key Words
- E Glossary
- F Program Messages
- I Index
- CI Customer Information

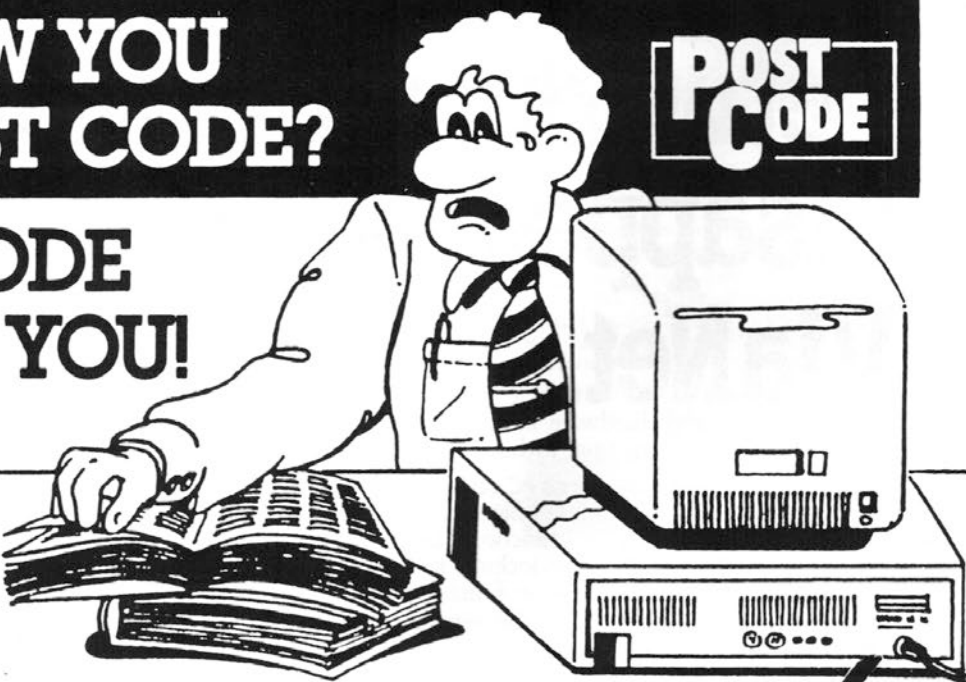
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Not a Publisher

Dear Sir

Dennis Lally's review of Pagemaker, while providing a reasonable outline of the program, contains some amazing and incredible statements regarding Pagemaker as a design tool, and about desktop publishing in general.

Summing up the correctness of the term 'Desktop Publishing' he says, "Arguing the correctness of the term... is about as fruitless as debating whether micros are serious computers". I find this statement silly, for it is clear that micros are serious computers. There are two points that must be addressed in relation to this statement.

Firstly, the process of publishing, contrary to what Mr Lally would have us believe, is complex and involves many stages. The function of Pagemaker is only a small one. Pagemaker is not able to read a manuscript and decide on its value to the market, it cannot edit for spelling and grammatical style, it cannot design, nor can it arrange and check printing.

Pagemaker has no ability for raising finance, and most importantly it does not have the distribution network necessary for all but the smallest of publications. In short, Pagemaker is not a Publisher.

Secondly, there is the issue of design. In the same paragraph that Mr Lally provided us with his 'definition' of desktop publishing he states that "with higher quality output devices... the differences in quality would be more likely be due to operator skill than inherent limitations in the DTP process, and these differences are likely to be noticed only by a professional in the printing trade."

This statement is quite untrue. While in most cases output (if using the Linotronic typesetter, and for text only) match dot for dot the pixel quality provided by a design studio, it can never match the 'look'. A design studio has at its disposal hundreds of different typefaces, and has the people with the knowledge of using

them in a way to produce what the client wants in the most aesthetic manner possible.

This is the main thing lacking in a program like Pagemaker - design knowledge. One cannot become an expert in typography by reading a few manuals. It is something that comes with the correct training and years of experience. Pagemaker may be good at finished art, but to attribute wild statements such as those outlined is not responsible reviewing.

It leads purchasers to believe that they are getting more than they are. I hope that in future reviews of such programs are conducted by people with experience in the design/production field, rather than by those who are new to the field, and lack the experience to provide objectivity needed in a magazine of your status.

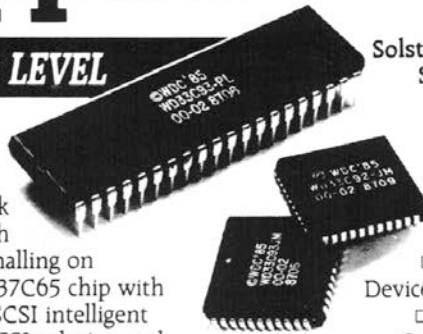
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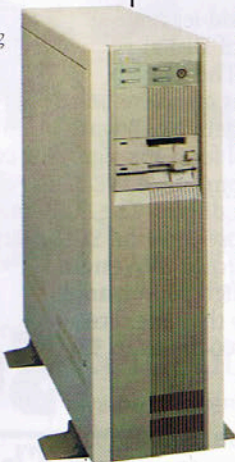
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The most MS-DOS power for the dollar?



Many hardware suppliers are making claims about more power for less cost, and Mark James studies one 80286-based machine which is said to rival the 80386 microcomputers. Does it offer the speed and compatibility for much less? Is anything perfect?

Most people who buy 80386 computers do so for their speed attracted by the promise of 32-bit performance. Then they run traditional MS-DOS programs on them, which require the chip to run in 16-bit mode. In this mode, the only remaining advantage of the 80386 chip is its high 16 MHz clock rate, and even this can be wasted if (as is often the case) the computer's memory cannot respond at that speed.

A new invasion of clones of the now-abandoned IBM PC/AT computer, based on the much cheaper 80286 chip, are in a position to give their users the same kind of speed advantage that they would be likely to derive from an 80386-based machine. Professional Systems International (PSI), of Christchurch, distributes one which it calls the AT/2, and it is a very impressive computer.

The PSI AT/2, manufactured by Sunlogix Inc of Taiwan, is based on the 80286-12, Intel's latest revision of the 80286 microprocessor; the 12 means that the chip's top speed is 12 MHz, or twice that of the original 80286. Much design work has gone into the PSI AT/2 to make sure that it takes advantage of the higher speed.

Big and clunky

The PSI AT/2 is not a small box. It is about the same size and weight as the original IBM PC/AT, which means rather big and clunky. It also means that you can fit up to five mass-storage devices into the chassis without running out of space or power (the power supply is 200 watts). The review machine, Model 60R, contained one standard 360kb floppy disk drive, one high-density (1.2 Mb) floppy drive, and a Seagate ST277R hard disk, formatted to 45 megabytes, although it is capable of formatting up to 65 Mb.

The keyboard is a spitting imitation of the IBM enhanced AT-style

keyboard. The firm, mechanical-click keys, the twelve function keys, the positioning of the LED indicators, the bar markings on the F and J keys, even the shape of the sculpting, all recall the IBM keyboard. The standard monitor is a high-resolution green, amber or paper-white screen, and the machine comes with a Hercules-compatible monochrome graphics adapter, with an EGA-type adapter and colour screen being optional. The graphics card includes a standard parallel port, and a serial port is also standard. (The review machine had two.)

The machine is about as IBM-compatible as you can legally get.

Interestingly, there are several D-connector slots on the back panel of the main unit. Although they are plated over from the inside, one cannot help but wonder if the designers of the AT/2 had multi-user ideas in mind.

In the middle of the back panel is a large yellow sticker warning that warranties will be voided if the box is opened. This is unusual, since nearly everyone will want to do something like upgrading the video controller or adding an internal modem, and you don't want to have to send the thing back to Christchurch for that. At first we suspected that there was something to hide inside, such as sloppy soldering work or kludgy jumper wire all over the place, but there was nothing so sinister.

A letter with the unit, warning of the dangers of static discharge, gave a clue. At first it was not clear why the PSI machine should be more sensitive to this than other AT clones, but PSI says the dangers of static electricity are greatly underestimated and the reason for many other machines' unreliability is the lack of care taken to prevent static discharge damage.

Much design work has gone into the PSI AT/2 to make sure that it takes advantage of the higher speed.

When the machine is booted up, its processor runs at 6 MHz, for compatibility with the old IBM PC/AT, which is important for a few copy-protection schemes and games but is unnecessary for most programs. By pressing Ctrl/Alt and the plus key on the numeric keypad, the processor speeds up to 12 MHz; then, by pressing Ctrl/Alt/Shift and the plus key, operations move from one wait state to none. You can also put the wait state back in, by pressing Ctrl/Alt/Shift and the minus key, although there is no practical reason why anyone would want to.

Ctrl/Alt/Minus returns the processor to 6 MHz. (These Ctrl/Alt combinations, however, do not work when Sidekick, or any other program that takes over keyboard interrupts, is running.) The system shows a line cursor when at 6 MHz and a block cursor at 12 MHz.

Only slight exaggeration

The PSI advertisements claim "386 performance at a 286 price" for the AT/2, and the prime-numbers test shown in Table 1 indicates that this claim is only a slight exaggeration. The prime-numbers test is a strict MS-DOS program that will run on any IBM clone, using only 16-bit 8088 code and not attempting to take ad-

Table 1

PSI AT/2 vs several 80386 machines

Computer	Processor	Prime Numbers
Apricot Xen-i 386	80386 16 MHz	0.1279 sec
Wyse pc386	80386 16 MHz	0.1293 sec
Compaq Deskpro386	38086 16 MHz	0.1312 sec
ALR 386/2	80386 16 MHz	0.1494 sec
PSI AT/2	80286 12 MHz	0.1569 sec

vantage of floating-point hardware. Under these conditions (which are the conditions of most MS-DOS programs), the PSI AT/2 is only about five percent slower than the slowest of the 80386 machines. To be sure, a prime-numbers program which took advantage of the 32-bit instructions on the 80386 would put the AT/2 in the shade, but such a program would not run happily under MS-DOS.

The key to the PSI AT/2's performance lies not only in the 12 MHz clock speed, but also in the elimination of most wait states. A wait state is simply wasted processor time, and occurs whenever some part of the computer (memory, typically) is slower than the processor, and the processor has to idle while the slower component finishes what it is doing.

Historically, wait states used to be unavoidable, particularly in memory accesses. The microprocessor would be on one board and the memory on another so whenever the processor wanted to fetch a value from memory, it would have to wait while the signals travelled from one board to another. In the past two years, however, high-density memory chips have become so cheap that most AT clones now cram either 512kb or a

megabyte of it onto the same board (the motherboard) as the processor. This has eliminated the primary cause of wait states.

New problem

As the faster 80286 and 80386 chips arrived, however, a new problem arose: the switching speed of memory chips has not kept pace with that of the microprocessors. An 80286 running at 8 MHz, for example, has a cycle time of 125 nanoseconds, and 125ns memory chips are readily available. However, an 80286 chip running at 12 MHz has a cycle time of only 83 ns. Memory that fast is expensive, and using a megabyte of it would more than offset the price advantage of the 80286 over the 80386. Yet if slower, cheaper memory is used, wait states become inevitable.

What the PSI AT/2 does is to use 32kb of fast memory as a memory cache. In a memory cache, the most frequently-used memory locations are duplicated in the small area of fast memory. Whenever the processor wants one of these, it gets it without a wait state, but if the processor needs a memory location that is not

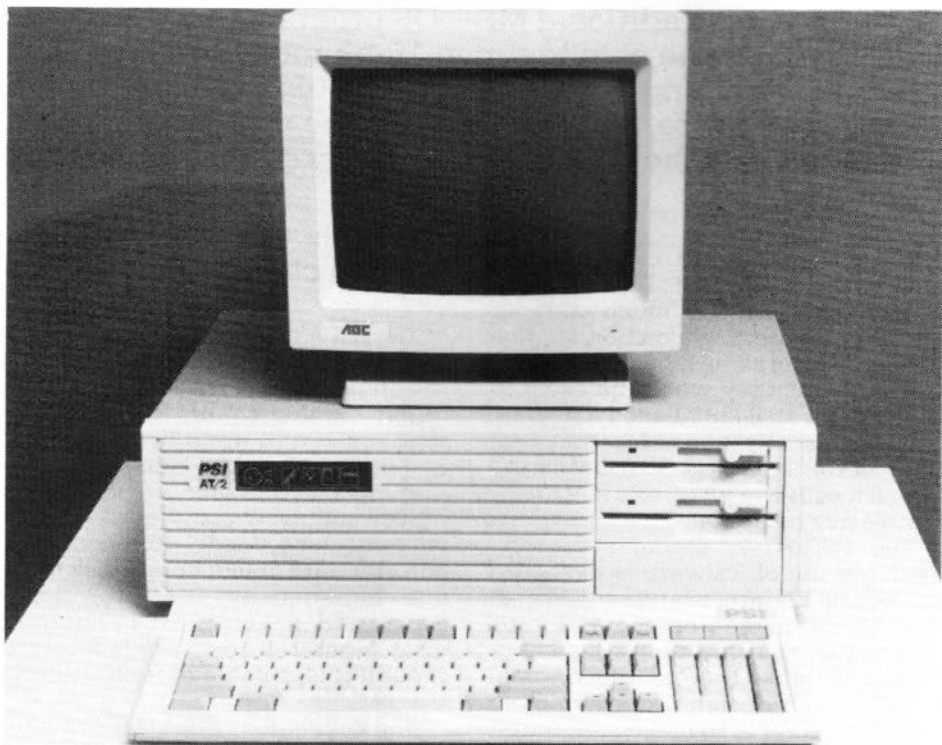


Table 2

Effect of cache memory on PSI AT/2 performance

Cache Memory	Prime Numbers
OFF	0.2076 sec
ON	0.1569 sec

Improvement: 24.5 per cent

Maximum improvement possible: 33.3 per cent

Cache memory effectiveness: 73.6 per cent

duplicated in the cache, it has to retrieve it from the slower main body of memory.

If the memory cache were 100 per cent effective, processor-bound performance such as the prime-numbers test would improve by exactly one-third. As Table 2 shows, however, the improvement is more like one-fourth, which suggests that the cache effectiveness is about 75 per cent. In other words, the machine runs with no wait states three-quarters of the time, and with one wait state for the remainder of the time. The claim of "zero wait state performance" is thus not technically true. In general, the larger and more complex a program is, the less of it will fit into the cache, and the less effective the cache will be.

Of course, the processor is not the only consideration when one speaks of machine performance. In database operations, particularly multi-user ones, the disk is much more of a bottleneck than is the processor. The disk in the review machine was impressively fast: 37.2 ms to find a random sector. If this is not fast enough, the ROM BIOS has inbuilt support for a choice of 47 different disk drive configurations, more than three times as many as most AT clones.

Incidentally, the Setup/Diagnostics procedure, usually found (and misplaced) on a special diskette on most microcomputers, is part of the ROM BIOS on the PSI AT/2. It can be called by pressing the Del key during boot-up.

The ROM BIOS for the AT/2 was written by American Megatrends Inc of Atlanta, Georgia, who were also apparently involved in the design of the machine itself. The BIOS, called AMI-BIOS in the documentation, scores well in compatibility with the IBM PC/AT.

Most AT clones can run nearly all PC-DOS programs, and compatibility problems arise mainly with peripherals. For example, most clones do not handle the keyboard LEDs in the same way that IBM does; the PSI AT/2, however, has got this right. In fact, in nearly two weeks of tests, we did not encounter a single incompatibility with the IBM PC/AT at 6 MHz, and at 12 MHz the only problems were the expected timing-related ones, games and some copy-protection schemes.

It should be noted, however, that the review machine did not have an EGA-type colour card. There are often minor bugs in EGA emulation.

All in all, the machine is about as IBM-compatible as you can legally get.

Massive documentation

The PSI AT/2 comes with a massive amount of documentation, but it is a curious mix. There are brief guidebooks for the monitor, the keyboard, the serial ports and the video controller, containing both practical and deeply technical information. There is also the *Sunlogix Main board [sic] User's Manual*, containing a wealth of technical information about the BIOS, bus signals and the like, for which a system programmer would normally have to pay a fortune. These are all written in a Taiwanese kind of English, and most give no indication whatsoever of their country or company or origin.

The *PSI PC XT/AT User's Manual* is the only one that mentions PSI. It is laser-printed and professional-looking, and contains information useful for beginners and for setting the computer up.

The longest document is also the most disturbing. This is the *PC AT User's Handbook*, a blue paperbound book of obvious photocopied quality. Inside, the text is strewn with gaps and erasures, hundreds of them, all of exactly the same size – all, in fact, of exactly the right size to hold the letters IBM. On the cover is a fuzzy photograph of an AT, but it is not PSI's; it is IBM's. This blatant plagiarism brings back the image of Taiwan as a land of ambiguous quality and dubious legality, an image that the computer itself had done much to dispel.

If we can set aside the *User's Handbook*, what we have left is a computer whose performance is surpassed only by the more expensive 80386 machines. Its fast cache memory allows even lowly MS-DOS programs to take advantage of its high processor speed; its IBM compatibility is almost suspiciously perfect; and its ROM-resident Setup/Diagnostics routines are both more convenient and more capable than most.

Although its 80286-12 chip is less than half the price of the 80386 chip, this in fact accounts for only a small fraction of the difference in price between the PSI AT/2 and most 80386-based computers. Most of the difference comes from wholesale and retail markups. As these become more competitive for 80386 machines, their prices will fall, to the point where they may be able to compete with the likes of the PSI AT/2. For now, however, in my experience the PSI AT/2 offers about the most MS-DOS power for the dollar available today. ■

Review machine supplied by Professional Systems International, Christchurch.

Microcomputer Summary

Name	Professional Systems International AT/2
Manufacturer	Sunlogix Inc, Taiwan
Microprocessor	Intel 80286, 6 or 12 MHz (switchable)
RAM	1 megabyte on motherboard (640kb base, 384kb expansion)
ROM	AMI-BIOS (PC/AT-compatible)
Floppy disk	NEC 1.2Mb, 5.25-inch
Hard disk	Seagate: 20, 42 or 65 Mb
Video	high-resolution AOC screen; Hercules-compatible monochrome graphics controller
Keyboard	101 keys in enhanced-AT format, including 12 function keys and 10 editing keys
Communications	one RS-232C serial and one parallel port standard
Power supply	200 watts
Expansion slots	6
Operating system	MS-DOS (multi-user systems also possible)
Bundled software	none
Price	20Mb \$5395; 42Mb \$5995; 65Mb \$6395 (plus GST)
Options	360kb 5.25-inch floppy disk drive colour monitor and EGA-compatible controller, \$1000
Ratings	ease of use 5) documentation 3; compatibility 5; expansion capability 4; value for money 5.

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The personal

by John King

Airlines are highly visible users of advanced technology in a highly competitive world, and need to keep up with the play for the sake of safety and economic survival. Among the first users of the modern mainframe computer – New Zealand's national airlines were firmly established in that field 20 years ago – they might also be expected to make full use of the latest trends in business tools.

As many people know by now, one of the most useful items of business equipment is the microcomputer with its numerous and specialised applications. In some companies nearly everybody has a PC on the desk, and one as forward-thinking as Air New Zealand might be thought to be equipped with such machines in significant quantities.

But it's not quite as simple as that. Any organisation with nearly 7,800 staff, a large number of whom are administrators, has its share of inbuilt inertia, and Air New Zealand is no exception. The spread of PCs through the airline, while definite, is by no means as general as might perhaps be thought.

"In order to justify a PC we have to put up quite a case," says one enthusiastic user. "In the initial stages that wasn't the situation, and in several cases PCs were thrust on people who didn't ask for them."

About 120 microcomputers are in use throughout Air New Zealand, most of them in the Auckland head office but also spread around the other major airports in the country and in overseas sales offices in Melbourne, Sydney, Singapore, Los Angeles and London. The great majority are standalone PCs – only one network is in operation, in marketing services – and used for a wide variety of purposes.

Somebody has to keep an eye on all this sort of thing in a large company, and that task falls on the productivity services department, formed in late 1982 as an internal consulting group to look at ways of reducing costs.

Large part

"One way of doing that was getting PCs," explains Peter Marwick, head productivity services. "That became a large part of our activities. We incorporate the information centre, which is the interface between the main

Newton Data Centre mainframes and the end user, and provide an internal consulting service to all levels. We also provide information services to end users, as well as training and support for both microcomputer and mainframe end users.

"The idea is to avoid the uncontrolled proliferation of PCs which could become quite a powerful force within the company. Standardisation and control is done through productivity services, and we feel the investment is about right in returns on PCs."

...one of the first big companies to form a policy to standardise both hardware and software for PC applications throughout all its divisions.

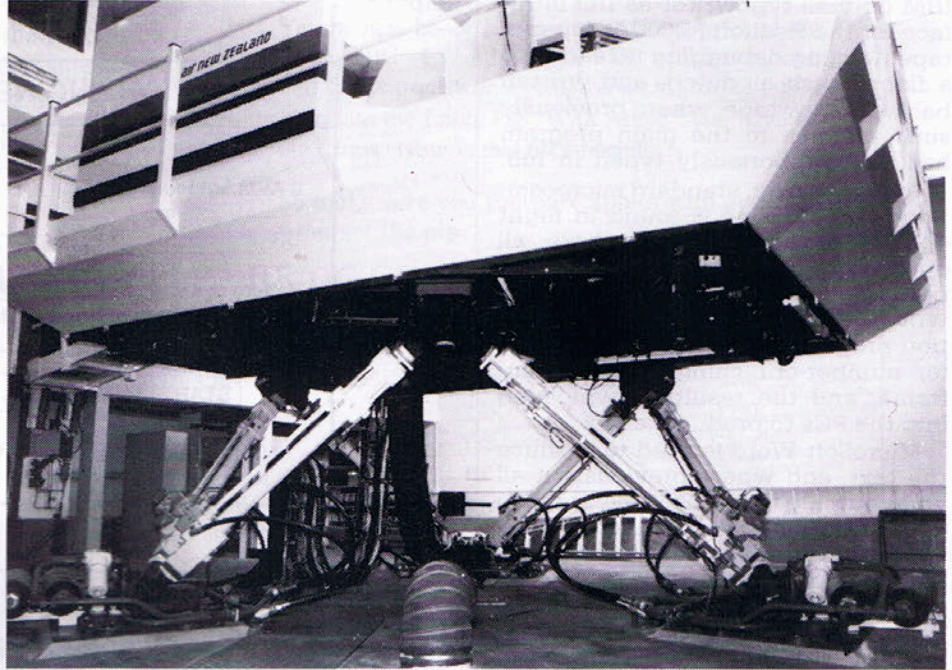
As a modern time-and-motion type of operation, productivity services also produces business studies, work measurements and operations research into such things as cargo shed layout, but microcomputer application development is an important aspect. Normal standards of system development are used, and any application is studied to see whether it would better suit a mainframe or PC environment.

