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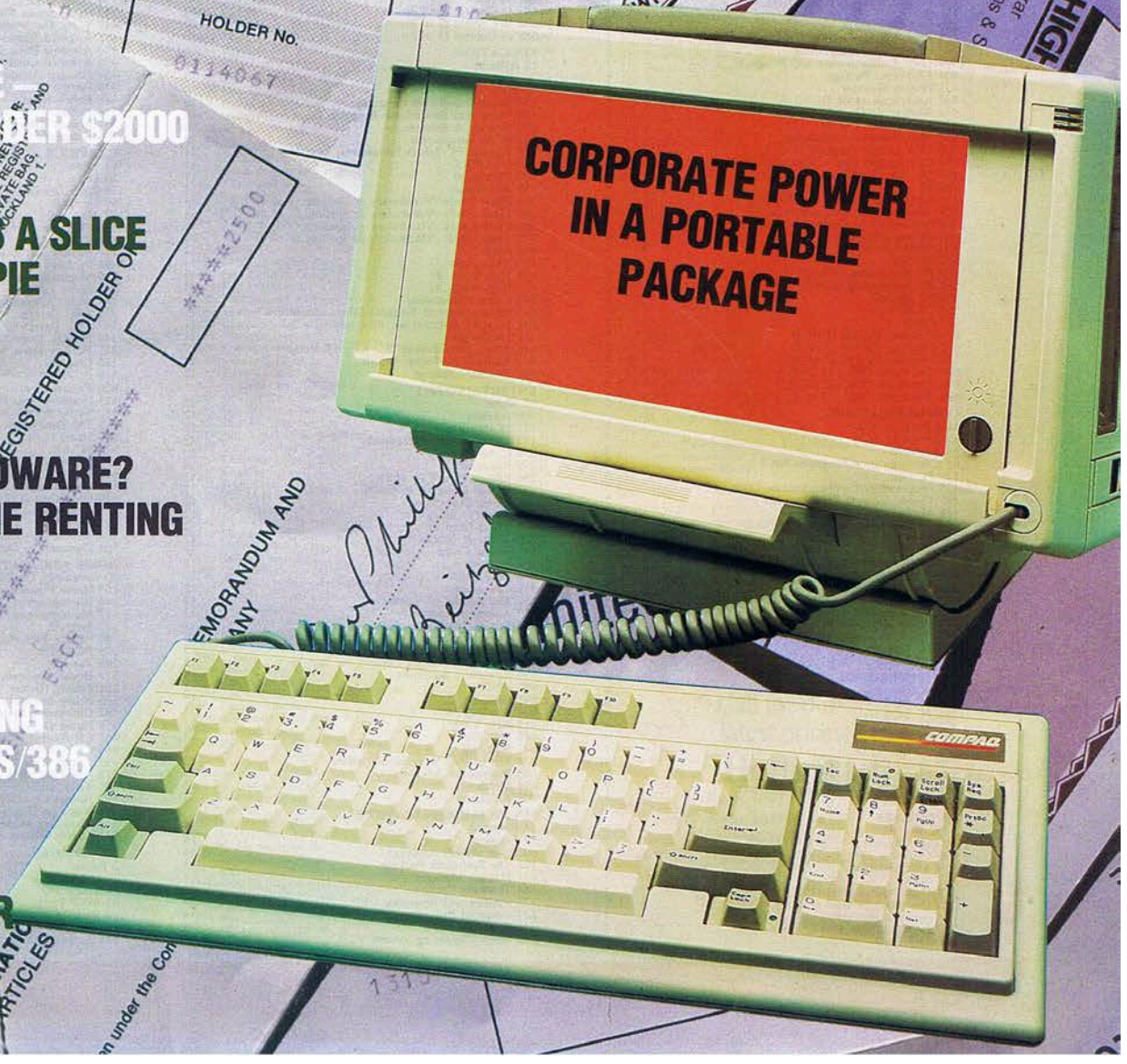

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# BITS & BYTES

September 1987 Vol. 6 No. 1 ISN 0111-9826

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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. **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; 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.

## New range for all needs

Released by Impact is a new range of laser printers. Entry-level is the LS800 series with the new Canon SX engine, with the basic single-emulation model LS800-01 starting at $4,540, while the LS800-02 has six fonts and five emulations for $6,040, and the LS800-03 is aimed at the desktop publishing market with HP LaserJet Plus emulation at $6,970.

The 15 pages per minute L1500 is available in two models, and the L2000, a heavy-duty 20 ppm laser printer comes in three versions as a lineprinter, graphics capable machine, and for desktop publishing with PostScript.

## PS: more coming soon

Another printer manufacturer going the PostScript page description language way is Hewlett-Packard, which recently signed an international marketing and distribution agreement with QMS. Central to the agreement is the QMS JetScript controller, presently under development and comprising a host-based PostScript controller card, HP LaserJet Series II video adapter card and diskette based software.

Laser printer manufacturers are noting the demand for Adobe licensed PostScript compatible machines, a monopoly held until recently by Apple with its LaserWriter. Adobe fonts are used in the majority of typesetting machines and so are particularly useful in desktop publishing where added versatility and quality are required.

## Seconds count

Recently appointed NZ distributor for the Texas Instruments series of printers, Barson Computers has launched two new PostScript-compatible lasers, priced from $13,800 plus GST. Aimed at the second-time user, whose existing laser printer is nearing the end of its mechanism life, the new TI machines feature the second-generation Ricoh II engine with improvements to life length, duty cycle and print speed.

The TI lasers are compatible with both Apple and IBM computers, being able to be connected to both types at the same time in a networking environment.

## Evolution of Profax

The small business accounting package Profax, first released some 18 months ago, has had a major upgrade with Version 4.0. Logical Methods sales and marketing manager Jon Vincent says the manual has been revised and several areas of the program enhanced, including stock handling, reporting facilities and the general ledger, along with several areas affected by the apparent anomalies in the government's implementation of GST.

## Share your printer

Case Communications has introduced the Lasernet printer sharing unit which allows up to eight users to share one parallel and one serial printer or plotter simultaneously. Battery protected in case of power failure, the unit has up to 2Mb of memory, and users can set their own configurations of baud rate, handshaking and parity. Baud rate of 3000 to 19.2 gives transmission of data at a faster rate than is allowed by direct transmission to the printer.

Incoming data is stored separately in the Lasernet, which ensures that data transmitted from one port is not mixed with data from another. Allocated to printers on a first-come, first-served basis, data can also be directed to both printers simultaneously for efficiency.

## Continuing major successes

The STC Group, which includes the computer group ICL, has announced an interim operating profit, for the first six months of 1987, of £81.2 million or 40 per cent more than the same period last year, on a 10 per cent increase in turnover. ICL contributed £53 million of the profit.

Tim Cullinane, ICL New Zealand managing director, notes that the success of the total group has been mirrored by the local operation. He points to "a continuing string of major successes providing solutions for target market such as the sale of retail systems to Fletcher Merchants Homebase stores, Foodtown and Hannahs, and winning the contract for the New Zealand Customs Department."

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- **CAD**
  has been around for a while but they are taking businesses from the eighties into the nineties – or are they?
- **Radical developments in software.**

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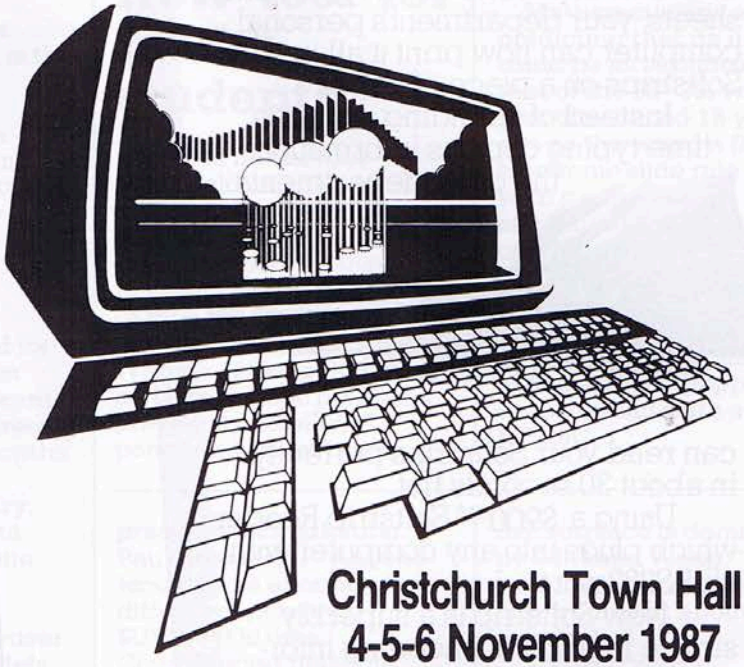