Air New Zealand was one of the first big companies to form a policy to standardise both hardware and software for PC applications throughout all its divisions. Word processing is Multimate, database dBASE III, and spreadsheets are done on Lotus 1-2-3. Those are still the standard packages, but the hardware originally specified – IBM – has been dropped in favour of Scala, an MS-DOS

touch



Airline computer technology is most apparent in the flight simulators. The Boeing 767 model (right) is poised for flight in multiple axes, but (above) there's still room for the more mundane applications, with this operator interface with the Friendship simulator.



machine commonly referred to by that inelegant word 'clone'. IBM PCs, XT's and AT's are still in use, of course, and still make up more than half the machines, but new purchases are Scalas from MachineWare.

Micro-mainframe links form an important part of the overall system, in the form of Irma terminal emulator boards and Tempus-Link data transfer, used for 3270 emulation in its simplest form. At the other end of the scale is the PC interface between the separate Carina (the central on-line communications and reservations system) and general data processing (batch) systems, as PC users can download data from the mainframe to use in their own desktop systems. Budgets are prepared using Lotus and the data loaded back into the mainframe, and Carina information is used for capacity control augmentation.

Security control

Naturally enough, all this data transfer is carefully password-controlled. The mainframe systems have their own security, and the ACF2 file security package is widely used with the airline's commercial systems.

But with all these 120 or so machines using data from all over the company's operation, only one net-

work is currently in operation, with 15 workstations linked in marketing. "It seems that networking's a thing you put in at the beginning," Marwick points out. "The PCs have been installed in dribs and drabs, starting in the days before networks were available, and implementing networks later among standalone PCs is a costly business."

About 60 staff share those 15 linked machines, among which are three or four dot matrix printers, one laser printer and a plotter, 150Mb storage and three dedicated file servers. Uses include analysis of passengers and revenue data, maintenance of frequent traveller and Koru Club membership, and information on travel agents which is also distributed through other regions, on-line to London and Los Angeles and via floppy disk to others.

"The network was put in for resource sharing rather than multi-user applications," says Mike Peters, marketing information supervisor. "The optimisation of resources can save a lot of money. With marketing we have to provide management with information at the drop of a hat, and PCs have proved their worth."

When somebody at a regional office wants information, just the relevant data can be extracted for use in either report or graphical form, with spreadsheets being ideal for the purpose.

The mainframe holds a very large database, with information on every passenger sector (every ticket coupon used) which adds up to millions during a year.

Another use for desktop machines is the development of systems for future mainframe use. "It's almost in effect like prototyping," says Peters. "Effectively a little system on PCs may be of some use in the mainframe later."

With similar ideas is Air New Zealand's finance division, where the development and planning of getting local systems up and running have wider mainframe applications. There's also the added attraction of developing the systems from the user point of view, rather than in the separately-located Newton Data Centre.

Finance mainframe systems have always tended to be batch processed, rather than on-line, although accounts receivable was recently put on-line and other such upgrades are being planned. Much use is made of PCs to retrieve data for small stand-alone systems, particularly at budget time, and a network is planned to give some users access to a hard disk, for instance. No updating of mainframe files is permitted, although data can be generated for batch updates.

The engineering bases at Auckland and Christchurch may not have a

great number of PCs compared with the rest of the airline, but their uses tend to be a little more specialised.

Slightly incongruous, sitting among the very highest of high-tech equipment – the mainframe computers for flight simulators – is a modest little Commodore 64. It's not called upon to drive one of the simulators, but is being used as a keyboard replacement for an elderly IBM golfball typewriter as I/O interface for the Redifon R2000A. A paper tape needing debugging is read onto a floppy disk, updated, and written back to a new tape, where previously such patches to the main program had to be laboriously typed in full.

A change from standard microcomputer applications is found in flight operations engineering, where all operating manuals covering aircraft performance and safety aspects are written and maintained. The calculation programs are written in Fortran for number-crunching on the mainframe, and the results downloaded into the PCs to produce tables.

Microsoft Word is used to produce the text, and where previously it all went outside for typesetting at much cost and delay, PageMaker is now used for the final layout with shading and boxing. "We decided in January this year that the combination of Word and PageMaker suited our needs," says Bob Fletcher, one of two flight operations engineers. "We've had a laser printer for almost two years, but because of its limited memory for headings and things, we run complicated pages through it twice.

"Mainframes have fixed assumptions, while PCs give more flexibility. It's surprising how applications seem to grow when you have them. We didn't envisage some of the uses we now put them to. The two in our office have to be booked well in advance."

One advantage of the present sys-

tem for production of manuals, says Fletcher, is the standardisation of design and layout, and the formulation of the way the information is presented to the aircrew, even with changes in aircraft fleets. Flight operations is responsible for 26 operating manuals and performance manuals for all the airline's four aircraft types, so "being able to download data and print it out on the laser is a very big help."

While PCs are well entrenched in the Air New Zealand scheme of things, the development of further applications will continue. "There are still areas not utilising these sorts of tools," according to Peter Marwick. "PCs have tended in some cases to be interim solutions while the juggernaut of the mainframe has moved on, for example in rostering, finance and personnel.

"There's still a lot of potential."

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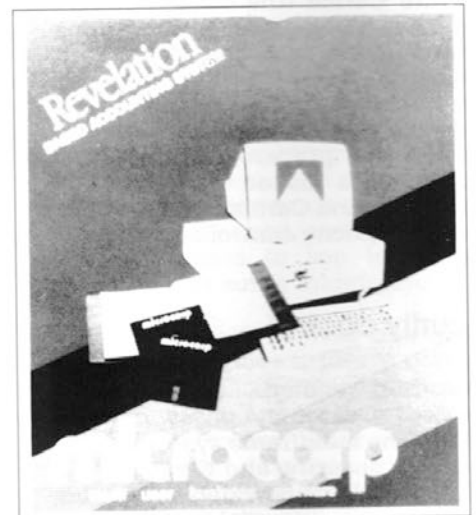
An example of PageMaker output for a Boeing 747 operating manual.

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CPU:	Laser	IIE	IIC
Processor	65C02	6502	65C02
ROM Memory	32K	16K	16K
RAM Memory	128K	128K	128K
Optional 1 Meg RAM Upgrade	Yes	Yes	No
I/O Interfaces:			
Parallel Printer I/F	In Built	Extra	No
Serial Printer I/F	In Built	Extra	In Built
Serial Modem I/F	In Built	Extra	In Built
80 Column Text	In Built	Extra	In Built
Mouse Port	Yes	No	Yes
Joystick Port	Yes	Yes	Yes
Floppy Disc Drive 5.25"	In Built	Yes	In Built
External Disc Drive 3.5"	Extra	Extra	Extra
Expansion Slots	Yes	Yes	No
Sound Output Volume Control	Yes	No	Yes
Sound Output Earjack	Yes	No	No
Keyboard:			
Number of Keys	90 Keys	63 Keys	63 Keys
Function Keys	10 Keys	No	No
Numeric Keypad	Yes	No	No
Qwerty & Dvorak Keyboard	Yes	No	No
Video Display:			
RGB Colour	In Built	No	No
Composite Colour	In Built	No	No
Television Interface	Extra	Extra	Extra
16 Programmable Text Colours	Yes	No	No
16 Programmable Background Colours	Yes	No	No
16 Programmable Backdrop Colours	Yes	No	No
Maximum Graphics Resolution	560H × 384V	560H × 160V	560H × 192V
Warranty	1 Year	1 Year	1 Year
Price Includes Monitor (GST Inclusive)*	\$1,494	\$3,467	\$2,744

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* (Apple retail prices as quoted by an Auckland computer shop March 1987)

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QMD 16C

Fast and

Top model of three new 10-inch printers recently released by Panasonic, the KX-P1083 offers fast 240 cps draft printing, near letter quality at a reasonable 48 cps, Epson FX and IBM Proprinter compatibility, front panel function selection, auto single sheet loading, and optional auto cut sheet feeder.

The KX-P1083 at first glance appears to be a cut-down version of the 15-inch KX-P1592 multi-mode printer, but closer examination reveals a few differences. Visually, the printer looks quite chunky, but I was surprised to find that it is only 2.5cm higher than my own printer, and the same around the 'waist' - 20 x 36 cm. Decked out in cream and grey with smoked perspex top cover, it is similar in appearance to most other printers - I guess there are only so many ways the bits can be put together!

The top function panel controls form length, online mode, line feed, form feed and print mode selection. The latter offers seven modes - draft 10 or 17 cpi, draft proportional, Courier 10 or 12 cpi, Courier proportional, and bold proportional. Both the Courier and bold options print in the near letter quality font.

I found the choice a bit limited and not quite as flexible as on my own printer - I usually print program listings at 12 cpi on paper that is a bit narrower than standard 10-inch fan-fold, and I could not achieve this from the 1083's front panel. All possible functions can of course be set from software, and one would just use a printer setup program for this. Configuration dip switches are easily accessible through a cutout in the plate below the perspex window.

Push tractor

As is more common these days, the paper feed is via push tractors concealed beneath the rear top cover, giving a tidier appearance to the unit. Push tractors work well most of the time, but I have experienced occasional feed problems on a rebadged version of the 15-inch KX-P1592 with

reasonably priced

Panasonic's new range of 9-pin dot matrix printers gives good quality output without breaking the bank, says Shayne Doyle.

some fanfold paper. However, no such problems were encountered while I had the KX-P1083.

The rear top cover doubles as a stand-up support and guide when using A4 cut sheets. To auto load single sheets, the paper feed selector is set to friction, and the sheet fed through a slot in the now raised rear cover. The printer automatically feeds the sheet half way around the platen, but the user then has to manually feed it the rest of the way and tuck it under the metal tear bar.

The paper feed is via push tractors concealed beneath the rear top cover, giving a tidier appearance to the unit.

Five times out of ten the paper catches on the rear of the tear bar when doing this, and once loaded, the first available print line is line 8. This is not satisfactory, and I found that if the tear bar is left raised, then the first usable line is 2. In my view the single sheet load facility is not well designed and is clumsy in operation.

One of the penalties of designing compact printers is usually an unfortunate choice of location for the parallel interface socket. Most fully-wired parallel cables are thick inflexible things, and with the large Centronics plug backshell, protrude a fair way out of the socket, interfering with the paper feeding.

The KX-P1083 suffers from this, but it is only one of many different printers with the same design problem. My solution is to use a bare minimum hacker's cable made up from ribbon cable and centronics plug, without the backshell. It occasionally needs a minor repair, but that's quick and easy.

Fast but noisy

In operation, the KX-P1083 is certainly fast enough, but it has a fairly high noise level. The specs quote 66 dBA, but that is compounded by reasonably loud clunks as the head carriage reverses at the end of each line.



SPECIFICATIONS

Panasonic KX-P1083 impact dot matrix printer		
9 head pins		
Printing speeds	draft: 240 cps NLO: 48 cps compressed: 205 cps	
Print modes	draft (10, 17, PS pitch), Courier NLO (10, 12, PS), bold (PS, NLO)	
Print direction	bi-directional with logic seeking (uni-directional in bit image mode)	
Line spacing	1/6, 1/8, 7/72, n/72, n/216 (programmable) inches	
Character set	96 ASCII chars with descenders, 32 international chars (11 countries), 135 IBM special chars	
Bit images (dpi)	60, 72, 80, 90, 120, 144, 240	
Number of columns	cpl	cpi
	Pica	80
	Elite	96
	semi-compressed	120
	compressed	137
		17.1
Paper feed	adjustable push tractor and friction	
Paper width	fanfold: 4-10" cut sheet: 4-9"	
Copies	original plus 2	
Interface	standard Centronics parallel, optional RS232C serial	
Buffer	standard 6kb text, optional 32kb	
Dimensions	413 x 350 x 137mm	
Weight	9.9 kg	
Ribbon	endless cartridge, black, brown, blue or red	
Options	automatic cut sheet feeder	
Price	\$1260 plus GST	

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[] Quick Basic 3	\$256.95	[] Wizardry	\$98.82
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[] VP Expert	\$153.40	[] Paradox D/Base 1.1	\$678.50
[] VP Graphics	\$153.40	[] Paradox D/Base 2.0	\$1014.80
[] VP Info	\$153.40	[] Paradox LAN Pack	\$1410.10
[] VP Planner	\$153.40	[] Crosstalk	\$286.15
[] Lotus 1-2-3	\$649.00		
[] Hal	\$230.10	<u>IBM HARDWARE</u>	
[] Express	\$159.30	[] 8087-2 Co-Pro	\$409.13
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[] Symphony Txt Out	\$212.40		
[] Ability	\$141.60	<u>MONITORS</u>	
[] Sidekick	\$153.40	[] ADI DM12A Amber	\$272.58
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[] Turbo Tutor	\$80.24	[] ADI DM1502 RGB	\$717.44
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Review

Why Panasonic chose to make this unit IBM Proprinter compatible rather than the usual IBM PC compatible is beyond me. The result is a very curious situation whereby two different control codes are required for the same function, depending on whether the printer is switched to Standard or Proprinter mode. There are a lot more functions available in Standard mode, but the character set does not provide the normal IBM graphics characters. In Proprinter mode the graphics characters are available, but a much reduced choice of functions is imposed.

Switching between the two modes is by dip switch and therefore cannot be controlled by software. I found these limitations irritating after a while and not to my liking.

Having said that, the KX-P1083 certainly has a thoroughly comprehensive lineup of programmable functions available. I guess most of us have given up programming our own bit-image graphics prints these days, and would rather use software goodies such as Deluxe Paint to produce those stunning hi-res pics, but it's still a comfort to know one has a choice of seven different densities available if one decides to go back to 'roll your own' graphics.

Near letter quality is very good for a 9-pin printer, the dual pass producing an overlapping 18x18 dot character matrix. Draft is of average quality, using a standard 9x9 dot matrix.

It is well suited for a user needing fast draft printing and good reasonably fast near letter quality print at a reasonable price.

The KX-P1083 is well suited for a user needing fast draft printing and good reasonably fast near letter quality print at a reasonable price. The previously mentioned limitations may not affect your requirements at all, and the only true way to find this out is to go to your Panasonic dealer and get a hands-on demonstration.

If you have any intentions of doing more than the very occasional print on A4 cut sheet, I would recommend purchasing the optional cut sheet feeder as well, although I did not have this unit to evaluate. You may also need to consider an acoustic hood if the unit is to be sited in close proximity to other persons. ■

*Review machine supplied by
Microcomputer Electronic Company,
Auckland.*



The Clone Killer

Exclusive to Pacific Computers

PARAGON

from *mitac*





The Clone Killer

The Paragon 88 Business System is a Full Feature Small Footprint Turbo XT computer.

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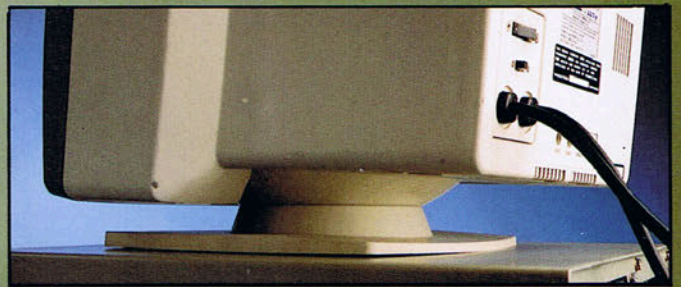
That's why it's called **THE CLONE KILLER**

The heart of the new Paragon 88 is a 8088-2 micro-processor. This is the same CPU used in the IBM PC but it is a special "turbo" version which runs 60% faster for more raw processing power.

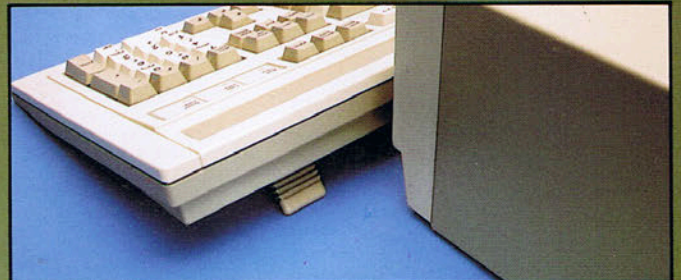
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mitac

It's all on board.

with its enhanced keyboard and multi-mode display monitor. The keyboard features 101 keys with 12 software function keys and separate numeric and cursor keypads for faster data entry.

For the latest in display technology the Paragon multi-mode monitor has to be seen to be believed! It's soft-white display is soothing on the eyes for hours of fatigue-free data viewing. The tilt-swivel base allows easy adjustment to the best viewing angle for the user.

Due to Mitac's huge Research & Development resources and their commitment to delivering the latest technology, the Paragon 88 is a complete computer on a single board. All the extras are on board including the most

revolutionary multi-mode display circuitry available in the industry. The Paragon with its multi-mode on board graphics and paper white monitor can actually run software written for four different display cards. It's like having four differently configured computers. This multi-mode graphics makes Paragon the most compatible PC available, being able to run software for the Hercules Mono, MDA, IBM Colour Graphics and Plantronics display adaptors.

PARAGON

from **mitac**

IT'S ALL ON BOARD!



The Clone Killer

The on-board real-time clock/calendar means that the Paragon knows the date and time — without you having to key it in. And the battery back-up keeps the clock ticking when the power's off. Even all the RAM you'll need is on-board, the standard 640K plus an extra 128K for a super fast RAM-Disk to make your programs fly.

A On-Board Real Time Clock/Calendar.

B The Paragon features on-board RAM of 768K

A parallel Centronics printer port is standard on the Paragon, along with an RS-232 serial port for connection to a Mouse or Modem. There's a co-processor socket and **five** free full length IBM PC compatible expansion slots. Also on-board is a floppy disk drive controller to control the Paragons Disk Drives.

With Paragon you get the best of both worlds.

An industry standard 360K 5¼" disk drive to run the thousands of IBM PC packages available **off-the-shelf today**.

C The right connections.

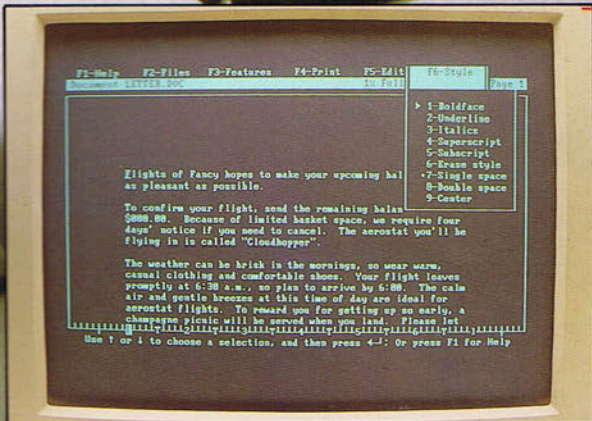
D Both a 5¼" and a 3½" disk drive.

And the Paragon 88 Floppy drive system you also get a 3½" 720K disk drive to lead you into the industry standard of tomorrow. The best of both worlds — only with Paragon.

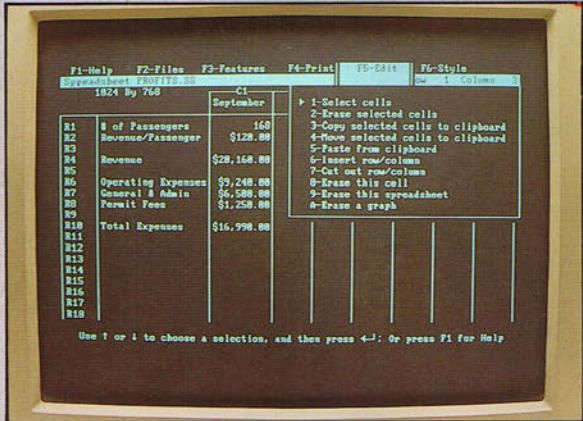
With an array of front panel controls and indicators, the Paragon doesn't leave you in the dark.

E On/Off switch, Reset button, Turbo indicator, keyboard connector, and disk drive indicators are all on the front panel.

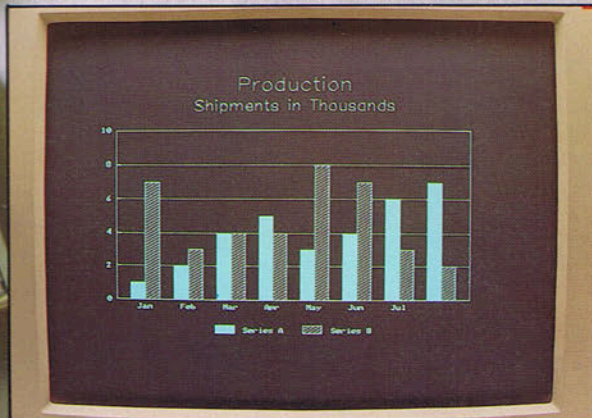
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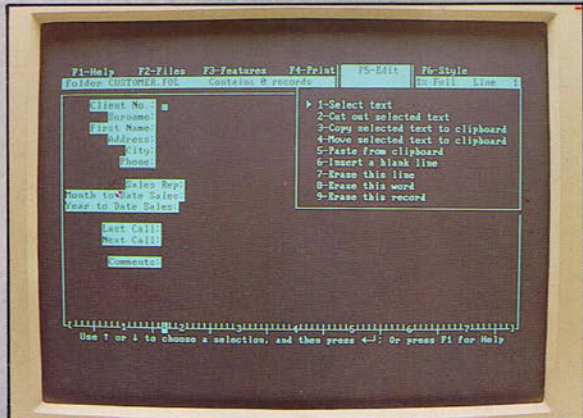
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For those who need extra data storage, the Paragon 88 Hard Drive System features a 3 1/2" 32 Megabyte Hard Card. With its 7.5 MHz data transfer rate, RLL technology and self-parking mechanism you'll get performance at the right price.

Although the Paragon 88 is the latest, single board, small footprint technology, it's more than just a computer. It's a total solution, including printer and software.

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If you are new to computers then this program gets you ahead by providing simple, straight-forward menus and commands as well as the power needed to get the job done.



from milac



star[✶]
NX-1000



Font & Mode selection panel.

The Clone Killer

With any computer system the results are on a printed page. And with a Paragon 88 System the printed page has never looked better. As if Near Letter Quality wasn't enough, the new Star NX-1000 offers Multi-Font NLQ. Take your choice of Courier, Sanserif, or Orator in NLQ, even Italics! Of course, you also have full IBM and Epson compatibility as well as 120 cps draft and condensed, bold, double sized, sub-script, super-script, and quadruple sized print. And if you thought that choice of options would be confusing, the Star NX-1000 has easy-to-use front panel font and mode selection.

The NX-1000 accepts a wide variety of paper — from your company letterhead to continuous tractor fed paper (up to triple ply).

Even if you've loaded the NX-1000 with continuous paper the innovative paper park function "parks" the continuous paper and allows you to print on single sheet. No re-loading, no hassles, no wasted time. With its superb multi-mode NLQ, brisk 120 cps draft, Epson and IBM compatibility, Paper Park, and Mode selection panel, the results speak for themselves.

PACIFIC COMPUTERS



* SUPPORT * SERVICE * QUALITY

Pacific Computers is New Zealand's fastest growing computer company, and now one of the largest. But unlike many of the other hardware importers, Pacific Computers have a complete commitment to their customers, and to the future.

When you purchase your Paragon 88 Business System you receive a free voucher to attend one of our introductory training courses. So even if you've had no previous computer experience you're supported every step of the way.

The brands we import have been carefully selected for quality and value. Every computer is unpacked and tested by our Service Division before it is sold. And the same highly skilled team is standing by should any problems occur.

Talk to our sales staff and you will find them extremely knowledgeable. Tell them your requirements, and they will find the right hardware and software solutions.

And once you are a Pacific Computers customer, you have a free support service just a phone call away.

Because above all Pacific Computers is a service organisation.



A



D



B



E



C



F

A
Our trained support specialists can help with any of your hardware/software queries.

B
Each computer system is individually configured to customer requirements.

C
Regular training courses covering a wide range of software applications are held in our spacious training facilities.

D
A full range of products on display in our large showroom.

E
A fast, efficient mailorder division sends orders by overnight courier throughout New Zealand.

F
Our well equipped service department is staffed by a team of qualified technicians.

AUCKLAND

Corporate Headquarters & Showroom
87 Carbine Road, Mt Wellington
Phone (09) 577-246, (09) 577-323

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Wellington Division
140 Hutt Road
Phone (04) 692-971



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A BUYER'S GUIDE TO PRINTERS – Part 2

Welcome to the second part of our annual printer roundup, covering the selection available between \$2,000 and \$5,000. Part 3 next month will outline those printers costing more than \$5,000 and will also include the rapidly-increasing range of laser-based machines on the local market.

By comparison with last year's roundup, progress has been made by printer manufacturers in both speed and price – but while printing speed has tended to increase, prices have held their own or even shown a tendency to come down. Where the exact model was available 12 months ago it is usually cheaper now; but an obviously revised version this year has more user-selectable functions on the front panel as well as higher speed, all for about the same cost.

As usual in our roundups, the information is presented in standardised form so that readers may compare printers directly with one another.

SEIKOSHA SP180

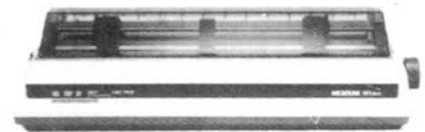


Dot matrix
Pins in print head: 9
NLQ feature: yes
Print speed in
NLQ mode: 25 cps
Print speed: 100 draft
Max chars/line: 80
Paper width: 11"
Paper feed: rear
Buffer size: 2k
Ribbon type: cartridge
Graphics mode: IBM, Epson or Commodore
Interface: serial, parallel and Commodore
Features: front panel selectable NLQ. Coloured printers available.
Retail price: \$625.00
Agent: Mitsui Computer Ltd

SEIKOSHA SP1200AI

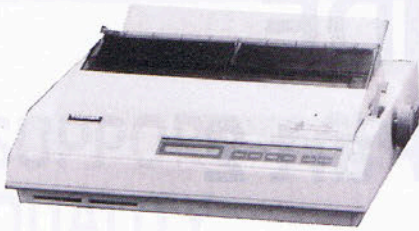
Dot matrix
Pins in print head: 9
NLQ feature: yes
Print speed in
NLQ mode: 25 cps
Print speed: 120 draft
Max chars/line: 80
Paper width: 11"
Paper feed: rear
Buffer size: 2.3k
Ribbon type: cartridge
Graphics mode: IBM Epson
Interface: serial, parallel or Commodore
Features: automatic paper load and ejection. Six kinds of character pitch selection.
Options: cutsheet feeder, 8k byte buffer
Retail price: \$795.00
Agent: Mitsui Computer Ltd

AWA/OKI MICROLINE 193+



Impact dot matrix
Pins in print head: 9
NLQ feature: yes
Print speed in
NLQ mode: 40 cps
Print speed: 200 cps
Max chars/line: 136,233 compressed
Point sizes: 5, 6, 8.5, 10, 12, 17.1
Paper width: 16"
Paper feed: friction & tractor
Buffer size: 8k
Ribbon type: Re-inking
Graphics mode: 15 densities, IBM or Microline
Interface: Serial RS232, Parallel Centronics and RS422-A Ready/Busy x on/off
Options: Sheet Insertion guide, Automatic Sheet Feeders, RS232, RS422
Retail price: \$1550 plus GST
Agent: AWA New Zealand Ltd

TOSHIBA P321SL



Dot matrix

Pins in print head: 24
 NLQ feature: yes
 Print speed in NLQ mode: 72 cps
 Print speed: 216 cps
 Max chars/line: 160 at 20 cpl, 120 at 15 cpl NLQ
 Point sizes: 10, 12, 15 (NLQ); 10, 12, 16.7, 20 (Draft)
 Paper width: 4"-10"
 Paper feed: Friction and bi-di tractor
 Buffer size: 32k
 Ribbon type: multistrike
 Interface: serial RS232 and centronics parallel
 Features: serial and parallel interfaces.
 Retail price: \$1498 plus GST
 Agent: Southmark Computers Ltd

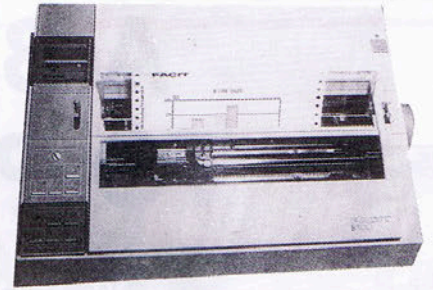
SEIKOSHA MP1300AI



Dot matrix

Pins in print head: 9
 NLQ feature: yes
 Print speed in NLQ mode: 50
 Print speed: 300 draft
 Max chars/line: 80
 Paper width: 11"
 Paper feed: rear and bottom
 Buffer size: 10k
 Ribbon type: cartridge
 Graphics mode: IBM, Epson
 Interface: serial RS232 and parallel (centronics)
 Features: tractors, single sheet feeder, serial port, 2m tap on power cable,
 Options: cutsheet feeder, colour kit
 Retail price: \$1700
 Agent: Mitsui Computer Ltd

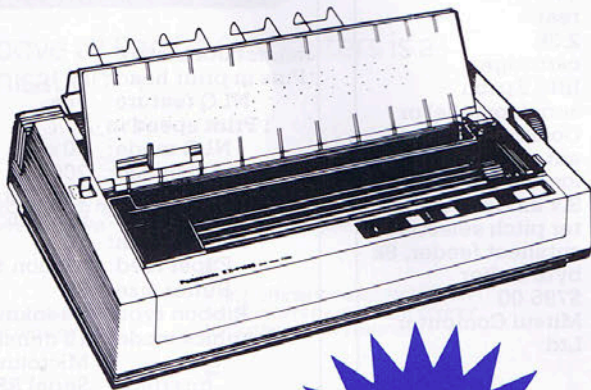
FACIT B3100



Dot matrix

Pins in print head: 9
 NLQ feature: yes
 Print speed in NLQ mode: 60 cps
 Print speed: 250 cps
 Max chars/line: 133 compressed
 Paper width: 10²/₃"
 Paper feed: tractor
 Buffer size: 12k
 Ribbon type: endless loop
 Graphics mode: full colour graphics
 Interface: RS232c serial and parallel centronics
 Features: low noise function, easy menu set-up card system for font changing, Epson FX/JX and IBM emulations.
 Options: colour, single and double sheetfeeders
 Retail price: \$1703 plus GST
 Agent: Northrop Instruments and Systems Ltd

Flexibility and super-fast printing from Panasonic



The Panasonic KX-P1595 dot matrix printer can do some amazing things. Like 240 cps in draft mode. To let you produce your letters, memos and reports in a snap. All with the quality you expect from Panasonic. For demanding users, the KX-P1595 has a lot to offer.

- Prints 240 cps in draft mode, 360 cps with white spacing
- Near letter quality printing in all pitches
- Handles paper up to 16.5" wide
- Operator accessible touch switch for font and pitch
- Nine pitches and graphics printing
- Built-in parallel and RS-232-C serial ports
- Auto paper loading for cut sheet

\$1990
+ GST

MEC DEALER PRODUCTS

THE MICROCOMPUTER ELECTRONIC CO. LTD
 P O Box 9224, Newmarket, Auckland.
 Phone: (09) 504-774 Fax 500-173
 Telex NZ60721

Panasonic
 Leaders in Printer Technology

Contact your nearest Panasonic printer dealer now or phone MEC Dealer Products for the name and location of your nearest dealer.

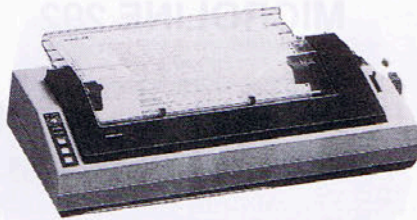
FACIT D2000



Daisy wheel

Print speed: 24 cps
 Max chars/line: 116
 Paper width: 15"
 Paper feed: friction
 Buffer size: 2k
 Ribbon type: multistrike
 Interface: RS232C serial and centronics parallel
 Features: quiet operation; auto paper injection; easy menu set-up
 Options: tractor feed, cut sheet feeder
 Retail price: \$1733 plus GST
 Agent: Northrop Instruments and Systems Ltd

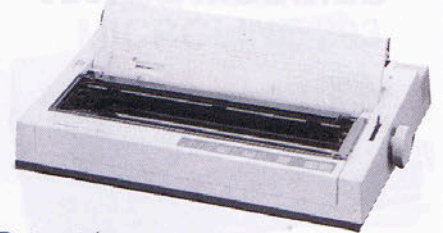
FACIT 4514



Dot matrix

Pins in print head: 9
 NLQ feature: yes
 Print speed in NLQ mode: 30/40 cps
 Print speed: 160 cps
 Max chars/line: 220 compressed
 Point sizes: 9 x 9 and 18 x 17
 Paper width: 16 1/3"
 Paper feed: friction and tractor
 Buffer size: 2k
 Ribbon type: cassette
 Graphics mode: 8 pin and 9 pin bit image mode
 Interface: RS232C serial and centronics parallel
 Features: Epson FX/100/IBM emulations.
 Options: cut sheet feeder
 Retail price: \$1967 plus GST
 Agent: Northrop Instruments and Systems Ltd

PANASONIC KX-P1595

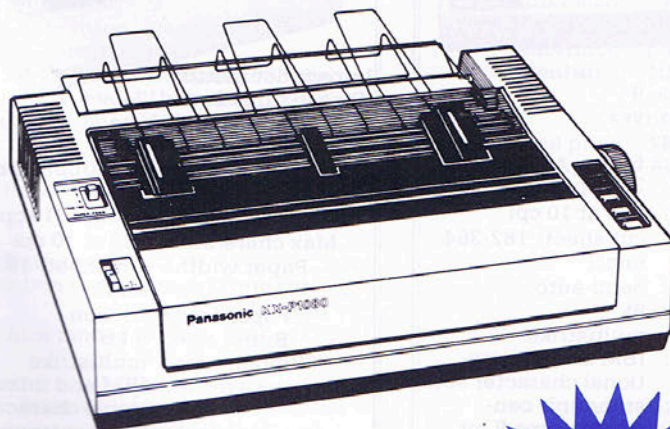


Dot matrix

Pins in print head: 9
 NLQ feature: yes
 Print speed in NLQ mode: 51 cps
 Print speed: 240
 Max chars/line: 136/233
 Paper width: 4" to 15.5" fanfold, 4" to 16.5" single adjustable push tractor and friction
 Paper feed: adjustable push tractor and friction
 Buffer size: 15k
 Ribbon type: nylon cartridge
 Graphics mode: bit image, IBM block
 Interface: parallel and serial
 Features: 15 position print mode selection, Diablo 630, FX100 and IBM matrix/graphics compatible, proportional printing.
 Options: 32k text buffer,
 Retail price: \$1990 plus GST
 Agent: The Microcomputer Electronic Company Ltd

Top value from a Panasonic printer

Economy and quality work together in the KX-P1080 dot matrix printer. Economy, because the KX-P1080 is priced to suit even a modest budget. Quality, because it's from Panasonic. So come and see the KX-P1080 — it's great value . . . worth a closer look!



- Prints 100 cps in draft mode
- Near letter quality printing
- Operator accessible print mode switch
- Dot addressable graphics
- Friction feed and variable tractor
- Word processing functions (justification, centering, margin alignment).

MEC DEALER PRODUCTS

THE MICROCOMPUTER ELECTRONIC CO. LTD
 P O Box 9224, Newmarket, Auckland.
 Phone: (09) 504-774 Fax 500-173
 Telex NZ 60721

\$630
 + GST

Panasonic
 Leaders in Printer Technology

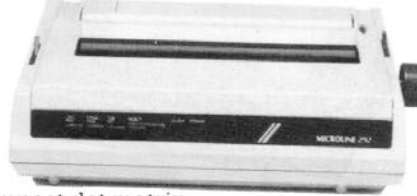
Contact your nearest Panasonic printer dealer now or phone MEC Dealer Products for the name and location of your nearest dealer.

GENICOM GE1020



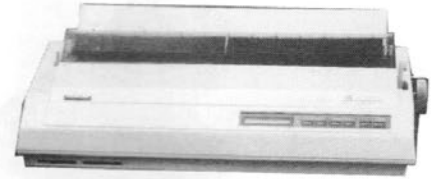
Dot matrix
 Pins in print head: 18 wire staggered
 NLQ feature: yes
 Print speed in
 NLQ mode: 100 cps
 Print speed: 200 cps
 Max chars/line: 230 in 17cpi mode
 point sizes: determined by font
 Paper width: 13.6 inch (345mm)
 Paper feed: friction and tractor
 Buffer size: 2k std 8k and 64k
 Ribbon type: multistrike, up to 4 million characters
 Graphics modes: IBM graphics
 Interface: serial or parallel
 Features: intergral printer stand, selection of plug in font styles and personlity modules
 Options: single bin feeder, font cartridges, color option kit
 Retail price: \$1997 plus GST
 Agent: AWA Computers

AWA/OKI MICROLINE 292



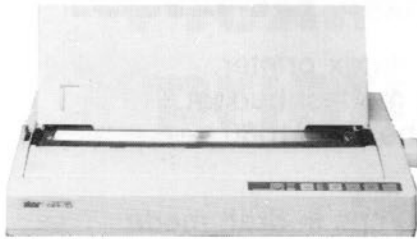
Impact dot matrix
 Pins in print head: 18
 NLQ feature: yes
 Print speed in
 NLQ mode: 100 cps
 Print speed: 200 cps
 Max chars/line: 80 (137)m 17.1 cpi mode
 Point sizes: 5, 6, 8.5, 10, 12, 17.1
 Paper width: 10.5"
 Paper feed: single sheet and bin feed
 Buffer size: 8k with optional 32k buffer
 Ribbon type: cartridge
 Graphics mode: 12 in black 8 in colour IBM or Microline compatible
 Interface: IBM parallel or serial, OKI parallel or serial
 Options: tractor feed, cut-sheet feeder, 32k buffer (20 page), colour ribbon
 Retail price: \$2000 plus GST
 Agent: AWA New Zealand Limited

TOSHIBA P341SL



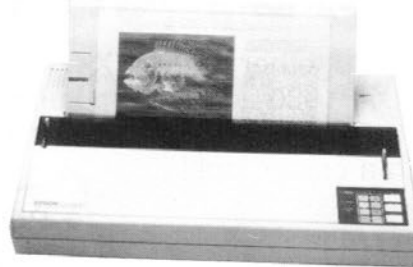
Dot matrix
 Pins in print head: 24
 NLQ feature: yes
 Print speed in
 NLQ mode: 72
 Print speed: 216 cps
 Max chars/line: 198 at 15 cpl in NLQ; 240 at 20 cpl in Draft
 Point sizes: 10, 12, 15 (NLQ); 10, 12, 16.7, 20 Draft
 Paper width: 4"-10"
 Paper feed: friction and bi-di tractor
 Buffer size: 32k
 Ribbon type: multistrike
 Interface: serial RS232 and centronics parallel
 Features: low noise, serial and parallel interfaces
 Retail price: \$2098
 Agent: Southmark Computers Ltd

STAR NR-15



Dot matrix
 Pins in print head: 9
 NLQ feature: yes
 Print speed in
 NLQ mode: 60
 Print speed: 240 cps
 Max chars/line: 136 (10 cpi) 272 (17 cpi)
 Paper width: 15"
 Paper feed: standard friction and push tractor
 Buffer size: 12.6k
 Ribbon type: cartridge multistrike
 Graphics mode: IBM graphics
 Interface: parallel
 Features: self test, optional automatic sheet feeder, italic mode, forward and reverse micro feed, hex dump.
 Options: 16 kb buffer board, serial RS-232C interface
 Retail price: \$2200
 Agent: Star Micronics (NZ) Ltd

EPSON EX-1000



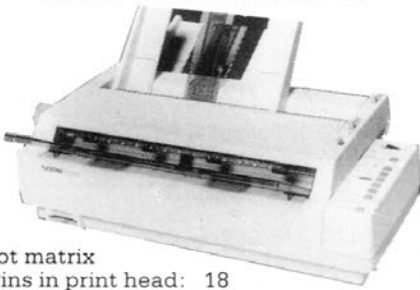
Impact dot matrix
 Pins in print head: 9
 NLQ feature: yes
 Print speed in
 NLQ mode: 50
 Print speed: 300 cps (draft elite)
 Max chars/line: 136 at 10 cpi
 Paper width: cut sheet: 182-364 mm;
 Paper feed: semi-auto
 Buffer size: 8k
 Ribbon type: multistrike
 Graphics mode: IBM and international character sets
 Interface: standard: centronics-type 8 bit parallel and RS-232S serial
 Features: bi-directional printing
 Options: colour printing, single and double bin cut sheet feeder,
 Retail price: \$2200
 Agent: Epson New Zealand Ltd

Epson LQ-1000



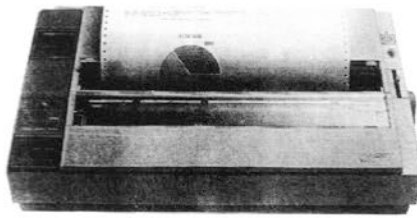
Impact dot matrix
 Pins in print head: 24
 NLQ feature: yes
 Print speed in
 NLQ mode: 60 (10 cpi) 72 cps (12 cpi)
 Print speed: 180 cps (10 cpi draft)
 Max chars/line: 132 at 10 cpi
 Paper width: cut sheet: 182-364 mm;
 Paper feed: friction
 Buffer size: 8 kb
 Ribbon type: multistrike
 Graphics mode: IBM and international character sets
 Interface: std: centronics-style 8 bit parallel and RS-232-C serial
 Features: bi-directional printing, proportional spacing,
 Options: font modules, single bin cut sheet feeder
 Retail price: \$2200
 Agent: Epson New Zealand Ltd

BROTHER M2518



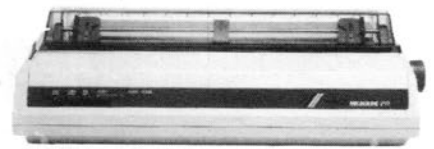
Dot matrix
 Pins in print head: 18
 NLQ feature: yes
 Print speed in NLQ mode: 75
 Print speed: 300 (pica) 360 (elite)
 Max chars/line: 136 (pica)
 Point sizes: 5, 6, 8.5, 10, 12, 17 and 20 cpi
 Paper width: cut sheet 101.6-421 P
 Paper feed: friction and tractor
 Buffer size: 8kb input buffer
 Ribbon type: nylon and colour
 Graphics mode: 8x816, 8x978, 8x1088, 8x1224, 8x1632, 8x1956
 Interface: centronics (parallel)
 Features: emulates IBM Proprinter and Epson EX/FX series,
 Options: NLQ font card
 Retail price: \$2200 plus GST (target - available November)
 Agent: Selected dealer throughout New Zealand

FACIT B3150



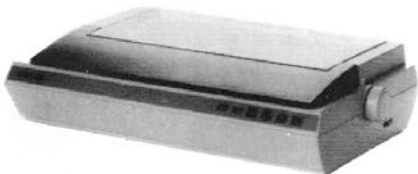
Dot matrix
 Pins in print head: 9
 NLQ feature: yes
 Print speed in NLQ mode: 60
 Print speed: 250
 Max chars/line: 230 condensed
 Paper width: 16 1/3"
 Paper feed: tractor with four paper paths
 Buffer size: 12k
 Ribbon type: endless loop cartridge
 Graphics mode: full colour graphics
 Interface: RS232C serial and centronics parallel
 Features: easy menu set-up, card system for font changing. Epson FX/JX and IBM emulations
 Options: Colour capability, dual and single sheet feeders
 Retail price: \$2243 plus GST
 Agent: Northrop Instruments and Systems Ltd

AWA/OKI MICROLINE 293



Impact dot matrix
 Pins in print head: 18
 NLQ feature: yes
 Print speed in NLQ mode: 100 cps
 Print speed: 200 cps
 Max chars/line: 136 (233) compressed print
 Point sizes: 5, 6, 8.5, 10, 12, 17.1
 Paper width: 16"
 Paper feed: friction and tractor feed, bottom and rear feed
 Buffer size: 8k with optional 32k cartridge
 Ribbon type: 12 in black and 8 in colour IBM or OKI
 Graphics mode: OKI or IBM. Parallel, RS232C or RS422-A cut sheet feeder, 32 buffer, colour ribbon cartridge
 Interface: OKI or IBM. Parallel, RS232C or RS422-A
 Options: cut sheet feeder, 32 buffer, colour ribbon cartridge
 Retail price: \$2265 plus GST
 Agent: AWA New Zealand Ltd

C. ITOH C315

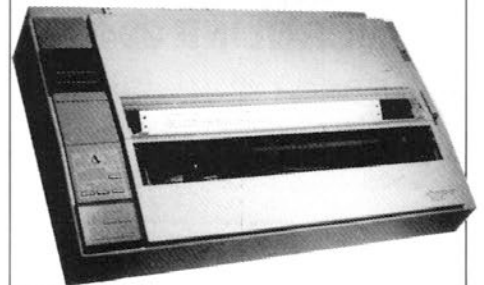


Dot matrix impact
 Pins in print head: 9
 NLQ feature: yes and LQ
 Print speed in NLQ mode: 50 cps LQ 33 cps
 Print speed: Up to 300 cps - 871
 Max chars/line: 136 at 10 cpi, 244 compressed
 Paper width: 4.5"-16"
 Paper feed: rear push tractor/ bottom pull tractor/ cut paper
 Buffer size: 10 kb
 Ribbon type: black fabric cartridge or 4 colour
 Graphics mode: Epson, IBM or C. ITOH, Macintosh compatible
 Interface: centronics parallel or RS-232-C/V24
 Features: Tear off 1 inch above print position, 7 colour printing
 Options: font cartridge bar code cartridge, 1 and 2 bin auto sheet feeders
 Retail price: \$2290 plus GST
 Agent: Control Microcomputers