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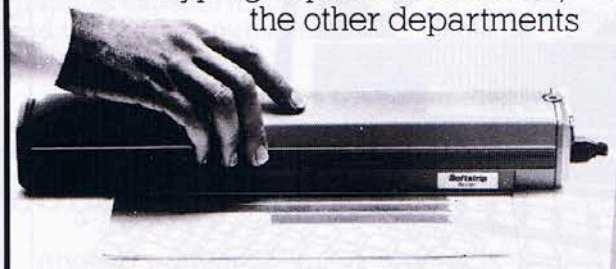

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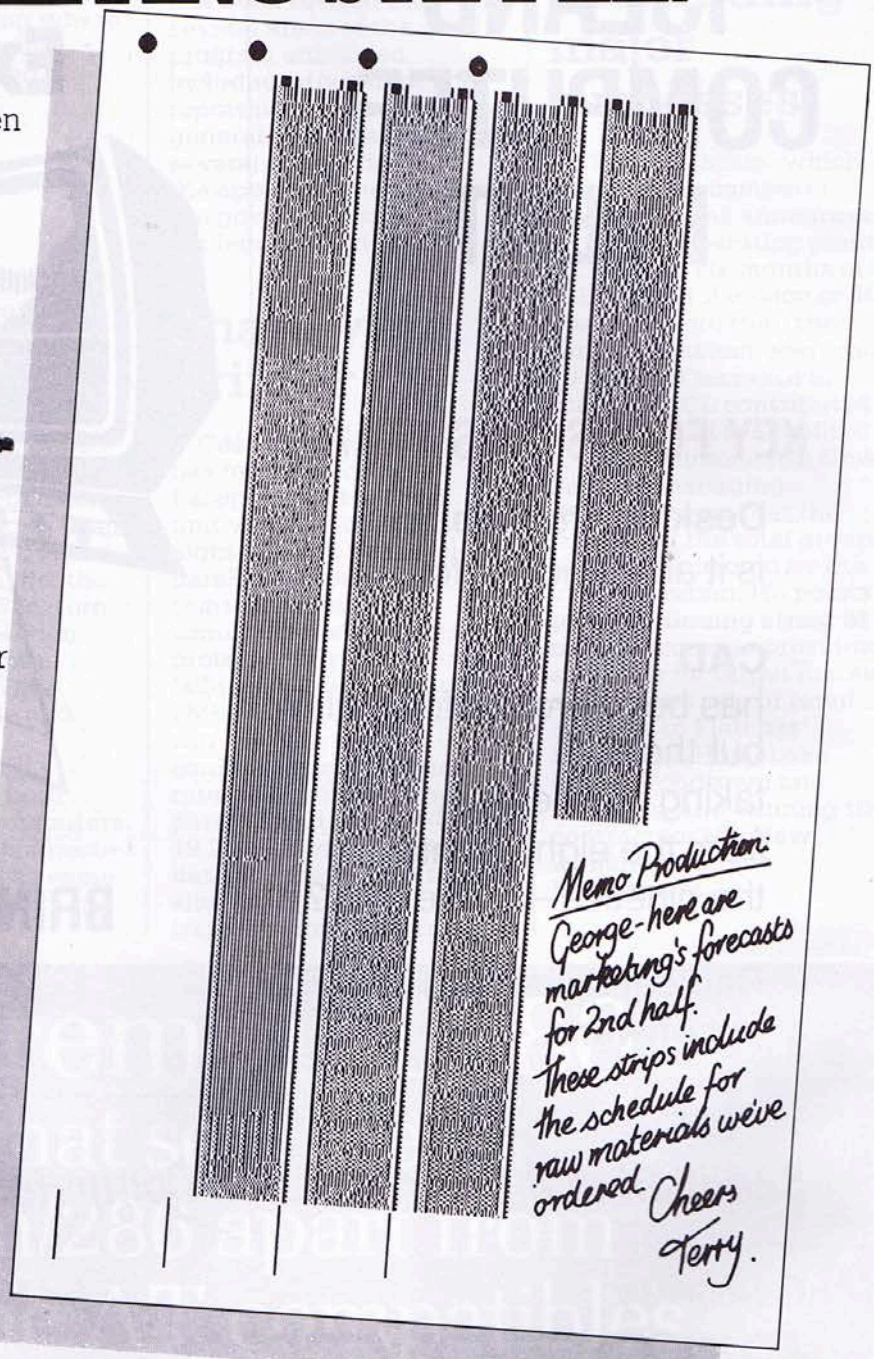


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# News with big Impact

A joint venture to produce Australia's largest computer company has been announced between Impact Systems and Gestetner Holdings, the UK-based worldwide office equipment giant. Each company will contribute around $A25 million to the project, 40 per cent of it to be invested in the UK-Europe market thrust and the remainder for the US.

Gestetner's market research indicated that laser printers were likely to be the fastest-growing office product in the next decade. The company selected Impact, whose printers already have a 40 per cent share of the Australian market, for its range of laser machines. Impact in turn has access to the Gestetner marketing network in 132 countries.

For the European market, production will be based in Denmark, but research and development will continue to be handled in Australia. The lasers will bear the Gestetner label.

# Satellite communications soon

A Memorandum of Understanding has been signed by Telecom Corporation and AUSSAT of Australia, covering New Zealand involvement in the AUSSAT-B series of advanced domestic communications satellites planned for the 1990s. They will provide enhanced domestic telecommunications, data and broadcasting services within both countries from the early years of the next decade.

AUSSAT-B will comprise two satellites and replace the present AUSSAT-A series, two of which have been launched with a third planned for this month. Telecom has leased one transponder and part of a second in AUSSAT-A3 for preliminary tests of domestic telecommunications, and will use up to four high power Ku band transponders in the final version. Each AUSSAT-B will feature a specially designed beam to cover all of New Zealand.

# Peace and Counterpoint

Another new microcomputer on the New Zealand market is the Unix-operating Counterpoint range, represented by Peace Computers of Auckland. With actual manufacturing centred on the highly automated Avco Electronics plant in Huntsville, Alabama, California-based Counterpoint shipped its first product in August 1985 and saw 60 per cent of its business as overseas sales in the first six months of this year.

Alone in the industry, Counterpoint bases its entire range on just one product – the 16MHz 68020 32-bit VLSI processor, for a multi-user machine, with all models being built as multi-processor, modular expansions of the unit. "The ability to expand is broader than any other single product in the industry," says Counterpoint's vice-president of marketing, Paul Rosenfeld, "Anyone would have enormous difficulty spending $US100,000 on a Counterpoint machine."

Brian Peace's background is solidly Unix, and in the three months since becoming Counterpoint's sole New Zealand distributor he has installed the machines in several sites. "The marketplace is dominated by DEC and Wang," he says. "All the others run into trouble at about 30 terminals."

The entry-level Counterpoint model CPS 830-6 will support six users, while the high-end system uses 68020 and 68881 CPUs, a 700Mb hard disk and 60Mb streaming tape to support 60 terminals.

# New tool for maths students

Said to be the first hand-held calculator capable of performing symbolic mathematics by using symbols instead of numbers to do algebra and calculus is the new Hewlett-Packard HP-28C. With its 128kb of ROM, it solves symbolic problems previously done with pencil and paper or on a large computer.

Mathematicians are predicting that its impact could be as significant as that of the HP-35, which was introduced 15 years ago as the world's first electronic slide rule and, with its successors, almost eliminated that chief tool of mathematicians and engineers. One university has already had a proposal to redesign its mathematics teaching sequence by equipping each student with an HP-28C.


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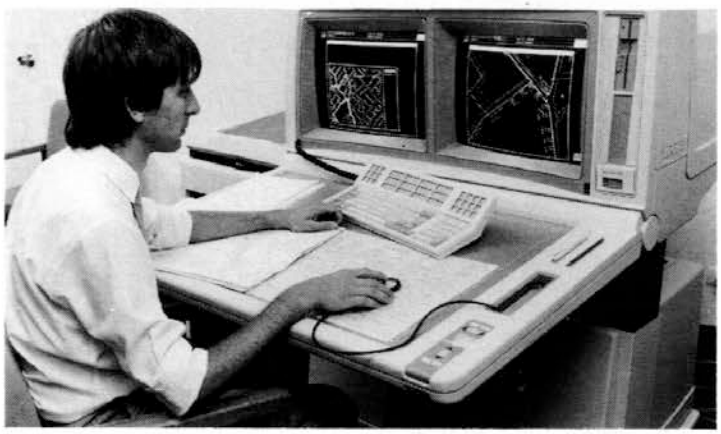

# Graphics workstation with new microprocessor

Intergraph's new graphics workstation, claimed to have the power of five VAX-11/780 computers, is the first to use the newly-released 32-bit 5 MIPS Fairchild Clipper reduced-instruction-set microprocessor. Both the twin-screen InterAct 32C and single-screen InterPro 32C will handle over 2 million double precision whetstones per second and have a 30 nanosecond instruction cycle.

Under Unix system V, the InterAct 32C functions as a general-purpose Unix-based workstation, as an Intergraph graphics terminal, an emulator of several industry standard terminals, and also as a standalone microcomputer compatible with the IBM PC and PC/XT. It has 6Mb RAM, 108.6Mb hard disk and 1.2Mb AT-compatible floppy drive.


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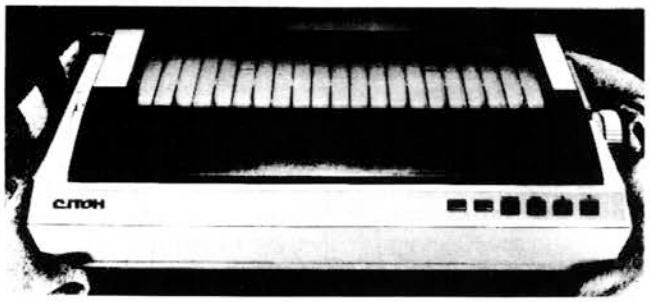


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# Appointments

*Peter Dickinson*

*Isabel Aldiss*

Contract software company ComputerPeople has installed a new management team in its Auckland office. Auckland manager is **Peter Dickinson,** co-founder and former managing director of Advanced Management Systems, while client services manager is **Glenn Bratton,** previously AMS marketing manager. Contractor services manager for Computer-People in Auckland is **Isabel Aldiss.**

*Glenn Bratton*

**Ross Pengelly** has been appointed to the new position of telephone products manager in Plessey New Zealand's Telecommunications Division. With a background in the NZPO, including instructing at the training school, his major responsibility will be liaison between Plessey and Telecom Corporation as new products are introduced with deregulation.

**Evert Jonker,** previously Plessey product manager for two-way radio, is now Hamilton branch manager of Plessey Business Systems.

Branch manager in Bell and Howell's newly-established Auckland office is **John McGregor.** The company recently purchased Macroset to expand its third-party computer maintenance business in New Zealand.

# New deal for Tandy

A new microcomputer dealer has appeared in Auckland. AdTech will operate mostly by mail-order until suitable premises have been found, says David Smith, adding that it will concentrate on being a low overhead, low price, high-turnover company. Computer systems will be exclusively Tandy, described as being the number one seller of micros worldwide, while peripherals such as printers will come from other sources.

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- Standard layout (IBM PC) keyboard

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## Package for bill-chasers

Recently released in Hamilton by Houston Computers is the Debt Collector series, a modular system for debt collectors and credit reporting agencies. Written in DataFlex, it can be run on LANs and linked to wider networks throughout the country.

Its modules include invoicing, file checking, debt collection, legal letters and court form generation, and word processing. The system has been designed in connection with a major credit reporting agency.

## Logan Park scores in Computer Olympics

Some 150 competitors on 32 machines vied with one another in the Otago Computer Education Society's Computer Olympics 87, held recently at Kaikorai Valley High School, Dunedin. Results were:

Graphics: senior T. Wright and J. Newman (Otago Boys High School) 1; junior: Christopher Edwards (Arthur Street School) 1, Michael Greaves (Wakari School) 2, Bryce McKinlay (Arthur Street School) 3. Brian Snell Quiz: Logan Park A 1, Balmacewan Intermediate 2, Logan Park B 3. Programming: Logan Park A 1, Bayfield 2, Logan Park B 3. Apple Logo: Bayfield B 1, Queens A 2, George Street Normal A 3.

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PAPERBACK SOFTWARE

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# New software distributor

Officially launched on 15 August was Seal Distribution, which has acquired the rights to distribute such brands as Hercules and Persoft (Smarterm) in New Zealand.

Managing director Mike Ridgway says that Seal will import direct from the manufacturers, and the company will be concentrating its resources on creating end user demand by aggressive marketing, with distribution through an authorised dealer network which will provide local technical support. He sees advantages in concentrating on a small product range and number of sources, while the established dealers handle the end-users.

A new Hercules product recently announced is the PS/2 Card, adding 720 by 348 graphics compatibility and RamFont to the new IBM PS/2 models 50, 60 and 80, and driving analog colour or monochrome monitors through the PS/2's built in video graphics array (VGA). The card is designed to enhance the new IBM range in the same way that the InColor card (reviewed on page 47 of this issue) does the PC/XT/AT series.

# Wyse moves

Providing technical and marketing support to Wyse Technology distributors and value-added resellers in both Australia and New Zealand is a new sales office in Sydney. Alan Stoops, regional sales manager for the region, will head the office, with plans to open a service and spare parts depot in Sydney before the end of the year.

The only importer to bring Wyse equipment into New Zealand direct from the San Jose, California, headquarters is Auckland-based The Great Escape Company. Other distributors Imagineering and MPA are branches of Australian companies which are themselves Australian distributors for Wyse Technology.

# Mac range Enhancement

New products have been announced by Apple for the Macintosh range. They icnlude HyperCard, described as "stackware" to link PCs with video technology and ease management of large amounts of data; MultiFinder, a multi-tasking operating system; and the Imagewriter LQ, a wide-carriage 27-pin dot matrix printer for all the Macintosh and Apple II range.

The communications product AppleShare PC has been released, enabling IBM PC or compatible equipment using the AppleTalk PC card to access information stored inthe AppleShare file server within an AppleTalk network.

# Crossword No. 2 solution

Golden Kiwi tickets have been sent to the three winners of the crossword in last month's *Bits & Bytes*. They are: J. Cammell, Auckland; Mrs B. Holowczak, Wellington; and E. Broadhurst, Stratford. Details of Crossword No. 3 can be found on page 94 of this issue.

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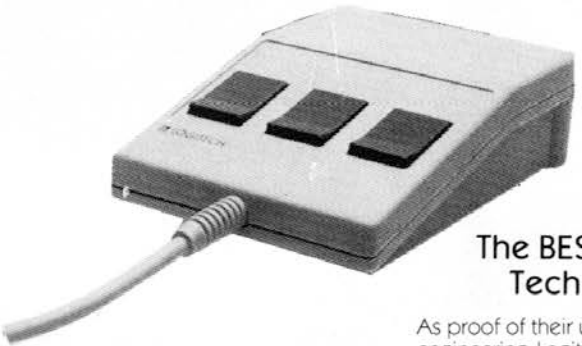

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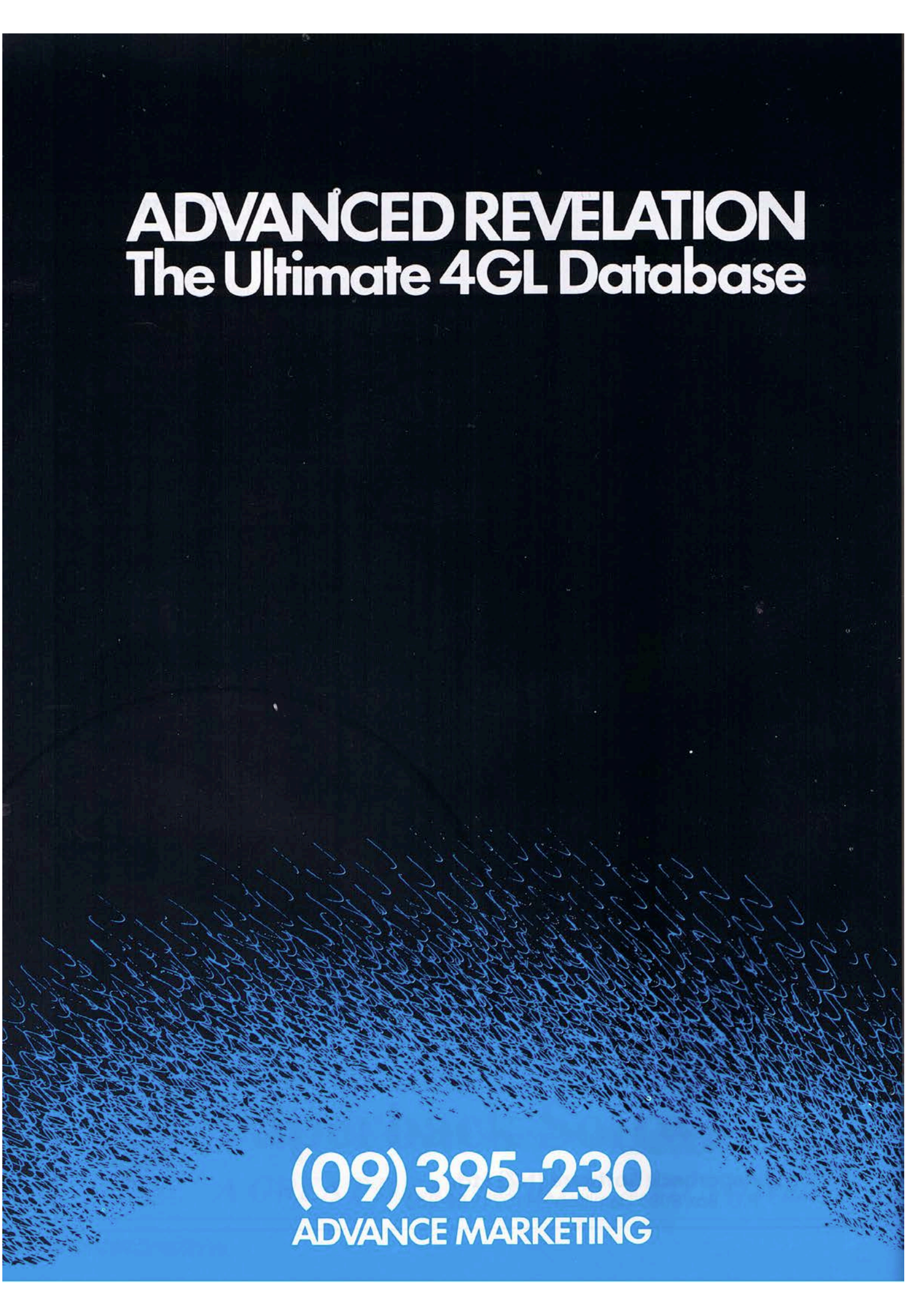