EXP 800 SILVER REED

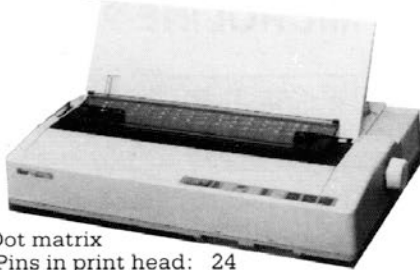
Daisy wheel
 Print speed: 40 cps
 Max chars/line: 132 ch (10 pitch) 158 ch (12 pitch) 197 ch (15 pitch)
 Point sizes:
 Paper width: 17"
 Paper feed: cut sheet feeder or tractor
 Buffer size: 3 k exp 40 k
 Ribbon type: multistriker
 Interface: parallel and serial
 Features: 10-12 pitch printing, superscript and underlining
 Retail price: \$2356 including GST
 Agent: Anitech

FACIT B3350



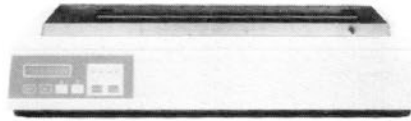
Dot matrix
 Pins in print head: 18
 NLQ feature: yes
 Print speed in NLQ mode: 100 cps
 Print speed: 200 cps
 Max chars/line: 230 condensed
 Paper width: 16"
 Paper feed: push/pull tractor
 Buffer size: 12k
 Ribbon type: endless loop cartridge
 Graphics mode: 60-240 DPI graphics
 Interface: RS232C serial and centronics parallel
 Features: 4 paper paths, single sheet auto load, auto paper park, Epson FX/JX and IBM emulations.
 Options: Colour capability, sheetfeeders.
 Retail price: \$2576 plus GST
 Agent: Northrop Instruments and Systems Ltd

STAR NB2415



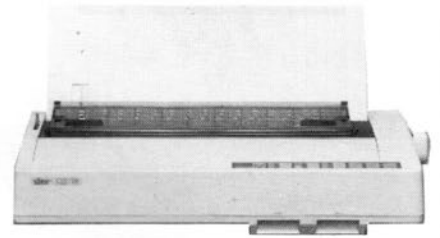
Dot matrix
 Pins in print head: 24
 NLQ feature: yes
 Print speed in NLQ mode: 72
 Print speed: 216 cps
 Max chars/line: 136 (10 cpi) 233 (17 cpi)
 Paper width: 15"
 Paper feed: standard friction and push tractor
 Buffer size: 5k
 Ribbon type: cartridge multistrike
 Graphics mode: full IBM proprinter and graphics printer
 Interface: Standard parallel, optional serial
 Features: character font cartridges, exchangeable interface board, forward and reverse micro feed,
 Options: automatic cut sheet feeder (one or two bins)
 Retail price: \$2600
 Agent: Star Micronics (NZ) Ltd

C. ITOH C715ACR



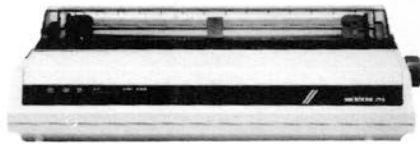
Dot matrix impact
 Pins in print head: 24
 NLQ feature: yes and LQ
 Print speed in NLQ mode: 100 cps
 Print speed: 288 cps
 Max chars/line: 136 at 10 cpi, 232 compressed
 Paper width: 4.5-16"
 Paper feed: rear push tractor/ bottom pull tractor/ cut paper
 Ribbon type: black fabric cartridge or 4 colour
 Graphics mode: IBM, Epson, Toshiba P351 compatible
 Interface: dual - centronics and RS-232-C
 Features: plug in Emulation cards for Toshiba P35, Epson LQ1000/LQ1500, IBM Proprinter, Diablo 630 compatibility.
 Options: font cards, 1 and 2 bin auto sheet feeder
 Retail price: \$2890 plus GST
 Agent: Control Microcomputers Ltd

STAR NB15



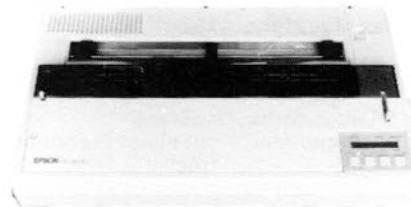
Dot matrix
 Pins in print head: 24
 NLQ feature: yes
 Print speed in NLQ mode: 100 cps
 Print speed: 300 cps
 Max chars/line: 136 (10 cpi) 222 (16 cpi)
 Paper width: 15"
 Paper feed: Friction and push tractor
 Buffer size: 16k
 Ribbon type: cartridge multistrike
 Graphics mode: full IBM graphics
 Interface: standard parallel, optional serial
 Features: exchangeable interface board, IBM graphics mode, forward and reverse microfeed,
 Options: automatic cut sheet feeder (one or two bins)
 Retail price: \$2990
 Agent: Star Micronics (NZ) Ltd

AWA/OKI MICROLINE 294



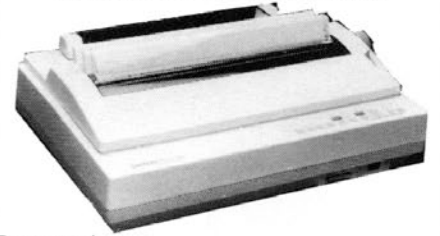
Impact dot matrix
 Pins in print head: 18
 NLQ feature: yes
 Print speed in NLQ mode: 100 cps
 Print speed: 400 cps
 Max chars/line: 136 (233) compressed
 Point sizes: 5, 6, 8.5, 10, 12, 17.1
 Paper width: 16"
 Paper feed: friction feed and tractor feed standard
 Buffer size: 12k with optional 32k
 Ribbon type: cartridge
 Graphics mode: 6 modes in black and 4 in colour
 Interface: OKI or IBM in parallel RS232C or RS422-A
 Options: colour ribbon cartridge, 32k buffer
 Retail price: \$3140 plus GST
 Agent: AWA New Zealand Limited

Epson LQ-2500

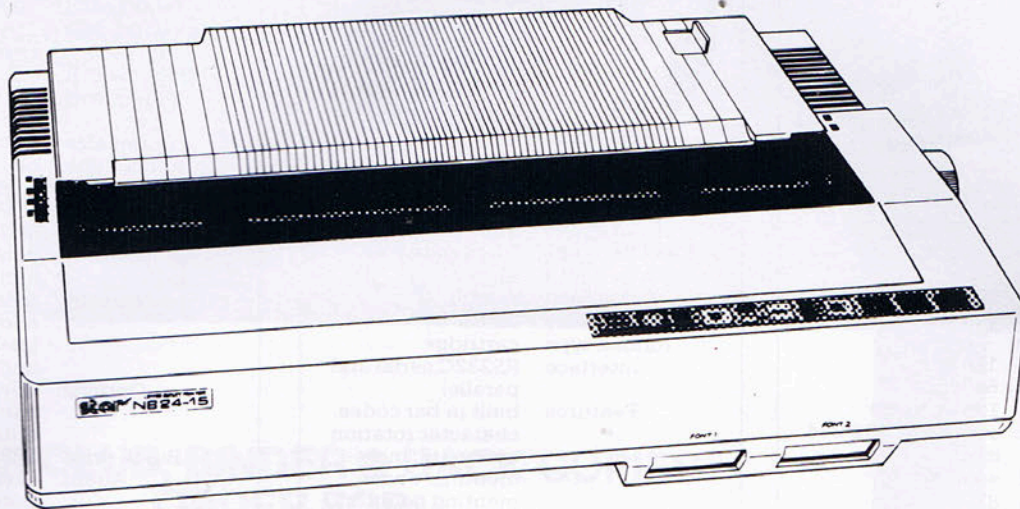


Impact dot matrix
 Pins in print head: 24
 NLQ feature: yes
 Print speed in NLQ mode: 108 cps (elite) 90 cps (pica)
 Print speed: 324 cps (draft elite)
 Max chars/line: 136 (pica) 272 (condensed elite)
 Paper width: cut sheet: 182-364 mm
 Paper feed: friction and tractor
 Buffer size: 8 kb
 Ribbon type: multistrike
 Graphics mode: IBM and international character sets
 Interface: std: centronics-type 8 bit parallel and RS-232-C serial
 Features: font cartridge
 Options: colour printing, single/double bin cut sheet feeder interfaces
 Retail price: \$3370
 Agent: Epson New Zealand Ltd

BROTHER M4018



Dot matrix
 Pins in print head: 18
 NLQ feature: yes
 Print speed in NLQ mode: 100 (pica)
 Print speed: 400 (pica)
 Max chars/line: 136 (pica)
 Point sizes: 5, 6, 8.5, 10, 12, 17 and 20.4 cpi
 Paper width: cut sheet 101.6-420
 Paper feed: friction, push and pull tractor
 Buffer size: 48-80kb
 Ribbon type: nylon multistrike
 Graphics mode: 8x816, 8x979, 8x1088, 8x1224, 8x1632, 8x1958, 8x3264
 Interface: centronics (parallel) and RS232C (serial)
 Features: emulates IBM Proprinter and Epson FX series
 Options: NLQ font card, 1 and 2 bin sheet feeder
 Retail price: \$3395 plus GST
 Agent: Selected dealers throughout New Zealand



Star's NB24-15. The business printer that works as hard as you do.

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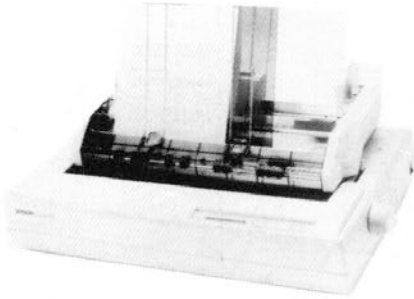
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Phone: 736-1144. Telex: AA73872

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EPSON SQ-2500



Ink jet

Pins in print head: 24 nozzles
NLQ feature: yes
Print speed in NLQ mode: 180 cps
Print speed: 540cps
Max chars/line: 136 at 10 cpi
Paper width: cut sheet: 182-364 mm;
Paper feed: semi-auto
Buffer size: 8k
Graphics mode: IBM and international character sets
Interface: centronics plus SSI plus 81xx
Features: auto sheet load
 5 standard multiple fonts
Options: tractor unit, double bin cut sheet feeder, interfaces
Retail price: \$3450
Agent: Epson New Zealand Ltd

FACIT 4528



Dot matrix

Pins in print head: 9
Print speed: 165
Max chars/line: 233 condensed
Paper width: 15"
Paper feed: tractor
Buffer size: 2k-6k
Ribbon type: cartridge
Interface: RS232C serial and parallel
Features: built in bar codes, character rotation automatic incrementing/decrementing counters
Retail price: \$3495
Agent: Northrop Instruments and Systems Ltd

C. ITOH C815DB

Dot matrix impact

Pins in print head: 24
NLQ feature: yes and LQ
Print speed: 400 cps
Max chars/line: 136 at 10 cpi, 232 compressed
Paper width: 4.5"-16"
Paper feed: cut paper or forms tractor
Buffer size: 40 kb
Ribbon type: black fabric cartridge
Graphics mode: IBM proprinter XL and P351
Interface: dual - centronics and RS-232-C
Features: fontmaster package and download card, special fonts, logos and bar codes.
Options: download card, font card, 1 and 2 bin auto sheet feeder
Retail price: \$3990 plus GST
Agent: Control Microcomputers

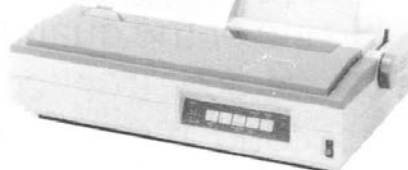
C. ITOH CI3500



Dot matrix

Pins in print head: 9
NLQ feature: yes
Print speed in NLQ mode: 87.5 cps
Print speed: 380 cps - 1481 pm
Max chars/line: 136 at 10 cpi, 232 compressed
Paper width: 4.5-16"
Paper feed: forms tractor or cut sheet
Buffer size: up to 10 kb
Ribbon type: fabric cartridge
Graphics mode: IBM, Epson, C. ITOH/Macintosh, CI300/CI600 DEC LA 120
Interface: cartridges
Features: programmable
Options: automatic sheet feeder
Retail price: \$3990 plus GST
Agent: Control Microcomputers Ltd

PRINTSTAR 5425



Dot matrix (diamond arrangement)

Pins in print head: 24
NLQ feature: yes
Print speed in NLQ mode: 162 cps
Print speed: 570 cps
Max chars/line: 136 at 10 cpi
Paper width: 4" to 16"
Paper feed: friction feed and cut sheet guide
Buffer size: 42kb
Ribbon type: multistrike
Graphics mode: bit image 24 pin. IBM block, P351 characters.
Interface: centronics parallel and RS232C serial
Features: no dip switch emulates IBM proprinter XL and Toshiba P351 plus vertical and horizontal character magnification font cards,
Options: uni-directional and bi-directional tractor feeds,
Retail price: \$399 0 plus GST
Agent: The Microcomputer Electronic Company Ltd

PANASONIC KX-P1540



Dot matrix

Pins in print head: 24
NLQ feature: yes
Print speed in NLQ mode: 80 cps
Print speed: 240 cps
Max chars/line: 136/233
Point sizes: pica 10 cpi, elite 12 cpi
Paper width: 4" to 16.5"
Paper feed: tractor and friction
Buffer size: 13.5k
Ribbon type: seamless fabric
Graphics mode: 8 and 24 pin bit image, IBM block centronics parallel and RS232C serial software compatibility with LQ-1500, IBM proprinter and Diablo 630,
Options: 7 font cards, 32k buffer, bottom feed tractor, auto sheet feeder
Retail price: P.O.A.
Agent: The Microcomputer Electronic Co Ltd



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Data processing – NLQ – Letter Quality
C. Itoh's new C-315 printer.
Speed, versatility and endurance.

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2. Push in tractor feed allows output to be torn off 1" above the print head – perfect for invoices.
3. Friction feed of letterheads while tractor holds sprocketed paper.

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Compact models too.

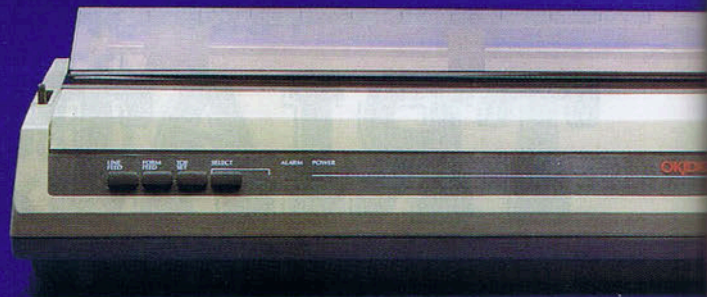
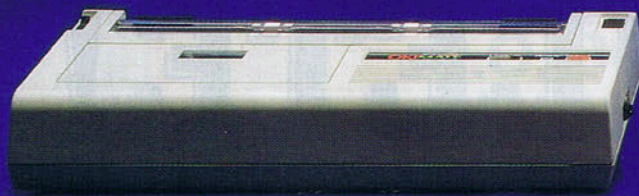
The C. Itoh C-310 with 10" wide paper feed has all the same features for letter size printing. If your business needs an all-round printer with the speed, versatility and endurance to win – put the C. Itoh C-310 or C-315 "Triathlete" to the test.

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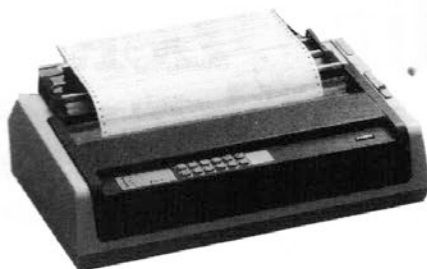
Dealer Inquiries Welcome

GENICOM GE3320



Dot matrix
 Pins in print head: 9
 NLQ feature: yes
 Print speed in NLQ mode: 180
 Print speed: 300
 Max chars/line: 240 (in 18 cpi mode)
 Point sizes: DP 9H x 9V
 Paper width: 13.6 (345mm)
 Paper feed: rear and bottom feed tractors
 Buffer size: 512 bytes
 Ribbon type: multistrike
 Graphics mode: dot graphics, barcode, expandable print, IBM graphics
 Interface: Std with both serial and centronics
 Features: high speed LQ mode
 Options: single document inserter, 3 bin auto sheet feeder.
 Retail price: \$3995 plus GST
 Agent: AWA Computers Ltd

FACIT C5500



Dot matrix
 Pins in print head: 9
 NLQ feature: yes
 Print speed in NLQ mode: 60
 Print speed: 250
 Max chars/line: 136 col
 Paper width: 16"
 Paper feed: friction and tractor, 2k, optional 8k
 Ribbon type: cartridge
 Graphics mode: 7 colour graphics
 Interface: RS232C serial and centronics parallel
 Features: easy menu set-up, colour print out, multi paper handling
 Options: cut sheet feeders
 Retail price: \$4068
 Agent: Northrop Instruments and Systems Ltd

NEC 8800



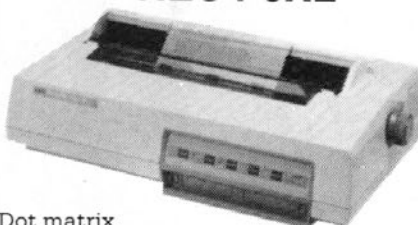
Spinwriter
 Print speed: 55 cps
 Max chars/line: 136
 Paper width: 16"
 Paper feed: 48 pos per inch
 Ribbon type: endless loop, multistrike or fabric
 Interface: parallel or serial - plug in modules
 Features: up to 128 characters on thimble, envelope adaptor
 Options: uni and bidirectional tractors, cut sheet feeder, dual bin adapter
 Retail price: \$4712 plus GST
 Agent: NEC Information Systems

NEC P5



Dot matrix
 Pins in print head: 24
 NLQ feature: yes
 Print speed in NLQ mode: 97 cps
 Print speed: 264 draft
 Max chars/line: 136
 Paper width: 16"
 Paper feed: 3, 6, 8 lines per inch
 Buffer size: 8k
 Ribbon type: endless loop
 Graphics mode: 360 x 360 dots per inch
 Interface: parallel centronics, serial RS232, Diablo
 Features: 19 resident fonts, additional plug in fonts, buffer expandable to 40k
 Options: pin feed tractor, bidirectional tractor, single cut sheet feeder, dual cut sheet feeder
 Retail price: \$2718 plus GST
 Agent: NEC Information Systems

NEC P5XL



Dot matrix
 Pins in print head: 24
 NLQ feature: yes
 Print speed in NLQ mode: 97 cps
 Print speed: 264 cps
 Max chars/line: 136
 Paper width: 16"
 Paper feed: 3, 6, 8 lines per inch
 Buffer size: 8k
 Ribbon type: black fabric, multistrike carbon, colour cartridge
 Graphics mode: 360 x 360 dots per inch
 Interface: parallel, serial RS232, Diablo
 Features: optional font cartridges, buffer expandable to 40k, 8 colour printing
 Options: pin feed tractor, bidirectional tractor, single cut sheet feeder, double cut sheet feeder
 Retail price: \$3450 plus GST
 Agent: NEC Information Systems

NEC 3500



Spinwriter
 Print speed: 35 cps
 Max chars/line: 136
 Paper width: 16"
 Paper feed: 48 positions per inch
 Buffer size: 2k
 Ribbon type: multistrike
 Interface: parallel, serial, Diablo
 Features: envelope adaptor, up to 128 characters on thimble
 Options: cut sheet feeder, dual bin, envelope adaptor, bidirectional tractor
 Retail price: \$3119 plus GST
 Agent: NEC Information Systems

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Quality printing with dot matrix

by Peter Taylor

T rue letter quality is delivered through the precision of this 24-wire dot matrix system on the full-width Star NB24-15. This review was delivered to *Bits & Bytes* produced on the medium, printed in draft mode at 216 cps and letter quality at 72 cps.

A number of really useful features have been brought forward on to the front control panel of this business printer. No fumbling around with those complicated dip switches any more – just touch the button to select page length, set print pitch, select typeface and either draft or letter quality mode. Other panel switch combinations give such features as forward/reverse feed in smallest pitch, set left/right margins, TOF, and other things.

A wide choice of functions and features are at your fingertips here. There are 12 indicators and seven keys on the control panel. From the left the power indicator LED glows green, under it is the red LED paper empty indicator, and beside these the paper length switch which sets the TOF. Next right, the type style indicators show character in use with button selection beside them. Next are the draft and LQ indicators with their button, and then come the print pitch indicators with their button, followed by the regular control buttons for TOF, paper feed and on-line selections.

Important functions

In addition to the above there are nine other important functions not directly specified on the control panel. These are selected by pressing the appropriate keys while turning on the power, with six others being activated by pressing two keys at the same time.

With the printer off-line, micro-feeding can be easily accessed (though not available when the sheet feeder is in use). Forward micro-feed is selected by holding the on-line button and pressing the paper feed button. Holding the on-line button and pressing the TOF button gives the reverse micro-feed action. To clear the buffer, hold the type style button and press the on-line button for at least three seconds. When margin setting just hold the mode button (quality)

and press TOF button, which activates the printhead movement in Pica pitch. When at the desired position release the TOF button. Right margins are similarly set using paper feed. To set the TOF, hold the print pitch button and press the TOF button until the paper is in the desired position.

Further functions are accessible by pressing buttons while switching on the power. Self-test is accessed through holding down the paper feed key. It gives the full range of letters, symbols etc available through this versatile printer. The hex dump mode is selected through holding down both the paper feed and mode (quality) buttons, and gives an exact print-out of the hexadecimal codes reaching the printer, making it easy to determine the possible cause of any problems.

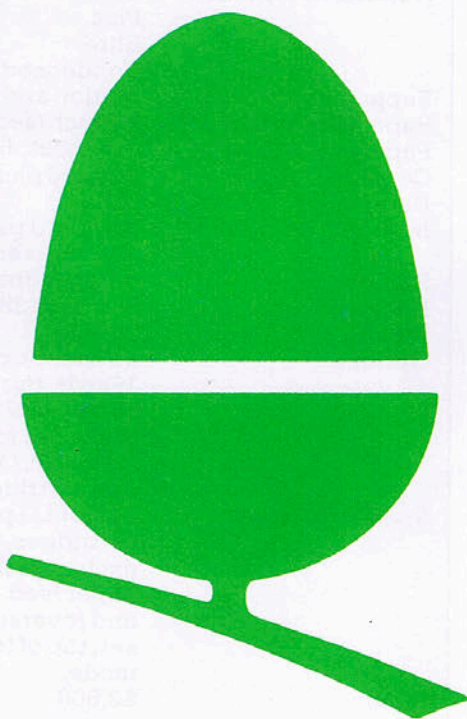
Panel lock mode is selected by holding down one of the type style, mode

(quality), and print pitch buttons, or two, or all together, depending on what function you wish to protect. The TOF button also operates as though pressing these three together. Once you are in this mode, it will not be overridden by conflicting print codes in any documents or files you are printing.

This is an excellent feature to protect your final selection of typestyle, mode or print pitch, so that former software controls in your documents no longer can upset that professional finish you seek. Cancelling is simple too – just turn off the printer.