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ADVANCE MARKETING

## Expanding terms of Trader

The award-winning accounting package The Trader Series has had a general ledger module added, with a creditors' ledger due in the last quarter of this year. Marketing of the system is now being done by Automation One, launched by Cowan Bowman Associates last month to work in closely with Automation One Australia, which was established as an associate of CBA last year and has offices in most of the state capitals and Papua New Guinea.

CBA's own Business Package is now installed in more than 2,000 sites in both countries, and Automation One will also be responsible for marketing DataFlex development language and the database Q&A.

## Digitisers for CAD

Roland Digital Group is importing the Laipen series of digitisers from Taiwan in response to demand from CAD users for such equipment, according to managing director Bennie Gunn.

Both the CT-1150 and the CT-1170 operate on a standard serial interface and are Summagraphics-compatible, with an effective area of 297 by 297mm and resolution being software-definable up to 1000 lines per inch. The CT-1170 also includes a facility which allows users to set up their own menu commands anywhere on the tablet.

## Timebomb control

Telecom has purchased a new clock which apparently will provide a significant boost in the quality and speed of this country's data links with overseas countries.

The caesium clock, developed in Japan, is guaranteed to maintain accuracy to within one second – every 3,000 years! The clock depends on the timing of atomic particle movement and it's this high degree of accuracy which will create the efficiency for data transfer: because today's methods of transmitting data depend on synchronised transmitting and receiving, on a fixed international time reference, even minor variations can result in lost data transmission.

The highest accuracy in time keeping will assist Telecoms in providing more accurate synchronisation and thus quality and speed in data transmission, according to the New Zealand agents for the clock, Marine-Air Systems Ltd.


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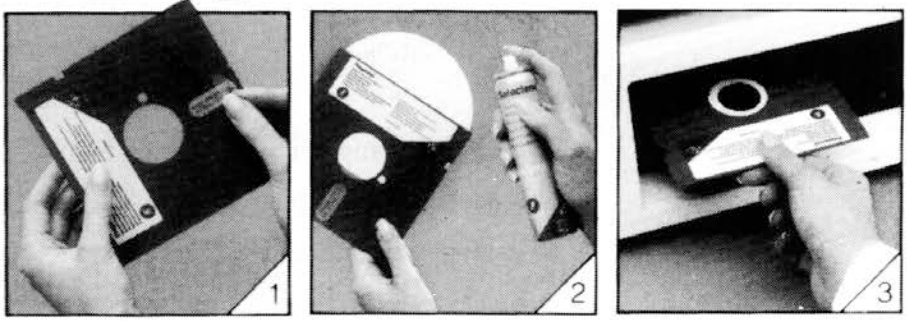


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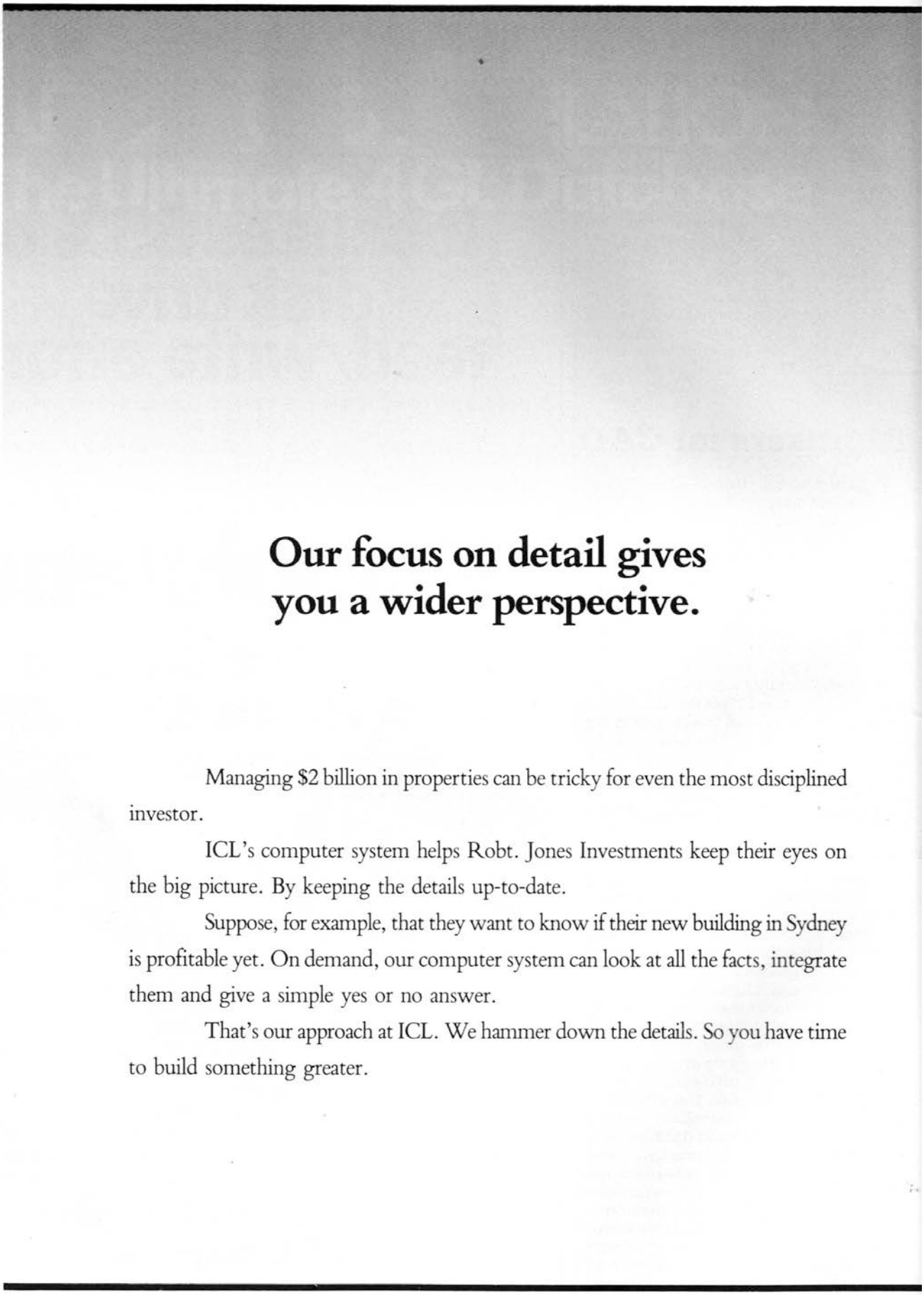

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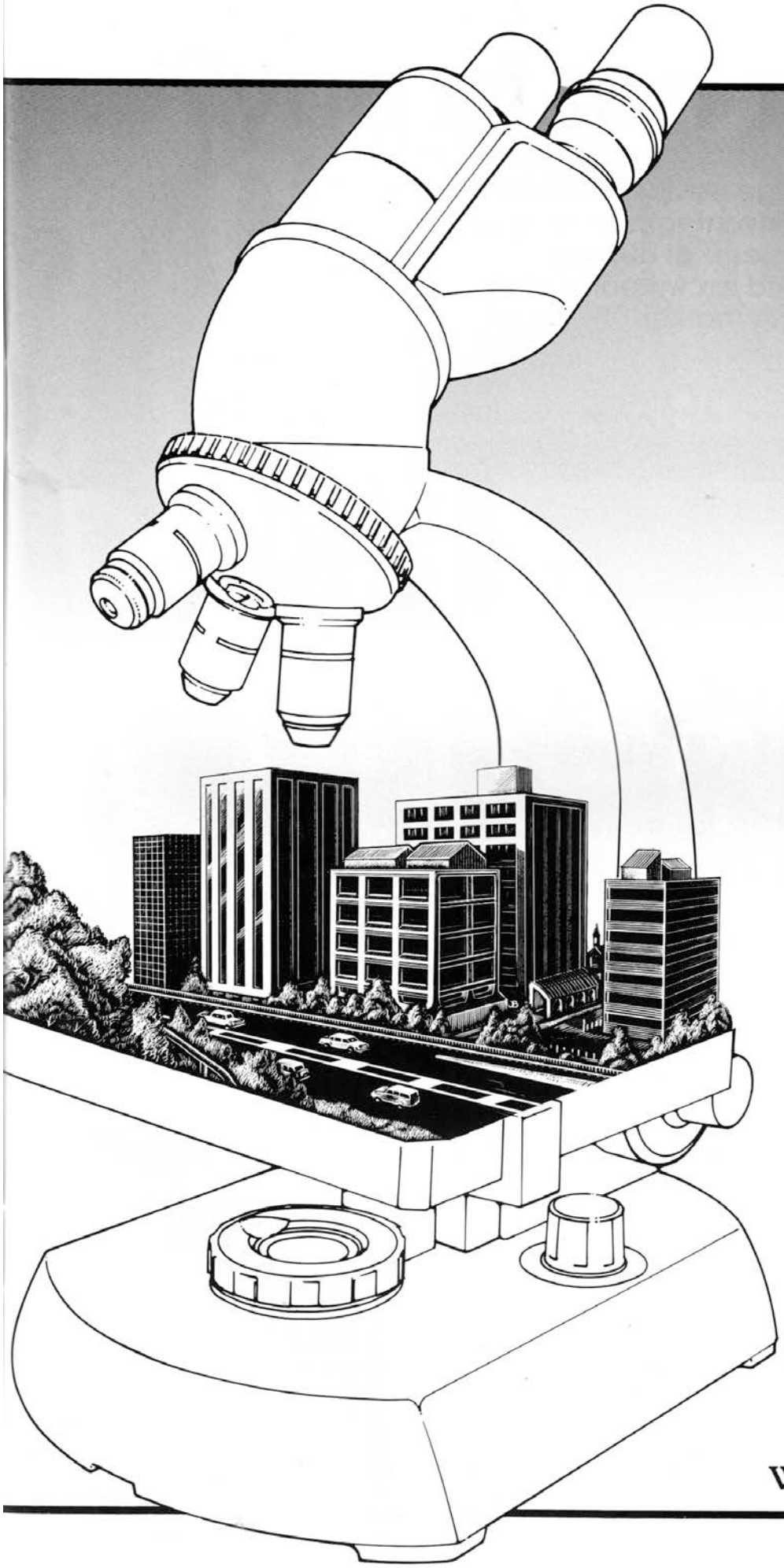

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# To buy or not to buy?

**That is the question facing a large number of people as they weigh up the definite advantages of computer ownership against the problems of obsolescence, capital expenditure and tax writeoffs. John King takes a look at a changing market.**

It used to be such a simple decision. The business person or organisation with a need for a microcomputer would either buy a suitable machine or press on with the old manual system, changed only by degree from the Dickensian image of eyeshaded clerks writing in large registers.

But things have changed recently. An increasing number of computer companies are renting hardware as an alternative for the customer who doesn't want the considerable cash outlay of buying outright. There might also be a need for specialised equipment to tide the business over a temporary busy period, or a preference to rent as a buffer against that ever-present problem facing the microcomputer user today – obsolescence from the day the machine is carried out the shorwoom door.

Software has no potential for renting, as it can be written-off for tax purposes in the first year. Besides, most PC users – and the majority of renters have already been in the PC environment – have their own pet software which they want to run on the new equipment.

Because of that software compatibility factor, the rental companies tend to specialise in the hardware they offer. Tech-Rentals, for example, stocks Macintosh, Hewlett-Packard, the Panasonic portable, and the full range of IBM, from PC to AT and including the new PS/2.

"Most of our customers are IBM-based users," says Judson Croft of Tech-Rentals. "They need the guaranteed software compatibility. They tend to be engineering and technical people and are reluctant to gamble, so they need the real thing. We could have a bigger share of the market if we had cheaper machines, but we like to address our client base properly rather than spread ourselves too thinly."

*(Continued on page 21)*

# The WESTERN Connection...

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# PROFAX RELEASE 4.0

## "Accounting for the future"

### ACCOUNTS RECEIVABLE

The Accounts Receivable module is principally designed to afford a small business efficient and accurate control of their customers' credit positions. From within this module, customer name and address lists are maintained, monthly statements are produced and accounts automatically aged. Credits and cash receipts are posted to specified months. Additionally, an analysis of monthly and yearly sales, reports on inactive accounts and nil sales lists are all produced to enhance the ability of the user to efficiently manage their business.
Reports include:

### INVENTORY CONTROL

The Inventory Control module is designed to maintain a constantly updated record of all stock items and their corresponding values and quantities. In addition, records are maintained of items sold or on order providing a business with a complete stock management system. Facilities to account for non-reducing, but chargeable services anditems, such as labour, freight, insurance and simlar have also been included. Stock quantities can be set to an accuracy of 4 decimal places. At the touch of a button an analysis is available of monthly and yearly sales, gross margins, stock valuations (by average and latest cost) and stock quantities (held or on order).
Reports include:

### INVOICING / SALES ANALYSIS

The Invoicing / Sales Analysis module is designed to integrate the information contained in the Accounts Receivable module (customer records) with the information contained in the Inventory Control module (stock records) to efficiently produce computerised invoices. These are created on the screen, with information recalled from the other modules on customer details, account balances, stock items, prices and corresponding stock levels. Extensive descriptions can be entered to the invoice, making it ideal for tradesmen and service industries. All data input from other modules can be manually over-ridden. GST is automatically calculated based on the optionally chosen inclusive or exclusive stock pricing. Multiple price lists are available through the use of a discount schedule.
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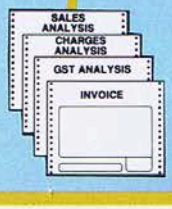


### GENERAL LEDGER

The General Ledger module can be regarded as the nucleus of the small business accounting system, providing up to the minute information on its financial position. Collating the data obtained from the other modules, the General Ledger produces reports that include Trading Account, Profit and Loss Account and Balance Sheet. Balances may be recorded up to $99,999,999.99. Monthly and annual budgets can be prepared for comparison purposes. PROFAX is supplied with an optional pre-set chart of accounts.
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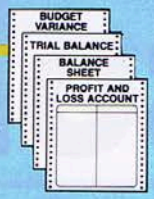
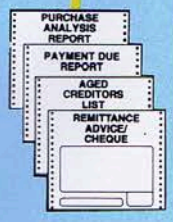



### ACCOUNTS PAYABLE

The Accounts Payable module attends to the all important creditor side of running a small business, where efficient cash management is vital. This module affords a business complete control of creditor payments and of the purchases made during the course of its trading activities. Facilities are provided to print cheques and remittance advices, analyse purchases and account for GST. Invoices and credits can be aged to the correct month. Invoices can be entered to the system and approved for payment at a later date.
Reports include:




*"Whether you use each module individually or integrate some or all of them, PROFAX is the most comprehensive accounting system for the small business. Take a closer look at PROFAX."*

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## Brand loyalty

Not surprisingly, other rental companies which are offshoots of hardware dealers tend to concentrate on those brands. Micro Utilities, the hiring arm of Metron Computer Centre, uses predominantly its own Kingtech brand of IBM-compatible imports, while Charles Battley and Associates has what its principal describes as a "symbiotic relationship with Computer Imports" and so fully half its business is Exzels, with "a very high proportion" of all machines being MS-DOS. Software Architects, an NEC dealer, offers that brand exclusively, as does Aspect Systems, although that company is only tentatively getting back into the rental area.

"We had an abortive attempt and it fell over," explains Peter Larkin. "Leaning or hire-purchase is available from Aspect Systems at the moment, but strict rental is being offered only selectively, to suit the customer's circumstances and our own cash flow."

***they have their own pet software which they want to run on the new equipment***

But NEC can be expected to have a bigger share of the rental market before long, as the New Zealand company plans to introduce a local version of the NEC Finance which has been operating in Australia for a couple of years. Both direct-sell (in minis and mainframes) and dealer (micros and printers) systems are working in Australia, although the tax laws there have a number of differences over the New Zealand scene.

Computer Rentals & Sales of Hamilton has been going five years ("we like to think we were the first company operating rentals in this country" – a claim likely to be challenged by Tech-Rentals which started in 1979) and offers the entire range of Commodores, from ATs down to the humble 64. "We stick with a name which is well-known," says Leslie Wong. "When we started out nothing else was available."