With such an easily and well-controlled printer, the rest of the exercise in using it to make this review assessment was a breeze. It is quieter in the LQ mode than some other brands I am associated with, and from using it during a week's trialling I would rate it well in the printer stakes. Unfortunately, not being able to put it into a hard work situation for several months, to see how the ribbons stand up to real office treatment and work load, doesn't allow me to speak for that direction. The machine is robustly built, with well-made die castings in the mechanical areas. There are two flat flexible head connecting leads laid inside each other, and they move freely within their operating slot. Being the wider machine, most areas are very easily accessed, with room to handle the necessary parts within the machine.

It was delivered in the original packing, and was no trouble whatsoever to set up. The instructions were easy to follow, with all parts marked and packed well, and every-



**Announcing
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thing fitted together nicely.

The ribbon came packed separately and was easy to install. The cartridge was set in place and the print head gently moved to the right and left when the ribbon slipped into the guide slots. For the unwary novice, a notice warned about not replacing while the head was hot!

The built-in Prestige is a fine standard font. Other type faces can be instantly accessed through the control panel, although they will need to be added to the front ports

The machine is low slung and sits securely on its rubber feet, with its standard light grey computer colour matching other equipment. The platen knob is on the right-hand side with the paper selector lever opposite, and from the rear come the power and interface cables. A clear, marked paper guide folds down over the neatly-fitting cover, while the paper rest has a wire support which allows it to be angled upright for ease of reading output in situ.

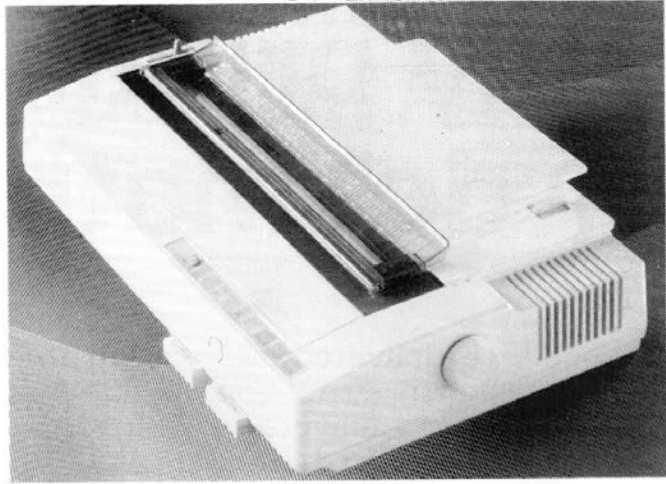
Paper feed

Several slots are provided for the paper guide's various positions required for single sheets and fanfold paper. These are easily selected and hold firmly in place during operations. The automatic paper feed involves simply moving the paper release lever forward, when single sheets are smoothly and automatically fed in. Should a single or double bin feeder be required, such items are available for different paper sizes.

Most areas are easily accessed, with room to handle the necessary parts within the machine.

The printer comes complete with a plasticized quick-reference card and a well-produced manual which is divided into eight chapters and eight appendices. The chapters cover: Setting up your printer; Getting to know your printer; Using the printer with commercial software; Printing with BASIC; Formatting text; Special features; Download characters and dot graphics; and Clearing your printer. The appendices cover: Dip switch settings; ASCII code conversion chart; Character code table; Function codes; Command summary in numeric order; Technical specifications; The parallel interface; and finally the Serial interface specifications. All is well-written and easy to follow information.

The Star NB24-15 is a worthy 15-



inch printer which many office installations will find a breeze to use. While by no means the cheapest 24-wire dot matrix machine on the market, it would prove to be a good choice for those who go out and check around before they purchase such an item for their business needs. ■

Ratings (5 highest)

Documentation 5
Performance 5
Ease of use 5
Value for money 4

Review printer provided by Star Micro-nics, Auckland.

SPECIFICATIONS

Model	Star NB24-15	
Serial impact dot matrix print method.		
Printing speeds - LQ:	72 cps (12 cpi) draft: 216 cps (12 cpi)	60 cps (10 cpi) 180 cps (10 cpi)
24 head pins		
Line feed spacing	1/6, 1/8, and n/180 inches.	
Character set	96 standard ASCII characters 156 international characters (13 sets) 87 IBM special characters 50 IBM block graphics characters 183 super/subscript characters (draft) 233 super/subscript characters (LQ) 35 download characters	
	Note: Prestige font is built-in standard. Other type faces are optionally selectable.	
Number of columns	cpl	cpi
	Pica 136	10
	Elite 163	12
	Condensed 233	17.1
Paper feed	friction and tractor feed	
Paper feed speed	3.3 inch/sec.	
Paper	cut sheet: 6"-14.5" fanfold 4"-15.5"	
Copies	original plus 2 copies	
Data buffer	5kb	
Interface	standard parallel (Centronics compatible) optional serial (RS-232C)	
Ribbon	original ribbon cartridge (black)	
Dimensions	580 (w) x 383 (c) x 121 (h) mm.	
Weight	14.8 kg	
Options	automatic cut sheet feeder (one or two bins) 16kb buffer board serial (RS-232C) interface board character font cartridge (Courier, Letter Gothic, Orator) ram cartridge available soon.	
Special features	24-dot LQ printing, character font cartridges, easy front panel operation, exchangeable interface board, automatic paper feed, optional RAM cartridge, forward and reverse micro-feed, left and right margin set, top of form set, hex dump, panel lock mode.	
Price	\$2,600	

EDP security – whose responsibility?

Management is responsible for providing protection for the organisation's assets. The information asset, administered in most organisations by the information systems and EDP departments, is as vital and vulnerable as any other. Do businesses give sufficient attention to the protection of the information asset?

Here are a series of questions which executives responsible for your organisation's information and data should be able to answer.

- Have you analysed the legal and competitive impact of loss of confidentiality?
- Have you identified and addressed the risks and exposures associated with data processing?
- Have you assessed the ramifications of a disruption of data processing services as a result of equipment or software damage/destruction?
- Have you determined how long you could survive without your computer services?
- Do you have documented and tested procedures for system recovery in the event of failure?
- Are security and recovery features an integral part of your system development and maintenance activity?
- Are your employees restricted from altering production programs and data without specific authorisation?
- Are the physical mechanisms that you have in place adequate to protect equipment and software?
- Do your current employment practices protect you from information disclosure and wilful acts of sabotage by employees?
- Does your computer insurance adequately cover hardware, software, data, extra expenses, business interruption and employee infidelity?
- Are you confident that use of your system is restricted to your business activities?
- Does your EDP security program provide sufficient direction to your employees to ensure that they adhere to your security requirements?

The issues raised by these questions are not easily answered. While

many organisations have invested heavily in developing computerised systems to support their business operations, they have not yet put commensurate effort into establishing a security program to protect that investment.

The computer security problem

Executives make decisions with some calculated risk every day based on an evaluation of the available and relevant information. However, when computerised systems are involved, the decision-making process becomes more complex. You now have to face additional issues such as:

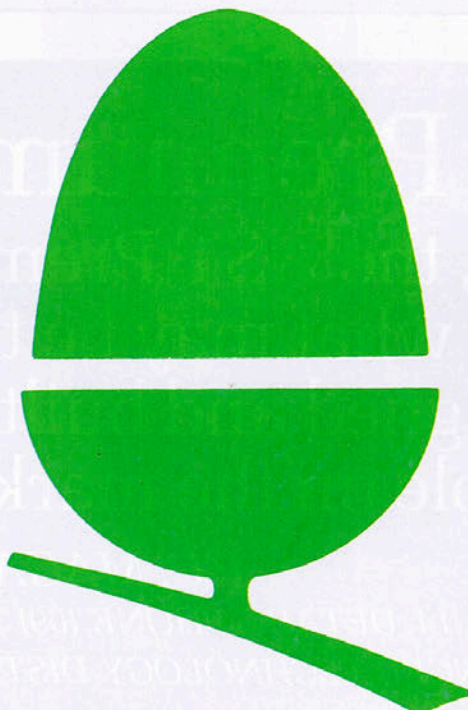
- the organisational changes brought about by the rapid growth of automation;
- the lack of time to keep pace with information system technology; and
- the compartmentalisation of busi-

ness functions which can distort broad corporate objectives.

Computer security is often neglected because of the pressures to deal with day-to-day operating needs first and worry about other requirements later. Yet data security can be fundamental to business survival.

While two organisations may use the same computer system, the level of security required for one will probably not be appropriate for the other. To establish effective security over your information asset, you need to:

- identify the information in your organisation that requires protection;
- identify the risks and exposures which the information is vulnerable to;
- define and implement security measures to protect the information; and
- implement a security program to ensure adherence to the measures required.



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Evaluating your computer security

As a first step to implementing effective security, you need to evaluate your current procedures to determine whether the level of protection is appropriate. Some organisations have assigned EDP security reviews to internal audit and data processing departments. Others, lacking the time and expertise to conduct such a review internally, or recognising the value of an independent assessment, have engaged specialists in the computer security field. Whoever does it,

the review should encompass three broad areas:

- the environment;
- the computer system; and
- the application programs.

These broad areas have been expanded on the following chart, to assist you in identifying the issues that should be considered in evaluating your security position. The review will most likely identify some areas where security is adequate and others where it clearly needs upgrading. Identification of the areas of deficiency is critical to balancing security risks with the need for profitable and flexible day-to-day operations.

The past several years have witnessed steadily increasing dependence on data processing systems, to the point where the actual survival of many organisations now hinges on the uninterrupted availability of the data processing resource. ■

MicroLab is Coopers & Lybrand's micro consulting and support arm providing independent advice and training on business systems. Through this column, MicroLab offers comments on developments in the computer industry as they affect the business person.

The Environment

Security Administration	organisation structure, security policy, personnel policies & practices, standards, insurances
Physical Security	fire detection & suppression systems, environmental controls, external & internal access protection
Contingency Planning	Plan status, plan requirements, plan completeness, plan testing
Support Services	Automated office services, internal communication systems, third party support & contracts, janitorial services

Software Integrity

Operating system, system utilities, change and update procedures, on-line libraries, system development procedures and standards

Documentation Security

Documentation standards, physical security, disaster or loss recovery procedures, sensitivity classification, retention cycles

The System

Data Security	Access to information, data file handling, libraries, data sensitivity, off-site backup, reports & documents, input/output control function, remote online operations
Computer Operations Security	Activity logging, job accounting, magnetic media control, automated recovery features, monitoring
Communications Security	Physical protection, network access, program & data access, remote on-line operations

The Application

Source Data	Data origination, administrative system controls, data submission, data receipt
Processing and Report Distribution	Processing security, post processing security, document distribution practices
Application Program Integrity	Range checks, data edits, exception reporting, program change and update controls
Documentation	Adherence to standards, completeness, physical security
Back-up	Duplication cycles, on/off site storage, retention cycles

AST Premium/286

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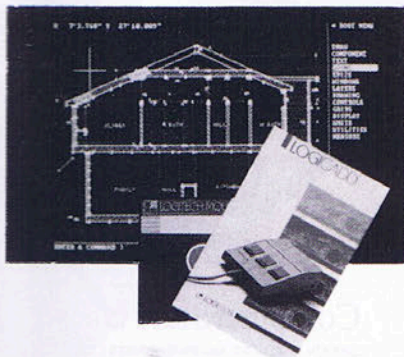


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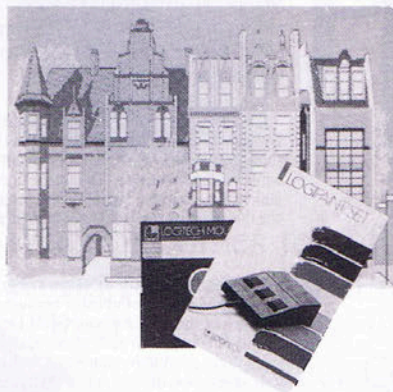
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Tips for desktop publishers

by John MacGibbon

The Macintosh/LaserWriter combination is much more than a fancy word processor. It greatly expands your presentation possibilities, through its variety of type styles, layout flexibility and ability to incorporate graphics.

Be careful though: this Pandora's Box of possibilities can easily produce a dog's breakfast.

Below are a number of pointers to good production, based on our training and experience, and observation of laserwritten material that's come by our office...

■ First up, produce a poster featuring the following time-honoured slogan:

**KISS:
Keep
It
Simple,
Stupid**

■ Remember – you don't have to use every feature available on the Macintosh. Stick to a few simple elements,

and use them consistently, and your production will be cleaner and more readable.

■ Try to keep a sense of balance and proportion in your page layout. This means arranging art, headlines, body copy, white space and other elements into something that is both visually pleasing and meaningful. Always think about the overall look of your page, and how it relates to the page opposite it. Read books on layout, and study what professionals do in other publications. Talk things over with a graphic artist. Remember: a poorly produced newsletter could be worse for your image than no newsletter at all.

■ As a general rule, use no more than two type fonts on a page. Either use one font for everything, or one body copy font and a contrasting font for headlines and subheadings. In the latter case, it's safest to use a sans serif font like Helvetica for the headings, and a serif font like Times for the body copy.

■ Don't (or hardly ever) use underline for headings and subheadings.

This isn't a typewriter: if you want to emphasise something, use larger type or **bold** type. (How often do you see underlining in professionally typeset magazines or books?) But make sure headlines and sub-headlines are big enough to be recognised for what they are.

■ *Italics* are good for emphasising words or phrases within the body of the text, or for captions. **Boldface** can be used for emphasis too, but it tends to emphasise itself too much.

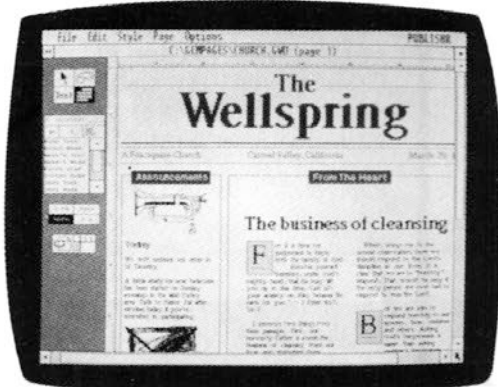
■ Use special character styles such as *outline* or shadow rarely, if at all. They add little but visual clutter.

■ Don't use ALL CAPITALS for emphasis – they're harder to read than a combination of uppercase and lowercase. Using all capitals is another hangover from typewriting.

■ *All italics in body type are hard to read.*

■ Limited use of inverse type for subheadings is OK, but don't use it for body type, because it's also harder to read than standard type.

■ Black type on a 10 or 20 per cent



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Of course, if you want to design your own style sheets you can. GEM Desktop Publisher includes the tools you need to do so.



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screen can effectively highlight special sections or sidebars.

■ Don't do the common (and unnecessary) typist's trick of inserting two spaces after a full-stop or other punctuation. It looks bad in typeset text.

■ It's best not to use justification in narrow columns of type (i.e. flush left and right margins). Studies have shown that readers prefer "ragged right" edges. They look less formal, are less forbidding, and the gaps between words are even. Irregular gaps make reading difficult.

■ Try not to use column widths wider than about 35 characters. Copy set in two or three side-by-side columns is easier to read than the same copy set in one wide column. (Of course, for some "report" style publications, multiple columns will not be appropriate.)

■ Never use a computer-drawn version of the company logo, unless it is 300 dots per inch quality (or better). Logos are an important aspect of any company's image, and 72 dpi ThunderScan or MacPaint quality is not acceptable. Respect the integrity of the logo: don't modify it in any way, and be careful not to distort it when re-sizing.

■ Don't feel obliged to do everything on the computer, just because it's

there... This is especially the case when adding graphics. You'll often get better (and quicker) results by leaving a "hole" in your page, and pasting the graphic in later. Especially avoid using ThunderScan equipment to copy line drawings: a pasted-in photocopy of the original picture will usually look much better. Use the copier to reduce or enlarge artwork to fit space available.

■ Break up lengthy areas of text with subheadings. Vary the length of sentences, but don't let any of them get too long. Ditto for paragraphs. Use white space creatively as a design element.

■ Use graphics or photographs wherever appropriate. They can really "lift" a page. If you intend to print your production on your own photocopier, don't paste in straight photographs. Have them screened first, or processed through a high quality digitiser.

■ Make sure subheadings are closer to the text they refer to, than the text in the paragraph immediately above.

■ Use boxes, borders and rules in moderation. A single thin line usually looks best: double or triple lines can make the page look too busy. Alternatively, no lines at all might be better. Or no border, but a vertical rule between columns of text.

■ We recommend you don't product A5 publications "actual size" on page layout programs like PageMaker. It's much harder to get a good result that way. Use a full A4 page format, and reduce it to A5 with a photocopier. Working on a full page gives greater layout control. Also, when the page is reduced, the dots will close up further, giving a cleaner result. If you intend to reduce to A5, use 14 point body copy or larger in the original, so that it will still be readable when reduced. Join pages together with white 3M "Post It" tape before photocopying, and you'll avoid a vertical black line where the pages meet.

■ In some cases, rather than use a photocopier to reduce pages, use the reduced size LaserWriter printing option. A 71 per cent reduction turns A4 into A5.

■ When printing MacPaint images on the LaserWriter, you'll get better results if you reduce to 96, 48 or 24 per cent. This is because MacPaint images are based on the ImageWriter's resolution of 72 dpi. Since the LaserWriter's 300 dpi is not an even multiple of 72, a 96 per cent reduction that results in 288 dpi resolution may give a better result. ($288/300=96$). Accordingly, 48 and 24 per cent reductions may be better than 50 or 25 per cent.

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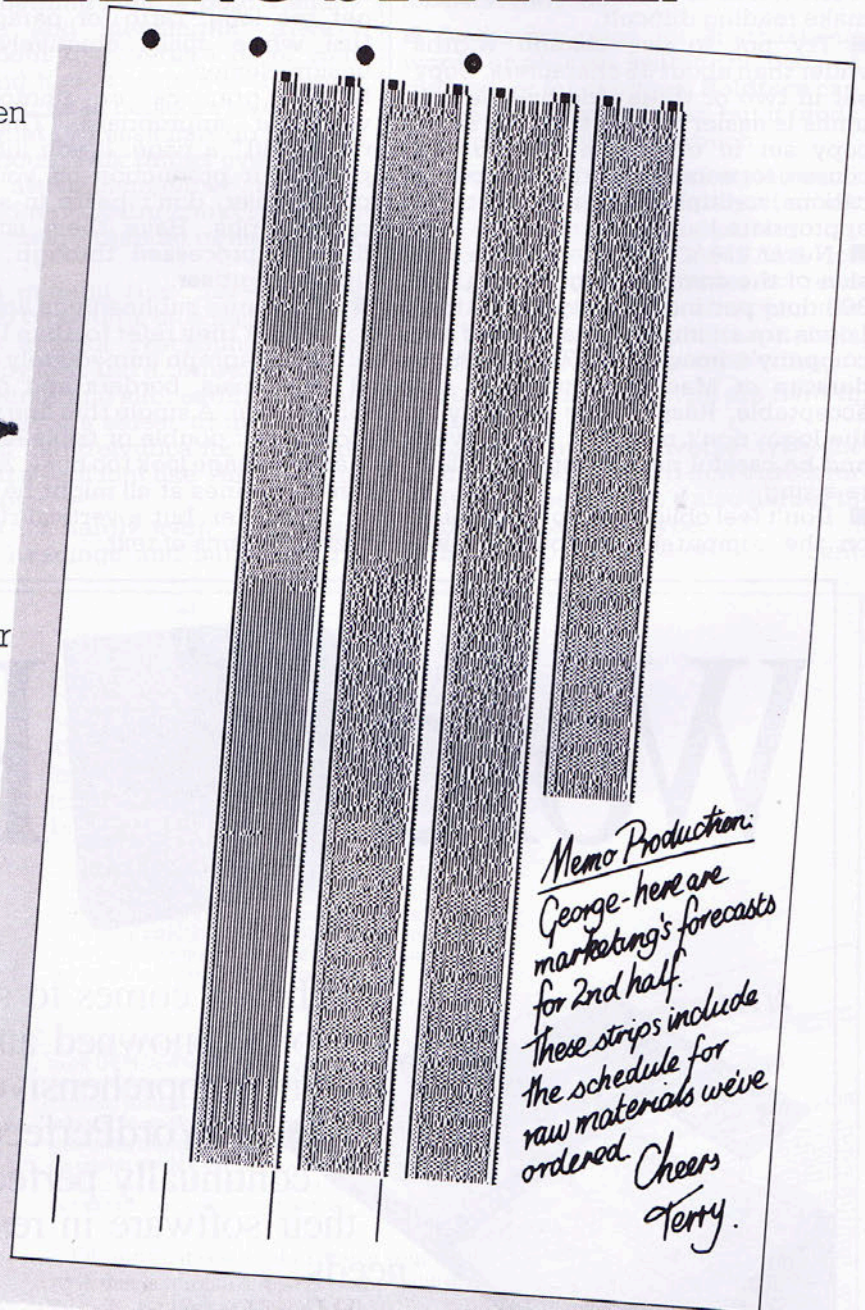
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A Unix view

by Roger G. Hicks

"What me? Write a column about Unix? What can you say about Unix that hasn't been said already?"

"Well, what sort of column? Who's going to read it? Where shall I get the information from?"

"...and anyway, I can't write..."

As an ex-president of the NZ Unix Systems User Group, I should be used to unusual requests, but I'm not. All my objections were over-ruled (I hope the editor has a good spelling checker, as well) and so I'm here to express some coherent thoughts about Unix.

There are many aspects to the world of Unix, from historic to futuristic, from deep in the internals to way out into the realms of marketing. In this column I hope to try to provide a wide view of things Unix. Naturally, many of the issues and news items I mention will be because they are of interest to me or have caught my attention for some reason. So if you know of anything with a Unix slant, please send it to me c/o *Bits & Bytes*.

There are many different things to interest your fellow readers, from your own favourite shell script trick to information about new products or new installations. Maybe you think Unix is the best thing since sliced bread; or perhaps a curled up, dried crust describes your view better.

Conferences and exhibitions

A handful of computer conferences and exhibitions around the world have become known as *the* ones to attend. Within the Unix arena, there are those times and places when you can be sure of hearing the latest information and catching up on the latest commercial offerings.

For us in New Zealand, two conferences such as this are organised by user groups. Our own conference, run on an annual basis by the New Zealand Unix User Group, must rank as the most important, followed by the conference (UNIFORUM) run by the US commercial user group (/usr/group). Having been closely involved with the first, and having attended the second, I can vouch for their significance as important forums for exchanging Unix information and experience.

I recently received details of another Unix conference being held in the US, and was impressed by the breadth of the programme and the subjects covered. One good way to gain an appreciation of the current state of a technology is to look at the general topics covered in a public

conference such as this and at the way they are presented.

UNIXEXPO is a full three-day conference that has adopted a five-stream approach throughout the three days. One of the streams is an exhibition, while the others are a conference presentation stream, tutorials, hands-on computer labs and a Unix primer stream. The latter two are for the various levels of beginners, two of the others are the traditional conference fare, and the exhibition is obviously for everyone.