If there's one area where all rental companies agree, it's in the advantages to users of renting over straight purchase. "You don't get stuck with old technology," is how Cameron Scott of MOS Computer Software and Supplies puts it. "It helps the cash flow using as little capital as possible, with *known* outgoings." He adds that releasing the replacement and servicing responsibilities from the customer is an important factor.

"You're not locked into outdated equipment and technology," is how Wiri Marketing's Ian Johnson puts it. "In this day and age the best way to keep capital purchases down is to rent."

"The advantages far outweight the disadvantages," states Chris Johnson of Software Architects. "No company's got $10-20,000 sitting in the bank. They're much better off spending that sort of money on advertising. The majority of our business is total solutions – hardware, software, printers, training and ongoing support. After three years they own the equipment."

But he's unwilling to divulge the actual technicalities of the rent-to-own agreement. "We've done a lot of homework on it, and spent a lot of effort. I don't want our competitors to know how we do it."

The problem is that many sources see any rent-to-own arrangement as not precisely legal. According to the Inland Revenue Department, the depreciation rate of computer hardware is 20 per cent of diminishing value. The rules regarding leasing were changed in early 1985, and under Section 222A of the Income Tax Act, with a specified lease (having a guaranteed residual value, a term of more than 36 months or ownership acquired by the lessee) interest payments only are deductible. A non-specified or operating lease allows all payments of principal and interest to be deductible.

## The $64,000 question

"That applies only to companies," says a careful IRD spokesman.

And is there any difference for a private individual?

"Not really."

A lease gives the option to buy, while hire-purchase is strictly an arrangement to buy and only interest is deductible. With pure rental everything is deductible, but there must be no intention to have ownership.

"There is no such thing in law as hire-to-buy," says Ian Johnson, "only hire-purchase. All ours are straight rentals. We do some back-to-back renting, where we buy equipment on already installed sites and rent it back to them."

Nevertheless, many rental companies offer some sort of arrangement to give full ownership of the machine at the end of the rental or lease period – with the option of upgrading or changing the hardware at any time during the agreement.

"It's protection against obsolescence and the ability to have the power you want at that time," Charles Battley points out. "Hardware is getting more powerful

# To buy or not to buy?

at the same time as it's getting cheaper. For example, if you buy a 10Mb machine, when you need to upgrade to 20 or 30Mb it's probably the same cost as that 10Mb today." Hiring has formed part of his computer business since 1981, and he offers rentals for periods from one week to 36 months, with varying residual amounts, being flexible to meet the customer's requirements.

Tech-Rentals, too, has a rental option to buy (ROB) which it describes as "slightly different from hire-purchase" but is treated as true rent with no obligation on the customer who can return the hardware at any time with no penalty. If the original agreement is for one year, 12 consecutive monthly rental invoices are sent, with the 13th, covering residual value, being a sales invoice. The customer pays interest while Tech-Rental carries the service contract.

All technicalities aside, who actually hires computers these days?

Just about everybody, it seems, from government departments (and of course their recent corporate counterparts) on down. Servicing the whole country from its Hamilton base, Computer Rentals & Sales finds it has no standard user, customers ranging from businesses to enthusiasts. A business might have a short-term need, for example for sudden expansion, to cover equipment breakdown or just for a short-term project, whereas the enthusiast might want to rent a part of a system, a printer or disk drive. One local school, for example, has a Commodore 64 network with one disk drive to service an array of screens, and for security during holidays rents the 64s to its pupils who then hire disk drives.

***"There is no such thing in law as hire-to-buy, only hire-purchase."***

One of the few currently not renting to government departments is Software Architects. Instead, its customers tend to be small to medium-sized businesses with some larger establishments. "The corporate market, as I see it, buys outright," says Chris Johnson.

# To buy or not to buy?

## Browbeaten

"We tend to supply the smaller business," Sion Roberts of Micro Utilities points out, "people who are marginally into computers and feel they have absolutely no choice in the matter. We get a broad range of those sorts, browbeaten into it by their accountants or the sheer volume of work. They haven't had a lot to do with the technicalities.

"Yet there's a high degree of optimism out there, even when machines are expensive. If someone has a Commodore 64 and wants to upgrade, he thinks hiring an AT is not much more – and he has to be disillusioned." In fact a relatively basic AT costs about four times a C.64 for a month's rent.

Charles Battley finds a large number of people who choose to rent for a period "have a fair idea of what they want. They satisfy needs right now, and as things change they get something more appropriate."

He is also cautious about the present high level of government renting. "With corporations there's a tendency to centralise, and often a lack of capital. They're in a temporary state of flux, until things settle down, so it's short term."

With no such worries is Tech-Rentals. "Not many government departments and corporations don't use us," according to Judson Croft. "At the end of March every year we can't supply enough – it's a big rush. Of the top 200 new Zealand companies over 150 use our equipment – not only computers as our major business is hiring digital electronic gear – and we get some weird applications."

The rental area seems a little more stable than the hardware dealership side of the microcomputer industry, even if firms still come and go. Group Rentals used to rent computers, and although the service would still be provided if somebody went along and asked, the company is not actively promoting it.

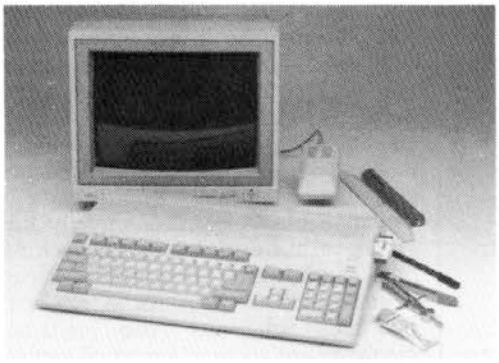
"The TV and video market was reaching saturation point about four years ago," says Grant Burtenshaw, "so we looked into the alternatives. Our first foray was into videotex, which is still successful, and then into computers – not so successful. Our strengths are not in one-off situations, and computers ended up not fitting the bill.

"In EFT-POS we're the only rental and sales supplier in New Zealand, with 100 per cent of the market – not a bad share. We provide more than just the hardware, with full installation, backup service and distribution. We couldn't do the same with computers, and couldn't provide any great advantage over other suppliers. Our style of operation suits mass distribution rather than one-offs."

So renting a computer has a number of advantages, to be weighed against the only apparent disadvantage – the increased cost of putting a machine in the office. Costs vary widely and it naturally pays to shop around, but a typical monthly rental for an XT or equivalent starts at about $300 and most rental companies would expect to cover all their overheads for a given piece of hardware within 12 to 18 months.

Somebody has to provide all these services and finance, and companies doing that for free are a bit thin on the ground these days. If the overall price is more important than the intangible benefits of keeping up with the very latest in technology, not to mention minimising the amount paid into the Consolidated Fund for somebody else to spend, by all means buy your hardware outright.

But there is another way. ■

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# Lapping up the snob appeal

American research companies disagree on the potential market for laptop computers, variously described as weighing less than 8kg and battery powered, or briefcase-sized and with flat panel display.

According to Infocorp of Cupertino, California, 295,000 laptops were sold in the US last year, a figure expected to more than double to 630,000 units in 1987. However, International Data Corporation of Framingham, Massachusetts, is more cautious, expecting that 330,000 portables will be sold this year, 27 per cent more than the 259,600 in 1986.

International Data's analysis of the market puts Zenith at the top of the laptop with a 20.7 per cent share, just ahead of Toshiba's 19.9 and Grid Systems at 17.2. Next come Tandy (9.6 per cent), IBM (8.8) and Hewlett Packard at 7.5, with Quadram Datavue 5.0 and all others accounting for 11.4 per cent.

Stephen J. Bosley, International Data analyst, says his company's more conservative estimates are due in part to a perception that many buyers are unlikely to pay a premium for portability unless their occupation requires them to carry computers around – or they want to show them off "for the snob appeal".

Just when everyone was starting to think how useful a laptop portable would be.

# Apple still biting

Apple distributor CED says it is not worried by the appearance of the IIc clone Laser 128 (reviewed on page 24 of this issue) on the local market. Helped by a recent reduction in price for the education market, the IIc is still 'selling strongly,' with 100 machines going into Southland schools in the last couple of months, while more than 3000 Lasers have so far been sold in New Zealand, many of them in Otago.

Nevertheless, CED is looking hard at the legal aspects of the Laser. "Are they breaking copyright?" asks CED managing director Mal Thompson. "The Apple II is much harder to protect than the Macintosh. There was a recent case in Australia, which Apple lost, but we have patent attorneys looking at the copyright in terms of the operating system and the way it's been put together."


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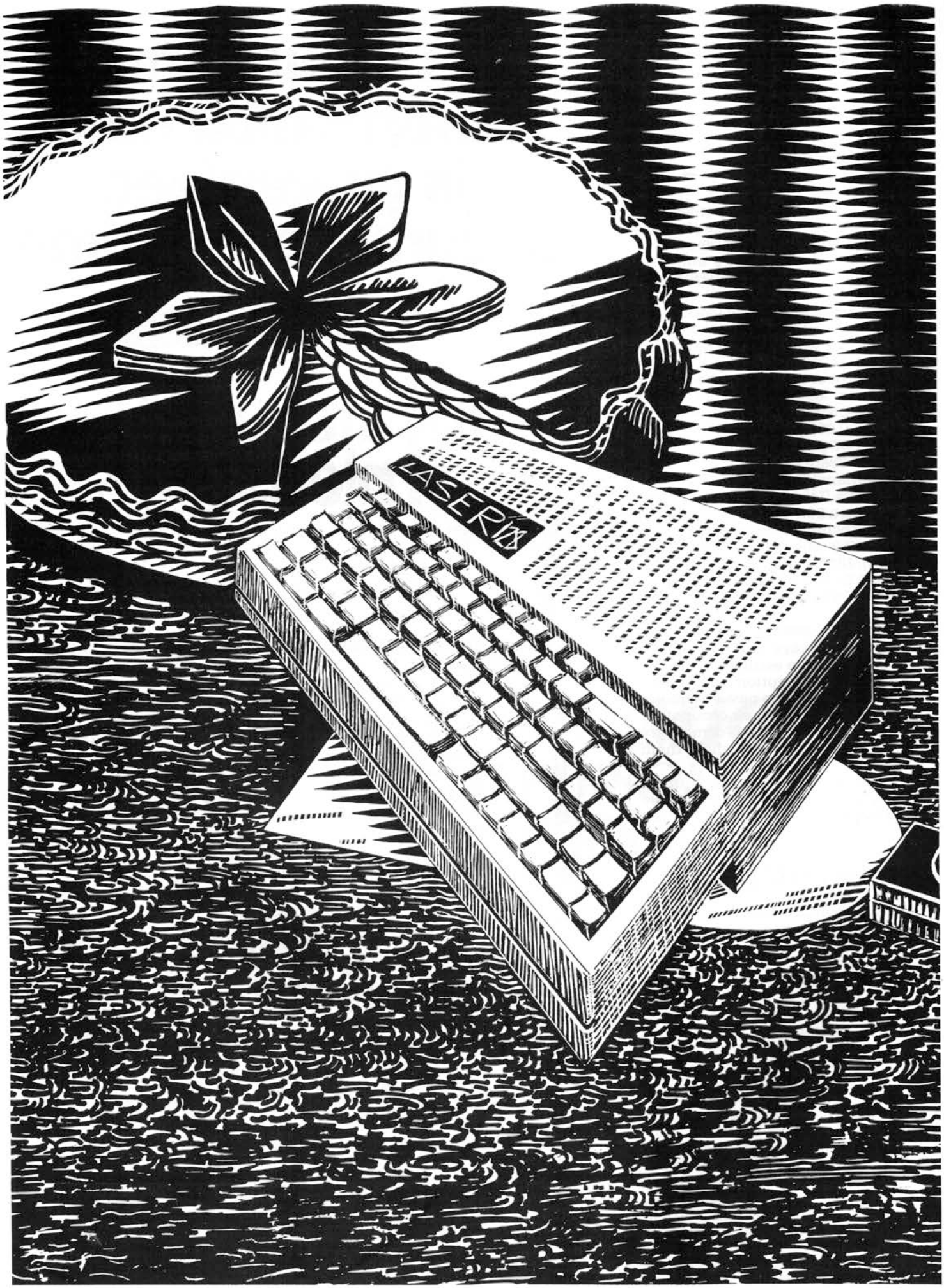



Illustration by Sally Hollis-McLeod

# Taking a slice of the pie?

**Apple has managed to keep the clones at bay for a while, but now another aggressive workalike has appeared on the market. Mark Lim, familiar with the products from Cupertino, takes a look at the Laser 128.**

Not so very long ago – in December 1984 to be exact – the then-new Apple IIc was reviewed in Bits & Bytes. Described as "cute", the computer made it all the way to the front cover and received very good marks inside.

Mainly on the strength of that review, my first computer was – what else? – an Apple IIc. Now I sit in front of a IIc lookalike, the Laser 128, writing a review on the strength of which...

But I'm getting carried away.

## Not too carefully

The Video Technology Laser 128 is an Apple IIc lookalike only if one isn't looking too carefully. Like the IIc, the Laser is a sort of portable computer, coming in a one-box unit which holds its processor, keyboard, one disk drive and lots of I/O (Input/Output) ports or sockets. These last include two serial ports, a connector for an external disk drive, one for a monitor and a video expansion socket, and a mouse/joystick port. There's also an earphone jack and a volume contrtol on the side.

However, like the IIc, the Laser's power supply is an external (but smaller) box and its monitor a separate unit. This means that, while it's relatively easy to move it about from room to room – something which I did quite a bit – those of you looking for a computer to use in the LearJet should keep looking.

And speaking of looking, a closer inspection the Laser reveals some important differences from the IIc. For a start, the Laser's wider, to accommodate a 90-key keyboard, so yes, there is an Apple II (of sorts) which comes with a built-in numeric keypad and function keys. More about them later.

## Sealed unit

As with the IIc, the Laser 128 is a closed box, which means that you risk scratching your case and voiding your warranty if you ever try opening it up. But you just might want to do that anyway, or get a dealer to do it for you, because inside the computer, near its RAM chips, is a memory expansion slot, a 15 by 2 pin jumper connector. That's not like any Apple II slot I've ever heard of, but it's there anyway and, with the Laser 128 Technical Reference Manual, someone could make some use of it.

As for what's already inside, the Laser 128 has at its heart the same 8-bit, 1 MHz 65C02 microprocessing unit (MPU) as have the Apple IIc and enhanced Apple IIe, supported by the same 128 kb of RAM as you'd find fitted inside the Apple IIc.

## Apprehensive

Something else interesting about the Laser ROM is that it's stored on a socketed EPROM (Eraseable/Programmable Read Only Memory) chip located under a removeable panel on the computer's underside. I'd been a bit apprehensive at first about how I'd go about testing the Laser's Apple-compatibility, but that socketed EPROM really set my mind at rest.

Let's just consider for a moment how a program can become Apple-incompatible. There are, in my opinion, two ways, corresponding roughly to matters of hardware and software. The first is when a program relies too heavily for its proper execution upon equipment which has been changed. This is what happened to all those communications programs which directly accessed their Apple's serial ports when Apple swapped the chip controlling it for the one in the Mac when it released the Apple IIGS.

The other way for a program to become Apple-incompatible is for it to use routines in its Apple's ROM in a way which Apple has said it should not. This happens when a program jumps into the middle of a ROM routine instead of calling it from an entry-point specified in Apple's manuals.

So, in the light of all this, how does the Laser 128 fare in the compatibility stakes?

Not too badly. I can't read a schematic, so I can't say whether the Laser's designers have done anything they really shouldn't have. But then again, everything which I as a programmer expect to be in a certain place is in that place, so I think we can be fairly certain the Laser's designers have played by the rules with respect to hardware.

Still, there's really only one way to assess the Laser's Apple-compatibility, and that's to run (or try to run) Apple software on it. Since there are thousands of such programs around, that's easier said than done. Reasoning, though, that old, copy-protected games would most test the Laser, I did just that, with results I've already noted above. My advice to the potential buyer is to do what those wanting IBM-clones do: have the software you want to run on the machine demonstrated on it, in your own home and at your own convenience if possible. After all, it's not whether the Laser can run all those thousands of Apple programs that counts, but whether it can run *your* programs.

## What should have been

And while I'm busy dishing out the free advice, here's what I think about the Laser 128: it's a good computer. It's what – with 20/20 hindsight – the Apple IIc should have been in the first place. Let's take the points in its favour one at a time.

- Inclusion of a parallel printer interface as standard equipment. Most printers, especially most low-cost printers, are parallel ones, and this allows first-time buyers and/or buyers on a budget to get one without having to buy a serial-to-parallel conversion box at the same time.
- Use of TEAC-type disk drives. Although these have a lever-locking mechanism with which most Apple users will be unfamiliar, they have the advantage of being able to reliably access 40 tracks, whereas whoever Apple buys its drives from makes ones which can only reach 35-38 tracks.
- Situation of a monochrome/colour display switch above the keyboard. This allows the user to flip from one type of display to the other in the middle of a program if he or she should find the display unreadable – a much better arrangement, I almost hate to admit, than that of the Apple IIGS.
- Location of a port- and mouse-configuration program in ROM accessible

by pressingt Ctrl-P-Reset (be very careful of the sequence!). No one should have to boot up a Systems Utilities diskette in the middle of a program just because a printer won't print.

- Possession of double-vertical graphics modes. I'm not too sure about this one. The User's Guide says the Laser can display a maximum of 560 by 384 monochrome pixels, but nowhere else in it or the Technical Reference Manual is one told how to get the Laser to do so.
- Commitment to openness of architecture. Now this one I am sure of. I've already mentioned the Laser's socketed ROM, and by now it should be clear that I'm one of those who believe that you can't have too many sockets.