The topics in the main conference sessions cover wide areas of interest. Several address the various issues involved with the Intel 80386 processor and its potential impact upon the supermicro Unix area. Other papers and panel sessions cover fields as widely differing as artificial intelligence, office automation and electronic publishing, Unix in the US government and on Wall Street, and object-oriented programming.

Several sessions are devoted to database technology. The one that I would be sure to attend brings together all the leading database and application development system vendors. After a comparison of their offerings, the vendors will be given a set of identical problems to solve using their products. A wrap-up session at the end of the conference will then review the results. From my personal perspective, this split session has the potential to yield some very constructive information.

The breadth of topics covered and the openness of the sessions planned certainly show the maturity of the Unix industry and the way in which it is an accepted and implicit part of the information technology environment.

If I chanced to be in the US in October, I would make a point of going to the UNIXEXPO, being held in New York from 27-29 October.

Lost anything lately?

They say you are not a horse rider until you've had seven falls. And you're not a Unixee until you've rm *'d in error.

If you are working at the shell command level the command to remove a file is rm. I digress slightly, but I hope no-one but a programmer or other technical user ever uses the standard shells directly. The standard shells are for technical people, researchers and programmers; ordinary (applications) users should only ever see the man/machine interface designed for the job they do.

To return to the original subject: rm junk will remove the file called 'junk'. Similarly rm *bak will remove all files ending in 'bak' and rm this that will remove the files called 'this' and 'that'.

The problem occurs if you accidentally type rm * bak instead of rm *bak (note the extra space). Instead of removing all files ending with 'bak' the command you've just entered will remove *all* your files and then try to remove the file called 'bak'. Of course it won't find 'bak', even if you had one called 'bak'. It has just been removed, so rm will print a terse error message such as 'rm: bak non-existent'.

At this point most people will scratch their heads and wonder what on earth the error message means. The next reaction is to list your filenames to have a look at what has happened and, at that instant, the penny will drop, the light will dawn and that horrid sinking feeling will hit your stomach as a few well chosen words will rend the air.

As I say, all Unix programmers have done this at some time or another in their career. After the event many people take steps to prevent it happening again. Have you heard about stable doors and bolting horses?

Here are two suggestions to guard against that devastating impact of finding you've just lost everything.

If you have super-user access to your system change the name of the 'rm' program to 'rmreal' by the command mv /bin/rm /bin/rmreal. Then create a file called /bin/rm looking like:

```
for a
do
  rmreal -i $a
done
```

Change the file permissions by the command chmod +x-w rm and you now have an rm command that will prompt you for confirmation before removing each file; simply type 'y' to remove the file or anything else to leave it.

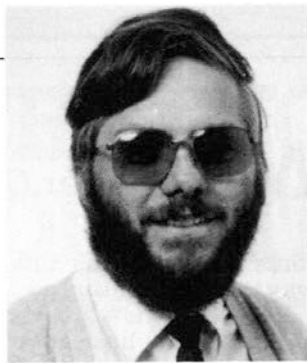
What's happening is that every time you type the command rm it will actually be converted to the command rmreal -i. The '-i' option tells rm (or rmreal as its now called) to ask for confirmation before removing each file. This may be slightly tedious when you're (intentionally) removing a lot of files, but can be a godsend when finger trouble strikes after a long day's hard work that hasn't yet been backed-up.

As a c-shell user you can, alternatively, add the command alias rm rm -i to your .cshrc file and this will ensure that your own 'rm' will be protective, even if the system-wide one is not.

The only catch in all this is that if you have any shell scripts that use rm * then they must be modified to use the new name 'rmreal'. ■

Easy editing

by Selwyn Arrow



Just for a change we will take a look at something that was designed to make using DOS much easier, but you have probably not taken full advantage of it because the typical DOS manual makes it look too complicated to learn. Before we start, it should be remembered that in this column the term DOS is taken to mean both IBM PC-DOS and MS-DOS, particular mention of either name being made only if it is necessary to avoid confusion with any difference between them.

Editing keys

When working with DOS files or even writing short text files (such as BAT files using EDLIN) it pays to become familiar with the use of the DOS function keys as these can save a considerable amount of rekeying as you become familiar with them. For instance, you have most likely used the F1 key to copy your last keyboard entry one character at a time, but just in case you have not I will explain.

Let us say you are logged into drive A and you want to know what is on that disk. You would of course type DIR. Next, if you want to see what is on drive B you don't have to type DIR again, but just press the F1 key three times and DIR will reappear. Now press the space bar once, then type B: and you will see the directory of the disk in B drive.

Of course you have not saved any keystrokes this time, but next try the F3 key instead. You should find DIR B: reappears on your screen, so just press Return and it will be done.

What has happened is that every time you are at the DOS command level and press the Return key, anything on the command line (including just a Return) is saved as what DOS calls a template. By pressing F3 the entire template up to, but not including, the Return is repeated on the current line, and in our case DIR B: was repeated.

There is more to it than that, though. Each character in the template can be replaced in turn by anything you type in. For instance, if you now press T and then F3 you would get TIR B: as the D is replaced by the T. Now when you press Return so that DOS can (try to) action your command you will of course get an error message as TIR is not a legal command.

This is OK if you want to replace the first (and successive) characters, and to replace only the second character we press F1 once to get T from the template and then type Y. Pressing F3 will now supply the rest of the templates so that you will see TYR B:.

After pressing Return, let's change that illegal command into something more useful. Try pressing F1 twice (TY), then P followed by the Insert key. If you now press E followed by F3 you will see TYPE B:. Now enter the name of a text file on your B: drive (anything ending with BAT will do), press Return and DOS will TYPE out the contents of your file.

Now that you have found out that you can Insert any number of characters in your command line, let's try the opposite. Try pressing F1 five times (TYPE), press Del twice, then F3. Now you should see TYPE filename.BAT. The B: has gone and your filename.BAT has moved left two spaces. This all may seem long-winded, but if you learn to use them one at a time you will soon be zipping around your keyboard like a professional.

Some of the regular uses I find for these DOS editing keys are making a new subdirectory (MD subdir). I then press C F3 Return (CD subdir) to change to that subdirectory. Another use is when COPYing files with similar names or extensions, as it saves a lot of repetitive typing. One very good use is when I want to delete a lot of files - say the .BAK files that seem to accumulate in my BAT subdirectory. First I enter DIR *.BAK to make sure they are all OK to be deleted, then F1 Del F3 to get DEL *.BAK, and then I check to see all is well before pressing Return to get that job done.

More shortcuts

Yes, there are more function key shortcuts, although these do take a bit more of an effort to remember. First, let's start again by entering DIR B: followed by Return - you do not have to have a disk in B as we will ignore the DOS error messages anyway.

Now press Insert, remembering that this will allow you to enter as many characters as you wish (within reason of course) into the template. Press 123 followed by F3 and you should have 123DIR B:, so press

Return and ignore the message DOS gives you. We can now try the more advanced but less common DOS functions.

Try pressing F4 followed by 3 and then F3. Very interesting! The F4 key ignores every character up to, but not including, the character 3 that we entered after it. What we should see now is 3DIR B:. Sure enough, the 12 has gone. Press Return to place this new line into the template and of course ignore the error message again.

Now try F2 followed by B and you will see that this key does the opposite of the previous one: it has copied all characters up to, but not including, B into the template and of course onto your screen so you should now see only 3DIR there.

Next press F5 and you will find the @ character appear, which means DOS has recopied the last command line into the template, the difference being it has not actioned it as Return would do. Now try F3 and you will find the line exactly as it was after you last pressed Return (3DIR B:). It has ignored the deletion you made with F2.

There remains only one more key, F6, and you may remember we covered its use several months ago. It saves us pressing Ctrl and Z to get ^Z to end BATch files.

As usual, you will find that there is information on the use of these function keys in your DOS manual, but until you see some examples of their uses they are quite often ignored by all but the more adventurous. To help you make the best use of these function keys, Table 1 provides a quick reference guide.

KeyAction	DOS Function
F1 Copy1	Copies one character from template to command line
F2 CopyUp	Copies characters to command line from template, up to the specified character
F3 CopyAll	Copies remaining characters in the template to the command line
F4 SkipUp	Skips over template characters, up to the specified character
F5 Void	voids the current input leaving the template unchanged
F6 CtrlZ	Places a Control Z (End-Of-File character) in the new template
Ins Insert	Enters/exits insert mode
Del Delete	Skips over (does not copy) the next character in the template
Retn Return	Makes the new line the new template

Table 1 DOS Editing Functions

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AK1001

Of RAMdisks and dynamic

I know, I used a different title in June, but at least now we all know just where this series is headed. And besides, it's a better title anyway. It lets me say 'dynamic data-what?' and so get straight into

Data Structures

In a way, all data types are structured. It's just that some data types are more structured than others. Take, for instance, integers and arrays.

I said last time that integers were basically whole numbers. Actually, an integer is a positive or negative whole number (including 0) in the range -32768 to 32767 inclusive. You can tell an integer from a real number - in BASIC anyway - by the integer's '%' suffix. It is represented in RAM (Random Access read/write Memory) by two consecutive bytes or 16 bits of storage. If we let X% be some integer and A be the memory location at which it is stored, then A + 1 contains - again, in BASIC terms - INT (X% / 256), while A itself holds X% - (X% / 256) * 256.

Besides this back-to-front way of doing things, note also that the highest bit of the higher byte of our

integer (bit 15) is its sign bit: a 0 here means that the sign of our integer is '+', a 1 '-'. As well, all integers are stored in a form known as two's complement. For example, the number 1 in binary is:
00000000 00000001.

Its one's complement, or complement for short, is obtained by setting every 0 in the above to 1 and resetting every 1 to 0, thus:
11111111 11111110

Adding 1 to this number gives us the two's complement of 1:

```
11111111 11111110
+ 00000000 00000001
= 11111111 11111111
```

and this number is taken to represent the integer -1.

('Excessively involved' you say? Well, consider what would happen if we were to do the 'logical' thing and let -1 be represented by a binary 1 with its sign bit set:

```
10000000 00000001
```

Adding 1 to this number would not give us 0, which is what we should get, but

```
10000000 00000001
+ 00000000 00000001
= 10000000 00000010
```

or -2. On the other hand, adding 1 to the two's complement of 1 (or -1) gives us

```
11111111 11111111
+ 00000000 00000001
= 00000000 00000000 (carry 1)
```

which is what we wanted all along.) Now, even if you don't understand all this - and I didn't the first and second times I saw it - it should still be pretty clear that so seemingly simple a data type as the integer is very tightly structured indeed. And yet, no one considers the integer to be a structured data type. Just why this should be so can be seen by turning to an example of a real structured data type, the array.

The Applesoft BASIC Programmer's Reference Manual (a mouthful but a must-have) defines an array as 'a collection of variables referred to by the same name'. It goes on to say that the individual variables of an array are known as its elements, and that "[these] are distinguished from one another by means of identifying index numbers called **subscripts**." (page 77).


A chessboard is very much like an array. Its ranks - rows in our lan-

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data structures

Part Two

by Mark Lim

guage – are numbered 1 to 8 starting at White's end, and its files – columns – A to H starting from the left. Each square may be likened to an array element, its co-ordinates (A1 or H8) to a subscript, and the whole board to a two-dimensional 8 by 8 array.

Arrays can be single- or multi-dimensional, and can hold – in BASIC – integers, real numbers and strings (but not all at once, of course.) An array of integers such as might be used to represent a chessboard could be declared

```
FDIM CB%(8,8),
```

which DIMensions or sets aside storage for a 9 by 9 array. (Numbering starts at 0, but you don't have to use your 0th row and column.) The lower left-hand corner square of our chessboard (A1 above) could then be referred to as CB%(1,8) and the upper right-hand corner (H8) CB%(8,1).

And that's why the array is considered to be a structured data-type and the integer not. Although the integer is highly organised, programmers cannot take advantage of this organisation and, say, go in and flip the sign bit, which is just as well. On the other hand, our programming languages have built into them routines which allow, for instance, series of integers to be grouped together and manipulated as an array.

Pascal is very good at this:

```
Array2 := Array1;
```

causes each element of Array2 to be assigned the value of its corresponding element in Array1. In short, therefore, a structured data type is one which makes available for use by the programmer its underlying principles of organisation..

And data structures? Well...

Structured Data Types vs Data Structures

The distinction between structured data types and data structures is a fine one, and one which is not often made. However, I'm an English major and believe in precision of language, so here goes.

When, in Pascal, I assigned one array to another earlier on, I performed an operation which was defined for arrays. This implies that there exist for arrays in Pascal not only conventions of interpretation, but also permissible operations. These, as you might recall, define a data type. In Pascal, therefore, the array is a structured data type.

In BASIC, however, there is no array-assignment operator. In fact, no operations are defined at all for arrays in BASIC. The BASIC array, therefore,

is simply a means by which related data may be organised in a related manner. In other words, arrays in BASIC are data structures.

But there's more – there always is. Let us say that you are writing a program to sort and print out your Christmas card list – one way, I suppose, to justify the cost of your computer. Now, the information in your list might consist of a name, address and whether or not you really want to send the person concerned a card come Christmas. Remembering that this is BASIC, you could set up three arrays, one each for name, address and whatever. This, too, is a data structure – but don't get too proud of it, because the computer scientists haven't given it a name, unlike such other data structures as stacks, lists and queues.

But never mind this lack of respectability. A structured data type is something provided by our programming languages to help us organise our data; a data structure is something we create to help us do the same thing, and to go beyond the organisational limitations of our languages.

Dynamic Data Structures

Getting back to your Christmas card program, how can you tell in

advance just how big an array to declare for your names, addresses and whatevers?

The short answer is that you can't. What you really want is a data structure which will – in the words of the ad – grow with your needs. You want, in other words, a dynamic data structure.

But here's the problem: apart from the string, BASIC has no dynamic data structures. And saying 'Use Pascal' is no help. I do, but would you, assuming you had it? No, there has to be another, easier way. And that's where, I should add, this series comes in. I hope, by the end of all this, to have provided you with enough insights and tools to help you do some really amazing things with Applesoft BASIC and a RAMdisk.

And here's one of the most important of those insights: the file is a dynamic data structure.

Erratum

May 'Bits and Bytes', page 71, column 1:

This causes ProDOS, or DOS 3.3, to

... should read

This causes ProDOS, but not DOS 3.3, to ...

BASIC.WINDOWS does not run under DOS 3.3. ■

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A borderline program

by Joe Colquitt

This simple little routine gives you 50 per cent more character screen to work on. It doesn't extend the number of text lines, but it will let you put sprites into the top and bottom border. Doing this means that messages or objects can be scrolled past the character screen, and not disrupt or obscure any text or picture.

Many thanks to Michael Dombroski for the basic ML, which I tinkered about with. I don't know where it came from originally, and can't recall seeing it in any commercial software, which surprises me, as it's potentially very useful. Apart from the obvious value in games, sprites can be set up to be read as characters. Menus or help information can then be put in the border, and not take up valuable character screen space.

The first program below enables the raster interrupt which permits extension of the top and bottom border, and then moves eight sprites all over the screen. As it does so, you'll notice some interesting effects. One is that some sprites appear to be in two places at once.

This is, of course, impossible. Only because the ML is quicker than the eye are twelve or sixteen sprites apparent, and careful positioning of sprites near to the top border will give you sixteen sprites.

To make the screen even 'louder', another ML routine also changes border and background colours dependent on the timer. The ML itself is quite smooth and stable, but typically that nasty Basic stuff holds it back. The interrupt routine is the data up to and including 234 in line 250. For those interested, the source code listings are provided.

The second program will convert character shapes to sprites. To make

things tough, screen codes don't coincide with ASCII codes (groan), so entering a character as a string rather than a code will not necessarily give the desired result. The Basic translator accepts codes looked up from the table in programmers' books.

The best way to find out how the program works is just to run it and see, and you're bound to want to change something. The program lets you create two rows of 24 characters, so any message longer than that will need to be in more than eight sprite shapes. When scrolling, provision will have to be made for changing sprite pointers. To save the sprites created, you could use the Blocksaver routine of a recent column.

```
0 GOSUB100:rem read data
10 SYS49152:Z=49276
```

```
20 V=53248:POKEV+23,255:POKEV+29,255
30 POKEV+21,255:POKEV+16,0
50 POKEV+39,1
60 FORI=0T07:POKEV+1+I*2,240:POKEV+I*2,
I*20+5:POKEV+39+I,I+2
65 POKE2040+I,192:NEXT
70 SYS49260
75 IF TI>295ANDTI<300THENPOKEZ,96:SYS49397
80 IF TI>600THENPOKEZ,76:TI#="000000":
SYS49397
90 GOT070
```

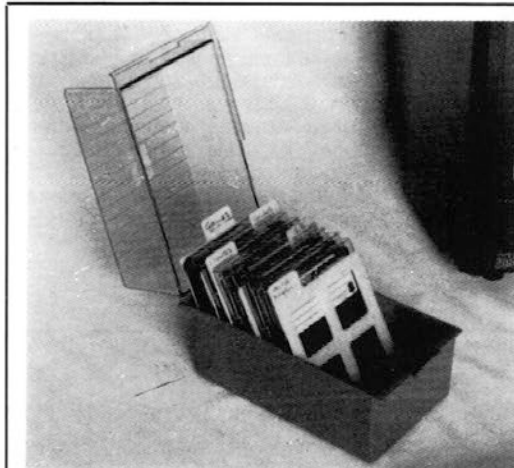
```
100 B=49152:FORI=0T0255:READML#
105 IFLEFT$(ML#,1)=""THENI=I-1:GOTO115
110 A=VAL(ML#):POKEB+I,A:CK=CK+A:GOTO125
115 C=VAL(RIGHT$(ML#,5))
120 IF C<>CK THENPRINT"ERROR",ML#,A:END
125 NEXT
128 FORI=0T062:POKE12288+I,255:NEXT:RETURN
200 DATA 120,169,34,141,20,3,169,192,
141,21,X01010
205 DATA 3,169,1,141,26,208,169,127,
141,13,X02008
210 DATA 220,169,0,141,14,220,173,25,
208,141,X03319
215 DATA 25,208,88,96,173,25,208,141,
25,208,X04516
220 DATA 173,18,208,41,160,240,25,41,
128,240,X05790
225 DATA 29,169,12,141,32,208,173,17,
208,41,X06820
230 DATA 247,141,17,208,169,0,141,18,
208,76,X08045
235 DATA 49,234,169,48,141,18,208,76,
49,234,X09271
```

```
240 DATA 169,39,141,33,208,173,17,208,
9,8,X10276
245 DATA 141,17,208,169,249,141,18,208,
76,49,X11552
250 DATA 234,0,0,0,0,0,0,0,162,14,X11962
255 DATA 222,0,208,189,0,208,201,255,
240,7,X13492
260 DATA 202,202,16,242,76,208,192,173,
16,208,X15027
265 DATA 61,176,192,208,17,169,90,157,
0,208,X16305
270 DATA 173,16,208,29,176,192,141,16,
208,76,X17540
275 DATA 120,192,169,255,157,0,208,173,
16,208,X19038
280 DATA 61,192,192,141,16,208,76,120,
192,255,X20491
285 DATA 0,0,255,255,0,0,1,1,2,2,X21007
290 DATA 4,4,8,8,16,16,32,32,64,64,X21255
295 DATA 128,128,254,254,253,253,251,
251,247,247,X23521
300 DATA 239,239,223,223,191,191,127,
127,206,1,X25286
305 DATA 208,206,5,208,206,9,208,206,
13,208,X26765
310 DATA 238,3,208,238,3,208,238,7,208,
238,X28354
315 DATA 7,208,238,11,208,238,11,208,
238,15,X29736
320 DATA 208,238,15,208,96,238,52,192,
206,81,X31270
325 DATA 192,96,255,255,0,0,0,X32068
```

```
SYS49152 set interrupt
SYS49260 move sprites horizontally
SYS49397 change screen colours
line 70 return without moving sprites
vertically
line 75 jump to vertical move routine
```

Border interrupt

```
C000 SEI ;set interrupt entry
C001 LDA#22 ;vector to #C022
C003 STA#0314
C006 LDA#C0
C008 STA#0315
C00B LDA#01 ;unlatch IRQ register
C00D STA#D01A
C010 LDA#7F ;clear IRQ's
C012 STA#DC0D
C015 LDA#00
C018 STA#DC0E
C01A LDA#D019
C01D STA#D019
C020 CLI
C021 RTS
C022 LDA#D019
C025 STA#D019
C028 LDA#D012 ;test raster line
C02B AND#FA0
C02D BEQ#C048
C02F AND#80
C031 BEQ#C050
C033 LDA#00 ;border colour
C035 STA#D020
C038 LDA#D011
```



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```

C03B AND#FF7 ;
C03D STA#D011 ;
C040 LDA#000 ;next line for IRQ
C042 STA#D012 ;
C045 JMP#EA31 ;resume interrupt flow
C048 LDA#030 ;next line for IRQ
C04A STA#D012 ;
C04D JMP#EA31 ;exit
C050 LDA#000 ;screen colour
C052 STA#D021 ;
C055 LDA#D011 ;
C058 ORA#008 ;
C05A STA#D011 ;
C05D LDA#FF9 ;next IRQ
C05F STA#D012 ;
C062 JMP#EA31 ;exit

```

Sprite move

```

C06C LDX#00E ;index D000,2,4,6,8,etc
C06E DEC#D000,X;sprite left one pixel
C071 LDA#D000,X;if below 0
C074 CMP#FF ;
C076 BEQ#C07F ;check high byte
C078 DEX ;step-2
C079 DEX ;
C07A BPL#C06F ;loop if >0
C07C JMP#C0D0 ;sprite vert move
C07F LDA#D010 ;if high bit for sprite
C082 AND#C080,X;is on, then turn it off
C085 BNE#C09B ;

```

```

C087 LDA#5A ;else move sprite to far
C089 STA#D000,X:right by turning it s
C08C LDA#D010 ;high byte bit on
C08F ORA#C080,X;
C092 STA#D010 ;
C095 JMP#C07B ;next sprite

```

```

C098 LDA#FF ;move sprite past 256
C09A STA#D000,X;by turning high bit off
C09D LDA#D010 ;
C0A0 AND#C0C0,X;
C0A3 STA#D010 ;
C0A6 JMP#C07B ;and the next one please

```

```

high C0B0 01 01 02 02 04 04 08 08
byte C0BB 10 10 20 20 40 40 80 80
data C0C0 FE FE FD FD FB FB F7 F7
      C0CB EF EF DF DF BF BF 7F 7F

```

```

bit 01=00000001 FE=11111110
value 02=00000010 FD=11111101
of 04=00000100 FB=11111011
mask 08=00001000 F7=11101111
bytes 10=00010000 EF=11011111
      20=00100000 DF=11011111
      40=01000000 BF=10111111
      80=10000000 7F=01111111

```

```

C0D0 DEC#D001 ;decrease vert registers
C0D3 DEC#D005 ;sprites 0,2,4,6
C0D6 DEC#D009 ;
C0D9 DEC#D00D ;
C0DC INC#D003 ;increase vert registers
C0DF INC#D007 ;sprites 1,3,5,7
C0E2 INC#D007 ;
C0E5 INC#D007 ;

```

```

C0E8 INC#D00B ;
C0EB INC#D00B ;
C0EE INC#D00F ;
C0F1 INC#D00F ;
C0F4 RTS ;
C0F5 INC#C034 ;screen colours
C0F8 INC#C051 ;
C0FB RTS ;

```

```

10 POKE53280,11:POKE53281,11
20 INPUT"[clr][white]START SPRITE ";SS
25 POKE828,SS;rem safest between 128
and 248

```

```

30 S1=SS*64;V=53248:POKEV+21,255
40 FORI=0T06:POKEV+I*2,I*32+32:POKE
V+I+1*2,170
50 POKE2040+I,SS+1:POKEV+39+I,3:NEXT:
POKEV+23,255
55 POKEV+46,3:POKEV+14,0:POKEV+15,170:
POKEV+16,128:POKE2047,SS+7
60 FORI=0T0511:POKE51+I,255:NEXT
70 FORJ=0T07:FORI=24T032:POKE51+J*64+I,
0:NEXT;rem clear space between chars
80 FORI=57T062:POKE51+J*64+I,0:NEXT:NEXTJ;
rem clear bottom of sprite
90 FORI=1T06:READB(I):NEXT:SS=PEEK(828)
92 PRINT"[clr]":FORI=0T07
95 PRINT"[home][I]Scrsrdown]";SPC(I*4):
SS=I:NEXT
100 INPUT"[home]SPRITE PAGE NUMBER ";SN
110 INPUT"CHARACTER NUMBER ";CN
120 INPUT"BYTE # OF SPRITE (1-6)";B
130 B=B(B)
140 PRINT"[clr]"
150 SN=SN*64;CN=CN*8
160 POKE56334,PEEK(56334)AND254:POKE1,
PEEK(1)AND251
170 FORI=0T07:POKESN+B+I*3,PEEK(53248+
CN+I):NEXT;rem copy char from ROM
180 POKE1,PEEK(1)OR4:POKE56334,PEEK
(56334)OR1
190 RUN90
200 DATA0,1,2,33,34,35

```

```

nb CN: 0 to 26='@'to'Z',48 to 57='0'to'9'
B(B)=start byte in sprite for each
of six chars

```

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by James Palmer

The quality arcade games that have been produced for the Atari owe a lot to the machine's inbuilt features. One of these very powerful capabilities is the Vertical Blanking Interrupt (VBI).

Every 1/50th of a second your Atari is interrupted from what it is doing and has to perform several house-keeping chores. The internal clock is updated, the keyboard scanned and any joysticks or paddles are also checked. This whole process is transparent to the user - that is, it carries on regardless of what you're doing and without you ever noticing it.

What makes this so powerful is the ability to execute your machine code programs after the Atari has finished its own work. Fifty times, each and every second, you can run a short routine of your own. This opens up the possibilities of continuous music, a flashing cursor, joystick control for your cursor, or you could even have an object moving around the screen and still be able to type in and run BASIC programs as usual. As an example of VBIs I have written a slightly less flamboyant demonstration routine.

By plotting several random dots on

a GRAPHICS 7 screen and then using a VBI routine to change their colour, regardless of whatever else may be happening, a background of flickering stars can be easily created.

Type in and SAVE listing 1, and then RUN it. Hopefully 20 random stars will be shimmering away in the background. Now try this (note that the stars continue to shimmer while you are typing).

```

10 REM A DEMONSTRATION OF VBIs
20 REM By James Palmer
30 REM 28/6/87
40 REM
50 GOSUB 1000
100 REM SET UP THE SCREEN
110 GRAPHICS 7
120 FOR N=1 TO 20
130 COLOR 1
140 PLOT RND(0)*159,RND(0)*79
150 NEXT N
200 X=USR(1536):REM TURN ON THE STARS
990 STOP
1000 REM SET UP THE VBI ROUTINE
1010 FOR N=0 TO 44
1020 READ A
1030 POKE 1536+N,A
1040 NEXT N
1050 RETURN
1100 DATA 104,160,11,162,6,169,7,32,92
,228,96,165,20,41,3,201
1110 DATA 3,208,23,238,196,2,173,196,2
,41,15,201,8,144,11,173
1120 DATA 196,2,41,240,24,105,18,141,1
96,2,76,98,228

```

Listing 1

```

10 ; VBI DEMONSTRATION
20 ; COLOUR CYCLING OF PLAYFIELD 0 (Co
rresponds to 'COLOR 1' in GRAPHICS 7)
30 ;
40 SETVBV = $E45C
50 RETURN = $E462
60 COLOR0 = 708
70 TIMER = 20
0100 ;
0110 ; SET UP THE VBLANK ROUTINE
0120 ;
0130 .ORG 1536
0140 ;
0150 PLA
0160 ;
0170 LDY # <ROUTINE
0180 LDX # >ROUTINE
0190 LDA #7
0200 JSR SETVBV
0210 ;
0220 RTS
0230 ;
0240 ;
0250 ; THIS IS THE ACTUAL ROUTINE, EX
ECUTED 50 TIMES A SECOND - A CUSTOMISE
D ROUTINE COULD GO HERE
0260 ;
0270 ROUTINE
0275 ;
0280 LDA TIMER
0290 AND #3
0300 CMP #3
0310 BNE END
0320 ;
0330 ;
0340 INC COLOR0
0350 LDA COLOR0
0360 AND #15
0370 CMP #8
0380 BCC END
0390 LDA COLOR0
0400 AND #240
0410 CLC
0420 ADC #18
0430 STA COLOR0
0440 ;
0450 END
0460 JMP RETURN

```

Listing 2

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GRAPHICS 1

```
PRINT #6; "THIS TEXT FLICKERS"
PRINT #6; "this text doesn't"
```

The routine works by continually changing the value of colour register 0. In GRAPHICS 7 it controls the colour of all points and lines drawn in COLOR 1, and in GRAPHICS 1 it determines the colour of the capital letters.

The routine is turned off by pressing [RESET].

Your own machine language routine could replace the code from line 280 onwards of listing 2 (the

assembly listing). The routine is stored in page 6 of the computer's memory, that is locations 1536 to 1791 (\$600-\$6FF), this area being set aside for user routines.

In this case the machine code could not be stored in a string. To execute the routine your Atari must know exactly where it is being stored, and as strings are moved about in memory when you start altering a BASIC program, in no time flat your Atari would find itself trying to execute a routine where the string used to be stored but instead it finds a jumble of

quite meaningless numbers that in all likelihood will make it crash in disgust.

Vertical Blanking Interrupts are one of the many powerful features built into the 8-bit Ataris and similar micros. The interrupts are essentially very easy to use, although a knowledge of machine code programming is necessary if you want to write your own routines. VBIs provide the best solution when a task must be repeated continuously and be hidden from the user. ■

80-column text

Eighty-column text on a normal 8-bit Atari can be very useful if you have large amounts of text to display or if you happen to have a modem and want to access databases that expect you to have an 80-column screen.

This routine modifies the Atari's own character set by squashing the shapes together and printing them onto a GRAPHICS 8 screen. It would have been possible to use a custom character set that would be more readable, but that would take up four times as much memory as the printing routine itself. Although the characters being displayed are only 4 pixels wide, the text still remains quite readable. Because this routine operates on the GRAPHICS 8 screen, 80-column text and graphics can be easily mixed.

Type in Listing 1 and SAVE it to cassette or disk before trying to RUN it. This routine must be included in any program that you want to access the 80-column printing. You must also include a GOSUB 25000 statement near the start of any program that is going to use the routine.

To execute the actual routine:

```
Z =USR(ADR(C80$),X,Y,TEXT)
```

where C80\$ holds the machine code routine, the co-ordinates are stored in X (0-79) and Y (0-19), and the ATASCII value of the character you want to print is stored in TEXT (or any other variable). The whole character set, including inverse characters, can be printed onto the screen. The best screen colours for 80-column printing seem to be white text on a black background.

Listing 2 provides a short 'typewriter style' demo that shows how the 80-column routine can be used in your own programs.

When the need arises, 80-column printing can be a real boon. This reasonably short routine provides a convenient way of getting around a deficiency common to most 8-bit micros, and it could well come in very handy. ■

```
25000 REM 80 Column Printing By James
Palmer
25010 REM Set up C80$
25020 DIM C80$(252)
25030 FOR N=1 TO 252
25040 READ A
25050 C80$(N,N)=CHR$(A)
25060 NEXT N
25070 RETURN
25100 DATA 104,104,104,133,206,104,104
,133,207,104,104,133,213,41,128,133
25110 DATA 226,165,213,41,127,133,213,
165,88,133,222,165,89,133,223,164
25120 DATA 207,240,16,24,169,64,101,22
2,133,222,169,1,101,223,133,223
25130 DATA 136,208,240,165,213,162,0,2
01,128,144,4,162,128,41,127,134
25140 DATA 228,201,32,176,7,24,105,64,
101,228,208,10,201,96,176,3
25150 DATA 56,233,32,24,101,228,133,21
3,165,213,133,224,169,0,133,225
25160 DATA 160,3,24,165,224,42,133,224
,165,225,42,133,225,136,208,242
25170 DATA 24,173,244,2,101,225,133,22
5,160,0,177,224,133,228,41,1
25180 DATA 153,214,0,165,228,41,4,74,2
5,214,0,153,214,0,165,228
25190 DATA 74,74,133,228,41,8,25,214,0
,153,214,0,165,228,41,4
25200 DATA 25,214,0,153,214,0,200,192,
8,208,207,169,15,133,227,169
25210 DATA 1,36,206,240,4,169,240,133,
227,165,206,74,168,162,0,177
25220 DATA 222,37,227,133,228,181,214,
133,229,169,1,36,206,208,8,165
25230 DATA 229,10,10,10,10,133,229,165
,226,240,8,169,255,69,227,69
25240 DATA 229,133,229,165,228,5,229,1
```

```
45,222,24,169,40,101,222,133,222
25250 DATA 169,0,101,223,133,223,232,2
24,8,208,196,96
```

Listing 1

```
10 REM SAVE "D:C80.DEM"
20 REM 80 COLUMN PRINTING DEMONSTRATIO
N
30 REM By James Palmer
40 REM 28/6/87
50 REM
80 GOSUB 25000:REM SET UP C80$
90 DIM A$(130)
100 REM
110 GRAPHICS 8
120 SETCOLOR 1,0,14
130 SETCOLOR 2,0,0
140 SETCOLOR 4,0,0
200 REM PRINT
210 INPUT A$
220 GOSUB 900
230 X=0:Y=Y+1
240 IF Y=20 THEN Y=0
250 GOTO 210
890 STOP
900 REM
910 FOR N=1 TO LEN(A$)
920 C=ASC(A$(N,N))
930 Z=USR(ADR(C80$),X,Y,C)
940 X=X+1
950 IF X>80 THEN X=0:Y=Y+1
960 IF Y=20 THEN Y=0
970 NEXT N
980 RETURN
990 STOP
```

Listing 2

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Reflections on computers in agriculture

by Koos Baars

In August I spent two days in Palmerston North attending the annual convention of the New Zealand Institute of Agriculture Science at Massey University. The organisers had devoted a full day to the place of computers in agriculture with the theme being Information Transfer: Distribution of Intellectual Wealth.

While these days were mainly organised for agriculturalists there were some interesting comments and opinions about agribusiness modelling, the current state of software development and the new user pays philosophy, expert systems, education and training requirements. They are of interest to a wider audience.

Modelling agribusiness

Nicola Shadbolt, manager of the National Info-System Centre (NISC) of the Ministry of Agriculture and Fisheries (MAF), said that while outdated large complex systems were often difficult to change, small simplistic systems often did not provide the depth of analysis required. She expressed concern about the lack of integration and co-ordination in the field of modelling agribusiness.

She felt that the power of technology was available and should be used now, and that at present many managers make decisions based on incomplete data. Marketing and economic components should be part of a total approach to modelling agribusiness. Regrettably the centre has had to tackle "quick and dirty jobs" to the detriment of larger integrated systems development.

User pays

Tony Lissaman (Farmplan-Primesoft) talked on the topic of what user pays means for agricultural software development. In his hard-hitting talk he chastised the New Zealand Dairy Board, MAF and other institutions for their low achievement level in delivering the goods to end users and going on indefinitely without bringing projects to conclusion.

He asked if the previous users of BEEFPLAN would be looked after, now the scheme was being disbanded. He compared it with his offer to customers of updating an old CP/M system to an MS-DOS system for a mere \$150.00, and said that he had always developed software in co-operation with the most demanding

end user. "Straight talking is required in the agricultural software industry," he said. He also expressed the view that joint ventures using different skills would be more useful for the end users.

Expert systems

Eric Forbes, a consultant with NISC in Canterbury, discussed recent trends in expert systems. Expert systems are computer programs which basically simulate the significant knowledge of an expert, and are designed to rapidly sort through many facts and rules to solve a user's problem. The user supplies the information required by the expert system to define the problem, which tells the system which facts and rules to use. It gives results and advice and also explains the reasoning behind this advice.

Why is there an upsurge in interest? It is new, and making a large body of knowledge accessible is attractive. Eric Forbes said that New Zealand was quite behind the scene compared with other countries. He emphasised that while there were major benefits in developing these systems, the development may be hindered by the different knowledge of programmers and agricultural experts involved in the development.

Some benefits are:

- integration of agricultural knowledge;
- quality systems for information transfer;
- will improve existing agricultural models;
- allow updating central knowledge base;
- reduce the consultants' involvement and time in giving advice to clients.

Education and training

Mr R. Craven (Flock House) talked on the new educational requirements of agriculturalists. He emphasised that psychophobia was often real with computers. Overcoming attitude and fear was necessary with many people, with a need to be more assertive in learning, and self-directed life learning is now a necessity.

He stated that garbage-in-garbage-out was not the real problem with computers, but the interpreta-

tion skills were. My inference was that however user-friendly a package may be, the knowledge of the farming system, management by objectives and the decision-making process will make software the useful tool it can be.

Ron Eckman (NISC) discussed training needs. He said that the crunch in agriculture was to put value on time. He emphasised the need for clear objectives, a list of results to be expected and learnable units with relevant data and examples.

In a later session Barry Butler, previously a farm adviser with MAF, stressed the need for a strong financial-economic emphasis in any agricultural management package. He also emphasised the need for more and more graphics and utility.

I have expressed similar sentiments in earlier columns. A great deal of effort and innovation is still required in many packages in presenting output clearly and simply. There is also little doubt in my mind that another comment of his, that farm software is overpriced is definitely the case in some instances.

The main message I took home about developments in software is that the user pays philosophy will result in a real open market with a proliferation of competing products in herd management systems, animal recording systems, financial systems and management packages. Little co-ordination and co-operation can be anticipated. A rapid pace of change will continue. There will be more and more software around, so it will be difficult for end users to decide what is best for their situation. However, information is a key to success and finally the end user will determine which packages will survive.

Agribusiness models are desirable. With the increased availability of hard and software in consultants' offices and on the farm there will be an increasing demand for such computer programs and data. However, the development of automated information systems as an aid for decision-making still has some way to go. Expert systems may be even further away.

In a future column I will report on other developments in the use of computers in agriculture. ■

Footnote: The total animal weighing system described in my Rural Computing column on page 82-83 of September *Bits & Bytes* costs about £30,000, not \$300,000!

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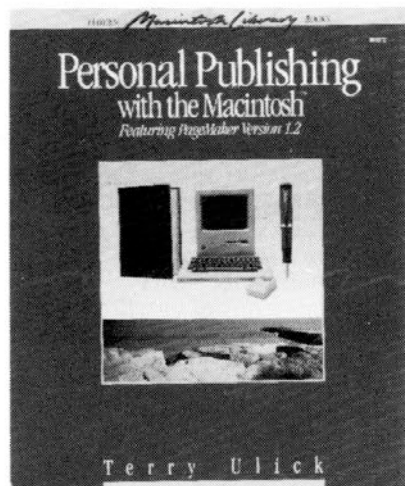
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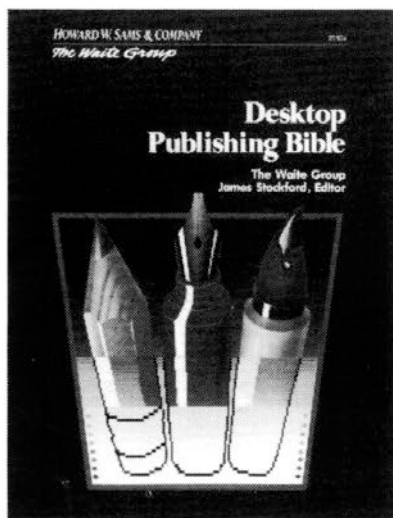


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Feeling out of sorts

by Tim Hartnell

Most of the computer programs in regular use around the world are applications or business programs. The majority of these use sorts in some form or another. In fact, according to Jonathan Amsterdam, writing in *Byte* magazine (September, 1985, p. 105), 90 per cent of all computer programs do some kind of sorting.

The most basic sorting needs are for a series of strings to be placed in alphabetical order, or for numbers to be placed in an ascending or descending series. Whether it is names of products in a storeroom, a mail list to be ordered by postcodes, or a ranking of examination results from highest to lowest within a class, similar sorting techniques can be used.

However, there is a bewildering number of sorting algorithms, and they differ wildly in their efficiency. We'll be looking at five different sorting techniques in this article, in which the most efficient one works 30 times faster than the least efficient one does. You might find it interesting to run the different sorts on your own computer, and time them as they sort out lists of your own. The difference in speed – which will be, of course, most noticeable with a long list – is quite amazing.

Although it makes little practical difference which sort you use when the list to be sorted is short, it becomes increasingly important as the length of the list grows. And if you're writing a business applications program which either sorts a long list from time to time, or sorts short lists frequently, it is very important to choose the most efficient sort.

The programs in this article should work with little or no modification on any computer which uses Basic. I've deliberately stuck to a common subset of Basic to make it easy to run the programs on any machine.

Speed and storage

Tony Guttmann, a lecturer at the University of Newcastle, NSW, in his book *Programming and Algorithms* (Heinemann, 1977; p.146), points out that choosing the correct sort for a job often involves a compromise between various incompatible requirements. "The two most commonly conflicting requirements," he writes, "are storage space and execution time." Some sorts, as we will see, demand no additional memory than that which holds the original,

unsorted data. In the worst case, a second array equal in size to that which holds the original data is needed to hold elements during a sort. The other sorts lie in between these two extremes.

In each of the programs in this article, the list to be sorted is an array filled with random numbers, which are then sorted into ascending order. The number of elements in the list can easily be altered, to demonstrate clearly that the efficiency of some sorts declines quite dramatically as the length of the list to be sorted increases.

Bubble Sort

```
10 REM Bubble Sort
20 CLS:INPUT "How many items to be sorted";N:
CLS
30 DIM A(N)
40 FOR Q=1 TO N:A(Q)=INT(RND(1)*N+1):NEXT Q
50 PRINT "Sort starting now..."
60 K=1
70 X=A(K):Y=A(K+1)
80 IF X<Y THEN 140
90 A(K)=Y:A(K+1)=X:TEMP=K-1
100 IF TEMP=0 THEN 140
110 X=A(TEMP):Y=A(TEMP+1):IF X<Y THEN 130
120 A(TEMP)=Y:A(TEMP+1)=X
130 TEMP=TEMP-1:GOTO 100
140 K=K+1:IF K<N THEN 70
150 PRINT "Sort finished:"
160 FOR J=1 TO N:PRINT A(J),:NEXT J
```

Program A

We'll start with the Bubble Sort (program A). In this, the computer looks at the first two elements in the list – $A(K)$ and $A(K+1)$ – and swaps them over if necessary. Next, the program looks at elements two and three in the list, and interchanges them if necessary. Once it has got right to the end of the list on the first pass, the bubble sort program goes back and does it over and over again, until the list is in order. The time a bubble sort takes to order a list is proportional to the square of the number of elements to be sorted.

You can use your computer's internal clock to see how long it takes the program to sort a particular list into order. On the IBM PC, on which these programs were developed, the string variable `TIME$` holds the current time. By adding the following two lines, the program will time the sort by itself:

```
55 TIME$="00:00:00"
145 PRINT TIME$
```

When I added lines, and tried the program with different length lists, it produced these results:



20 elements - 3 seconds
 50 elements - 24 seconds
 100 elements - 98 seconds
 150 elements - 224 seconds

It would be interesting to see how well your computer performs in comparison with mine. But you can see how the time which the sort takes rises quite unacceptably. If you had a list of 10,000 numbers to sort, you could practically paint the Harbour Bridge before it was finished.

Swap Sort

```
10 REM Swap Sort
20 CLS:INPUT "How many items to be sorted":N:
CLS
30 DIM A(N)
40 FOR M=1 TO N:A(M)=INT(RND[1]*N+1):NEXT M
50 PRINT "Sort starting now..."
60 FOR B=1 TO N-1
70 FOR C=B+1 TO N
80 IF A(B)<A(C) THEN 100
90 TEMP=A(B):A(B)=A(C):A(C)=TEMP
100 NEXT C:NEXT B
110 CLS:PRINT "Sort finished:"
120 FOR J=1 TO N:PRINT A(J):NEXT J
```

Program B

The Bubble Sort, even though it was slow, did not demand additional memory to hold the elements of the list as they were sorted. Similarly, the Swap Sort does not need extra memory. A Swap Sort is given as program B, so you can try it out. Starting with the first two elements in the list, this sort interchanges them if necessary. If they do not need to be swapped over, the program looks at the next two. If the first two need to be swapped, the swap is made, and then the program goes back to the beginning. This occurs until it gets to the end of the list.

To time the program, I put my additional timing lines in as 55 and 115. I got these results:

50 elements - 12 seconds
 100 elements - 49 seconds
 150 elements - 115 seconds

Whereas it took the Bubble Sort 24 seconds to put a list of 50 items in order, the Swap took just 12 seconds. When the length of the list to be ordered was increased by a factor of three (to 150), the Bubble Sort time increased by 93 percent while the Swap Sort time increased by around 96 per cent. This suggests that while the time it takes the sorts to work naturally increases as the length of the list increases, the Swap Sort may degrade to a greater extent. Try both

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programs with lists of 1000, and then more, numbers, and see if you can work out at which point – if any – a Bubble Sort would become more efficient than a Swap Sort.

Insertion Sort

```
10 REM Insertion Sort
20 CLS:INPUT "How many items to be sorted";N:
CLS
30 DIM A(N)
40 FOR Q=1 TO N:A(Q)=INT(RND(1)*N+1):NEXT Q
50 PRINT "Sort starting now..."
60 FOR K=2 TO N
70 J=K-1:L=A(K)
80 IF L>A(J) THEN 110
90 A(J+1)=A(J)
100 J=J-1:IF J>0 THEN 80
110 A(J+1)=L:NEXT K
120 PRINT "Sort finished:"
130 FOR J=1 TO N:PRINT A(J);:NEXT J
```

Program C

Like the first two sorts we've looked at, the Insertion Sort (program C) does not demand additional memory. Whereas the time taken to sort a list with the Swap Sort is related to the number of elements in the list cubed, the time the Insertion Sort takes to order a list is related to the number of items squared.

Here it is in action:

- 20 elements – 1 second
- 50 elements – 8 seconds
- 100 elements – 34 seconds
- 150 elements – 85 seconds

As the number of elements doubles (from 50 to 100), the time taken increases, in this example, by a factor of 4.25, which is more or less as expected. Tripling the number of elements, to 150, increases the time taken by a factor of 10.6 which again is related to the square of the number of elements in the list. Of course, I'm using pretty rough and ready timing methods (with, by the way, my timing lines inserted at 55 and 115), and when you run the program with larger lists, and perhaps using a stopwatch, you may find the time taken in various cases is closer to that which is predicted.

Shell Sort

```
10 REM Shell Sort
20 CLS:INPUT "How many items to be sorted";N:
CLS
30 DIM A(N),S(10)
40 FOR M=1 TO N:A(M)=INT(RND(1)*N+1):NEXT M
50 PRINT "Sort is beginning now..."
60 S(1)=1:FOR J=1 TO 9:S(J+1)=S(J)*3+1:NEXT J
70 P=0
80 P=P+1
90 IF S(P+2)<N THEN 80
100 FOR K=P TO 1 STEP -1:S=S(K)
110 FOR J=S+1 TO N:L=J-S:A=A(J)
120 IF A>A(L) THEN 140
130 A(L+S)=A(L):L=L-S:IF L>0 THEN 120
140 A(L+S)=A:NEXT J
150 IF K>1 THEN FOR Q=1 TO N:PRINT A(Q);:NEXT Q
160 PRINT:PRINT:NEXT K
170 PRINT "Final sorted list:":PRINT
180 FOR J=1 TO N:PRINT A(J);:NEXT J
```

Program D

Now we're moving into the Brands Hatch of sorts, where things really start zipping along. The Shell Sort (program D), although it needs a little extra storage (in this case, an array containing 10 elements), is very fast.

According to D E Knuth, in his book *The Art of Computer Programming* (Addison-Wesley, 1973), it works by filling the elements of the S array with a set of increasing integers starting with S(1)=1. "The best set is not known," he writes, "but the sequence 'S(J+1)=S(J)*3+1' is good." Once this is done, the program finds the smallest value P such that S(P+2)>=N (where N is an element in the list to be sorted). Then, for each S=S(K), where K is a loop control variable in a FOR/NEXT loop going down from P to 1 (see the end of line 100 in our program), take each value of J from S+1 to N, and insert A(J) in its proper position.

Complex as that explanation may seem, you don't need to be able to make sense of it in order to use the Shell Sort. When I ran it with two small sample lists of randomly-generated numbers I got these results:

- 100 elements – 11 seconds
- 1000 elements – 208 seconds

This is almost ten times faster than the Bubble for 100 elements, five times faster than the Swap, and three times faster than the Insertion Sort. Clearly, the small overhead cost of an additional array of 10 elements is worth paying. (To time the Shell Sort, P placed my TIME\$ lines at 55 and 165.)

Sort by Count

```
10 REM Sort by Count
20 CLS:INPUT "How many items to be sorted";N:
CLS
30 DIM A(N),Q(N)
40 INPUT "Highest value in data";M:CLS
50 DIM C(M)
60 FOR Q=1 TO N:A(Q)=INT(RND(1)*M+1):NEXT Q
70 PRINT "Sort starting now..."
80 FOR J=1 TO M:C(J)=0:NEXT J
90 FOR J=1 TO N:C(A(J))=C(A(J))+1:NEXT J
100 FOR J=2 TO M:C(J)=C(J)+C(J-1):NEXT J
110 FOR K=N TO 1 STEP -1
120 TEMP=A(K)
130 J=C(TEMP):Q(J)=TEMP:C(TEMP)=J-1
140 NEXT K
150 CLS:PRINT "Sort finished now:"
160 FOR J=1 TO N:PRINT Q(J);:NEXT J
```

Program E

The final sort to be examined here, and the one which puts all the others to shame in terms of speed of execution, is the Sort by Count, which needs an array in addition to the one which holds the original data. The second array (C in our program, Program E) contains the same number of elements as the value of the largest element in the data (so if the numbers in the original data were 6, 84 and 17, C would need 84 elements).

The cost of this storage overhead is well worth paying, as the time to sort a list of N elements is directly related

to N. Instead of finding the time taken increases as the square or cube of the number of elements in the list, the Sort by Count time increases only arithmetically with the number of elements (so the time taken to sort a list of 100 elements should be exactly double the time it takes to sort 50 elements).

The program works by setting every element of the C array to zero (line 80). Then, for each element of array A, the program increments its corresponding counter C(A(J)). This means that C(J) is now set to the number of elements in the original list of data equal to J. Next, the program counts from 2 up to M (where M is, you'll recall, the value of the largest number in the original list), adding each C(J) to C(J-1), as you'll see in line 100. This makes each C(J) the number of elements less than or equal to J.

Finally, using a loop counting backwards from N (the number of items in our original list) to 1 (see line 110), each element A(K) is copied (holding the value temporarily in the variable TEMP) to Q(C(A(K))) and C(A(K)) is decremented.

At the end of all these shenanigans, we have a sorted list.

Now, because the time the program takes to carry out a sort is dependent, to some extent, on the value of the largest number in the list, I ran a few additional tests on this program. The other sorts were tested, at one stage or another, by sorting 100 numbers chosen at random in the range 1 to 100, so it was important to do the same test for Sort by Count so they could be compared. I also ran tests with a smaller range, to see the effect this had on the speed of the sort. Here are my results:

Range of numbers	No. of elements	Time to sort
1-10	100	3 seconds
1-100	100	4 seconds
1-500	100	9 seconds
1-10	1000	24 seconds
1-1000	1000	37 seconds

You can see that the Sort by Count is a regular tearaway compared with the other sorts we've examined in this article. We can compare directly the sort of 100 numbers, in the range 1 to 100, with the other sorts, as they were all carrying out the same task. Here's how they measure up:

Bubble Sort	98 seconds	100%
Swap Sort	49 seconds	50%
Insertion Sort	34 seconds	35%
Shell Sort	11 seconds	11%
Sort by Count	4 seconds	4%

Of course, my timing has been pretty rough and ready (with the TIME\$ lines in the Sort by Count inserted as lines 75 and 155) and if you have larger samples, and use a stopwatch, you may find slight variations from the above, although the relationships between the times should be close to that given above.

The Mandelbrot set

by Bryce Utting

Fractals have been raising interest in various areas for several years now. I first came across them in a 1984 issue of *Byte*, which had colourful photographs of pseudo-random landscapes, multi-dimensional dragons and the Mandelbrot set.

The Mandelbrot set (named after Benoit M. Mandelbrot, who pioneered much of the work in fractals) is a complex fractal figure, an ideal showcase for computing power. A description of it would be very involved, so anyone who is interested in the details should read the article in the August 1985 issue of *Scientific American*, which describes a program for examining the Mandelbrot set.

This month's listing is such a program, written in Turbo Pascal, as BASIC is much too slow. If the speed of the Pascal version becomes aggravating, keep in mind that it can compete in speed terms with Berkeley Pascal on a VAX 11/750 (admittedly a slow beast much of the time anyway).

Anyone familiar with the Mandelbrot set should find the program fairly easy to use. It allows the close examination of a section of the set by specifying the real and imaginary coordinates of one corner and the size of the section. This allows zooming in on the set, limited only by what constraints Pascal places on real numbers. Unfortunately, output is only in numeric form (see fig. 1). This is for three reasons:

- The scanning resolution is less, so fewer points are calculated, resulting in faster program runs.
- Greater detail (albeit at a very low resolution) is revealed — two points with values of 8 and 12 will appear different, rather being arbitrarily assigned to "red".
- Technical reasons: I don't have access to graphics routines for the Sanyo under Turbo Pascal, and my monitor makes all colours look very similar when running the video board. Maybe one day I'll write the graphics library I've always been planning...

To get started, run the program with these values:

real: -2

Imaginary: -1.25

Width: 2.5

Maximum count: 999

The *Scientific American* article mentioned has a high resolution picture of this, which acts as a guide around the set. Note that any point with a count value (that number actually printed) equal to the maximum count assigned is inside the Mandelbrot set itself.

To get better pictures, I would

recommend sending output to the printer or a disk file, with as many columns as possible. If your printer can take 142 columns in compressed mode, use this (and set the constant WIDTH to 35). If you have practical graphics routines (and a lot of time) use them. Even better — if you enjoy writing routines to manipulate real numbers, code the program in Assembler.

The *Scientific American* article describes several worthwhile regions to examine. These are

	1	2	3
Real part	.26-.27	-.76--.74	-1.26--1.24
Imaginary part	0-.01	.01-.03	.01-.03

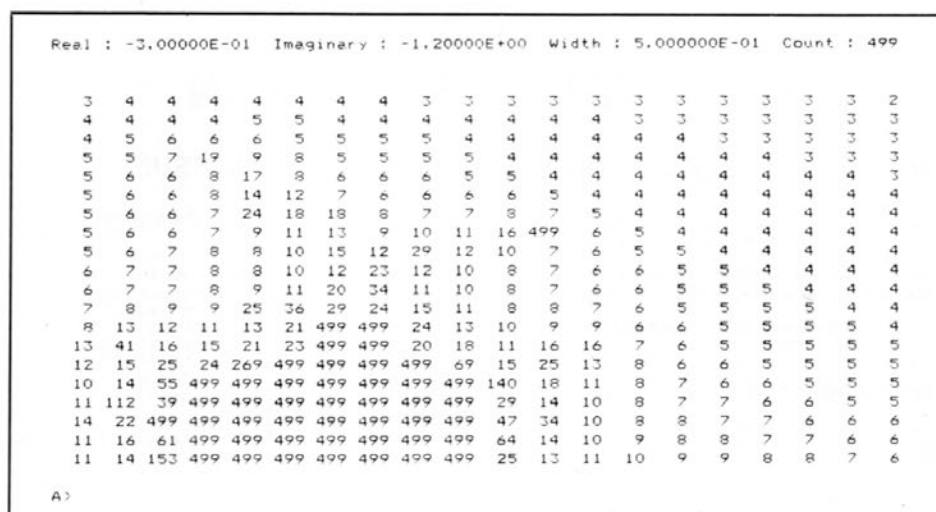


Figure 1

```

program Mandelbrot;
const
  width = 20;
var
  acorner, bcorner: real;
  side: real;
  x, y: integer;
  gap: real;
  creal, cimag: real;
  zreal, zimag: real;
  count, maxcount: integer;
  size: real;
procedure getinput;
begin
  writeln('Select bottom left point of r
egion to be examined:');
  writeln;
  write('Enter real part : ');
  readln(acorner);
  write('Enter imaginary part : ');
  readln(bcorner);
  writeln;
  write('Enter width of region : ');
  readln(side);
  writeln;
  repeat
    write('Enter maximum COUNT value : '
);
    readln(maxcount);
  until ( (maxcount>0) and (maxcount<100
0) );
  writeln;
  writeln;
  gap := side/width;
end;
procedure Mandelbrot;
var zr, zi: real;
begin
  writeln;
  writeln;
  write('Real : ',acorner:12,' Imaginar
y : ',bcorner:12);
  writeln;
  write('Width : ',side:12,' Count
: ',maxcount:3);
  writeln;
  for y := 1 to width do begin
    cimag := y * gap + bcorner;
    for x := 1 to width do begin
      creal := x * gap + acorner;
      zreal := creal;
      zimag := cimag;
      size := zreal*zreal + zimag*zimag;
      count := 1;
      while ( (size<4) and (count<maxcou
nt) ) do begin
        zr := zreal*zreal - zimag*zimag;
        zi := 2 * zreal * zimag;
        zreal := zr + creal;
        zimag := zi + cimag;
        count := count + 1;
        size := zreal*zreal + zimag*zima
g;
      end;
      write(count:4);
    end;
  end;
begin
  getinput;
  Mandelbrot;
end.

```


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Starflight – by Binary Systems

An IBM PC game review by Shayne Doyle

It has often been written that computer freaks are also Sci-Fi nuts, a generalisation never statistically proven but in my case true. My particular leaning is towards computer simulation of Star Ships, and I am consequently an avid collector and writer of versions of Star Trek type simulation games. My ultimate goal is to write the multi-player, multi-screen version discussed in detail in the book *Star Ship Simulation* by Roger Garrett. In the meantime, any new program of this genre is eagerly sampled.

Starflight was written by a team of five programmers who approached Electronic Arts back in 1982 with the idea of "creating a universe on disk that would let people experience the feeling of exploring the universe". The end result is essentially a combination of the classic Star Trek and Galactic Trading simulation games.

Apart from any self-set goals, there are two goals of primary importance to remember – gathering information and generating revenue. Revenue is created from sale of minerals, artifacts, life forms and life form data. Credit is also earned by recommending viable colony worlds, but you may be fined if a recommended planet turns out to be unsuitable. You are encouraged to come up with additional methods of revenue generation, but space piracy is frowned upon except in self defence.

The game starts with a graphic display of Starport Central, Earth Orbit Station, and shows the entrances to a number of modules – Operations, Personnel, Crew Assignment, Bank, Ship configuration, Trade Depot, and Docking Bay. These must be visited and steps undertaken before starflight can commence. For example, the crew must be chosen, trained and assigned, the ship repaired and outfitted, commodities or artifacts bought and sold, but finally the starship commander is guided over to the Docking Bay entrance where he dissolves in good old tried and true transporter style to present a display of the ship's console.

As the Captain, you have ultimate authority both in space and at Starport. From the control panel you may launch or land the starship, select a landing site, descent to the planet's surface, disembark the crew, pick up or jettison cargo items, log a planet for colonisation, and access the captain's log. The duties of your officers follow very much those of the primary officers in Star Trek.

Actual space travel takes place at three levels. Hyperspace is where

interstellar travel occurs and while in hyperspace you can see stars, nebulae, and continuum fluxes. The size of a star varies with its spectral class. During space travel, even in hyperspace, alien vessels may be encountered at any time. Both ships can scan and analyse strengths and weaknesses, detect if shields are up, and whether or not weapon systems are armed. Depending on the results of these scans the alien ship will interpret your presence as being hostile or friendly, the latter decision also influenced by the frequency and manner of your communications with an alien race during these encounters.

Approaching a star permits you to enter its solar system where the colour or pattern of a planet indicates its primary surface type. To enter an orbit around a planet it is necessary to position the starship over the centre of the planet. To make planetfall the captain selects the Land option which brings up Site Select and Descent sub-options. A Mercator projection of the planetary surface is displayed and a cursor moved around to choose the actual landing site. Descent then engages the auto-approach sequence.

While on the surface, you travel in a Terrain Vehicle equipped with a life form scanner, computer capable of generating maps of the terrain, scanner to examine terrain before entering it, a laser weapon and stunner. From the terrain vehicle you may drop cargo, pick up cargo or life forms, record messages found in ruins, and make holographic recordings of life forms.

This is not a game for the impatient players. It takes time and planning to achieve your goals, and the program responds rather slowly at times to commands. The graphic displays are quite good, but nowhere near the quality I expected. Some characters are very difficult to read, a combination of a poorly defined character font being used and colours selected for text and background being too similar.

The game will run on monochrome monitor, RGB colour monitor, colour TV or composite colour display, and Hercules monochrome graphics adaptor. Joystick control is not supported, all movements being initiated using the numeric keypad. The disks are not copy protected and the game may be copied to and run from hard disk. Once a game has started it may be saved at any stage and resumed later, but to commence a new game requires the original programs to be

Dragon's Lair II: Escape from Singes Castle

Reviewed by Brent Dickens

Price: \$57.00;

software company: Software Projects

copied back onto the playing copy.

Although the disks are not copy protected, Starflight employs a rather unusual method to make bootleg copies unrunnable. A "Security Code Access Wheel" is supplied - two disks joined but free to rotate. Around the perimeters of the disks are 24 location and artifact names. In the face of the front disk are cut nine slots, following a spiral track to the centre. Each of these slots is named after an alien race, and a number printed on the rear disk can be read through the slot.

Whenever your starship leaves Starport, Interstel Security will display three variables - location, artifact and race. To find the corresponding access code the disk wheels have to be aligned, and the code appearing in the slot is input to the program and verified. Only if verification is successful will you be permitted to leave Starport.

The game is attractively packaged, with a 32-page manual, five-page setup guide, and a fold-out Starmap. Fifteen manyears went into this game, and it offers quite a lot of different situations for the budding starship captain to come to grips with. As I mentioned before, I was disappointed with the graphics displays and fairly slow pace of the game. I doubt whether I would pay around \$135 for it, and I still look forward to seeing the ideal star ship simulation. ■

Review copy courtesy of PC Power Ltd, Lower Hutt.

This is the second conversion of the classic arcade game Dragon's Lair which had cartoon-like laser disk graphics. Unfortunately this version lacks the superb graphics and sound of the arcade game and most of the screens are different as well.

The first screen has you floating down a river towards Ye River Caves, in a barrel. Roaring waterfalls, partly submerged boulders and whirlpools all conspire to halt the journey onwards. The next screen has you being pursued by a huge boulder down Boulder Alley. The occasional hole appears, which must be jumped, while smaller boulders oscillate from side to side and try to skittle you. The Throne Room is filled with innocent looking traps for all who enter.

In the Dungeons of the Lizard King you must search all the rooms to find your sword and the pot of gold which has been taken from you. Get the sword, kill the king and the treasure is yours.

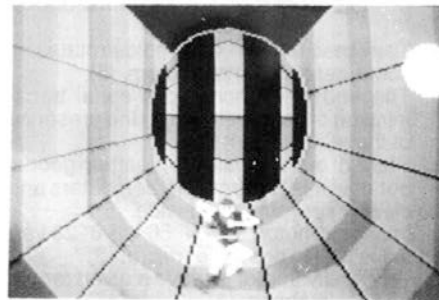
You stumble upon a mysterious statue of a Magical Flying Horse and as you climb aboard it springs into life carrying you at breakneck speed down dark corridors. You must steer your horse away from the walls or be forever dead.

The Doom Dungeon is the second of the arcade counterpart screens, in which you find an innocent looking dungeon, until it comes alive with bolts of lightning. Obvious exits contain deadly traps, so be wary. You

must negotiate a path across Mystic Mosaic, where squares appear and disappear in a flash to obscure the only way across, before facing the Mud Monsters who confront you at every turn. Bridge the gap, leap the canyon and freedom is yours.

This far above average game with many testing screens is much better than Dragon's Lair. The graphics aren't amazing, but they suit the game well and the excellent sound with nine different tunes keeps the game alive.

Graphics: good (not the best but they portray the action well enough); sound: very good (nine hot tunes that suit the game very well); presentation: good (good documentation describing all the screens but no two-player or other options); overall: very good (a challenging game giving hours of entertainment). Add this to your top 10 list. ■



Dragon's Lair II

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P.C. TECH JOURNAL JUNE, 1987

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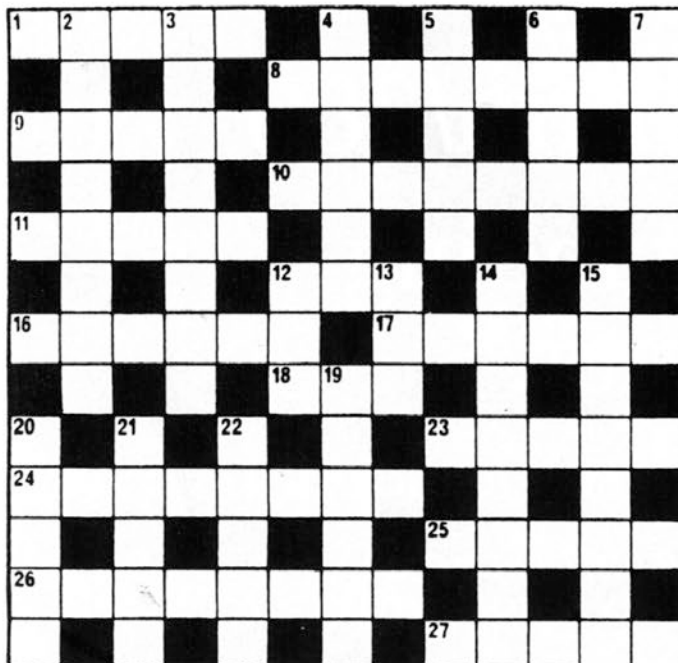
Across

1. Acronym for a standard binary code representing letters, numbers, symbols, and control codes. (5)
8. 1987 NZ Software Awards Dinner guest speaker, author of 60+ computer books. (8)
9. The mechanism that holds/rotates a computer recording medium. (5)
10. The end of asynchronous serial transmission of data is shown by the presence of these. (8)
11. Started out as maker of leather goods, but now this US firm sells computers and electronics gear world-wide. (5)
12. Initials common to 464, 664, & 6128 versions of this bestseller micro. (3)
16. To identify and/or retrieve a given record from a database. (6)
17. The code name or number required to initiate entry to a computer system. (6)

18. Acronym for Report Program Generator. (3)
23. Fruity micro from Hitachi! (5)
24. Set of conventions governing format of messages for transmission between systems. (8)
25. Key used to interrupt the running of a program. (5)
26. The regular user of a machine, or a character defining what action is to be carried out. (8)
27. Semi public domain programs like PC-Write, PC-File etc, are known as ----- Ware. (5)

Down

2. Back-up storage device using long tape. (8)
3. The classic Arcade Game, zapping aliens from Outer Space. (8)
4. The generic name for portables, midsize between "pocket" and "luggable". (6)
5. Commands, orders or instructions - to upset pests? (5)
6. Operating system - an unknown quantity at beginning and end? (5)
7. Machines like the HP Touchscreen used screens of touch-sensitive ----- as a form of control input. (5)
12. Abbreviation for Character. (3)
13. Acronym for closed user group. (3)
14. Digital ----- : the name of the firm that marketed CP/M operating system. (8)
15. Surname of the British "genius" who bought low-cost computing to the world with ZX-80 and 81. (8)
19. The Japanese have adopted this programming language, created in 1972 at Marseilles Univ, as their "5th Generation" language. (6)
20. This firm, a market leader in printers, and computer maker, is owned by Seiko watches. (5)
21. This device allows data to be transmitted over phone circuits. (5)
22. Opposite of global, referring to one defined part of a program or area of operation. (5)



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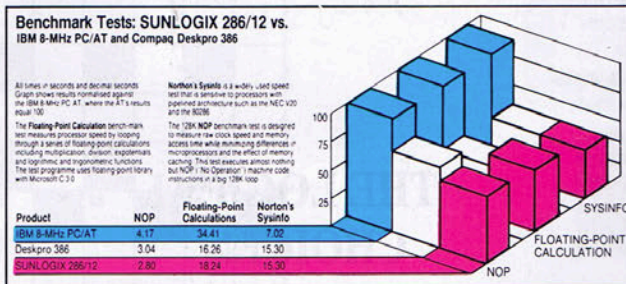
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