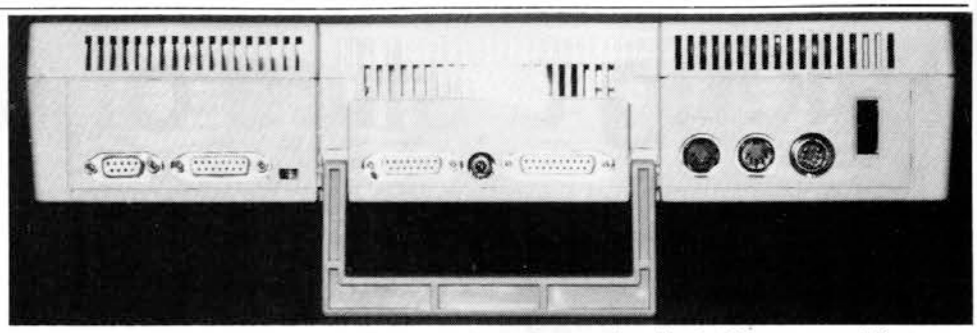
## And what could still be

There are things the Laser's designers could have done better. One's documentation. Most users will have only the User's Guide and BASIC Manual which comes with the computer. Now, this book should not be a User's Guide *and* BASIC Manual. Its design clearly indicates that it was intended to be two books, what with an appendix buried in the middle of it and no way of telling from the front where the BASIC Manual starts. Worst of all, there's no index.

And as for the optional Technical Reference Manual once again, no complaints about its contents, just the presentation. Everything a programmer could possibly want to know about the computer – except for details about double-vertical graphics – and the technician about its maintenance is there, all the way from memory maps and timing diagrams to the 65C02 data sheet and schematics of the computer. It's just that they'll all have the devil's own time finding the information they need without an index. Hong Kong English I can stand – and understand; missing indices I can't.

But perhaps the thing to which I most object about the Laser 128, apart from its mouse, is its keyboard. I'll start with its mouse. This is a lightweight plastic box which the user buys disassembled with no instructions on how to put it back together again. And that's very bad, because it's quite easy to wreck the mouse trying to assemble it.

Still, that's nothing compared to the way I feel about the Laser's keyboard. It is a fine concept flawed in the execution. I really appreciate its numeric keypad and contoured layout, as well as the fact of its full travel. Separate Pause and Break keys, which generate a Ctrl-S and Ctrl-C respectively, are also nice.



*South end of a northbound Laser 128, showing how the carry handle doubles as a stand. Ports are from left, joystick/mouse, parallel printer, Dvorak/qwerty keyboard switch, RGB port, composite colour or mono output (RCA socket), external drive port, modem, serial printer, power input socket, and power on/off switch.*

## In the balance

So is the Laser 128 for you? As is the case with all such questions, it depends.

All of my criticisms can be answered. The Laser is not so difficult a computer to set up and use that a hand-holding manual is absolutely essential, and most technical documentation smells anyway. As for the Laser's keyboard, that's for the individual to decide. I will admit to having been spoilt by my GS's keyboard, but if you've never used any other keyboard before...

The thing about Apple clones used to be that Apple controlled the standard to which they attempted to adhere more completely than IBM controlled its PC standard. That's no longer the case. The Apple IIe is now frozen in silicon, in the Mega chip of the Apple IIGS. Quite clearly, the leading edge of change is now to be found in the 16-bit arena; there's little prospect of any decision being made in Cupertino, California which could suddenly make the Laser 128 obsolete.

And that's the catch, because the Laser 128, along with all other 8-bit Apple IIs, is already obsolete. Obsolete, that is, in the sense in which CP/M is obsolete but not dead. As long as users continue to find the vast body of 8-bit Apple II and CP/M software useful, they will continue to buy 8-bit Apple IIs and CP/M systems.

And the Laser? I see no reason why the first-time buyer should not consider it. I've seen AppleWorks running on it and, if you intend to be a one-computer user, the Laser and it are all the hard and software you'll ever need. The Laser also makes a good second computer, as I've found these last few weeks and, with its low cost, could be a good way for a school or other educational institution to quickly swell the number of machines it has.

The answer, then, depends upon the question.

As usual. ■

**Microcomputer Summary**

| | |
|---|---|
| Name: | Video Technology Laser 128 |
| Distributor: | The Floppy Disc Express Co. |
| Microprocessor: | 65C02, 1 MHz |
| ROM: | 16kb |
| RAM: | 128kb |
| I/O: | 2 serial ports, 1 parallel printer port,<br>RCA-type monitor socket, video expansion port,<br>external disk drive connector, mouse/joystick port |
| Display: | 40 by 24 and 80 by 24 (columns by rows) text,<br>40 by 48 and 80 by 48 16-colour graphics,<br>280 by 192 and 560 by 192 6-colour graphics,<br>280 by 384 6-colour and 560 by 384 16-colour graphics |
| Keyboard: | 90-key QWERTY/Dvorak switchable, with numeric keypad and 10 non-programmable function keys |
| Mass storage: | 5.25 inch minifloppy disk drive, 140 kb |
| Language(s): | Microsoft BASIC (Applesoft-compatible) |
| Operating system: | (none bundled) |
| Software: | (none bundled) |
| Price: | $1265 (incl. GST) |
| Options: | TV interface – $59.95<br>monochrome monitor – $330.00<br>colour monitor – $870.00<br>external disk drive – $360.00<br>mouse – $165.00<br>expansion box – $120.00<br>Technical Reference Manual – $49.95<br>(all prices include GST) |

*Review machine supplied by The Floppy Disc Express Co, Auckland.*

# What's up with What's Best?

by Geoff Storey

Spreadsheet users will be familiar with the "what if?" question and the hit-and-miss approach that this implies. What's Best!, from General Optimization Inc, Chicago, takes this "what if?" question a critical step further by using the spreadsheet to find optional answers using linear programming.

The difference between a spreadsheet and What's Best! is that where a spreadsheet allows one to manipulate figures until what appears to be a suitable solution to a problem is reached, What's Best! takes all the relevant data from a spreadsheet and by the process of optimisation reaches, automatically, the single best solution under the circumstances. It can thus determine such things as the most appropriate product mix in a case where limited resources must be combined for maximum profit, or the most efficient staff scheduling at maximum cost or the optional routing of goods to minimise shipping costs.

One minor limitation is that What's Best! cannot be used directly with existing spreadsheet files. Data must be rearranged into a specific format, which is easy enough for most spreadsheet users to do.

What's Best! supports Lotus 1-2-3 Release 1A and higher, and Symphony release 1.1 and higher.

## Easily installed

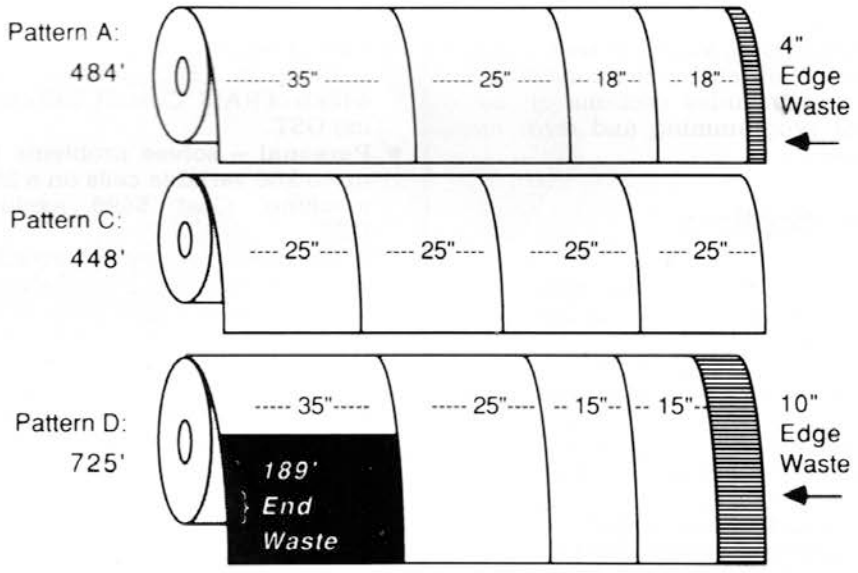
What's Best! is easily installed and its small memory – resident portion is called up from within the spreadsheet. Having rearranged the data in a spreadsheet into a suitable format, a simple A, B, C, routine, using the function keys, invokes the power of What's Best!

The program requires the user to identify three cell types or range: Adjustable, Best and Constraints, hence A, B, C. The contents of adjustable cells are essentially variable output, for example such things as quantity to produce, units to produce, and minimum number of staff, while the best cell reflects maximum profit or minimum cost and the contraints cells indicate the resource limitations, which might be stock quantities or number of employees.

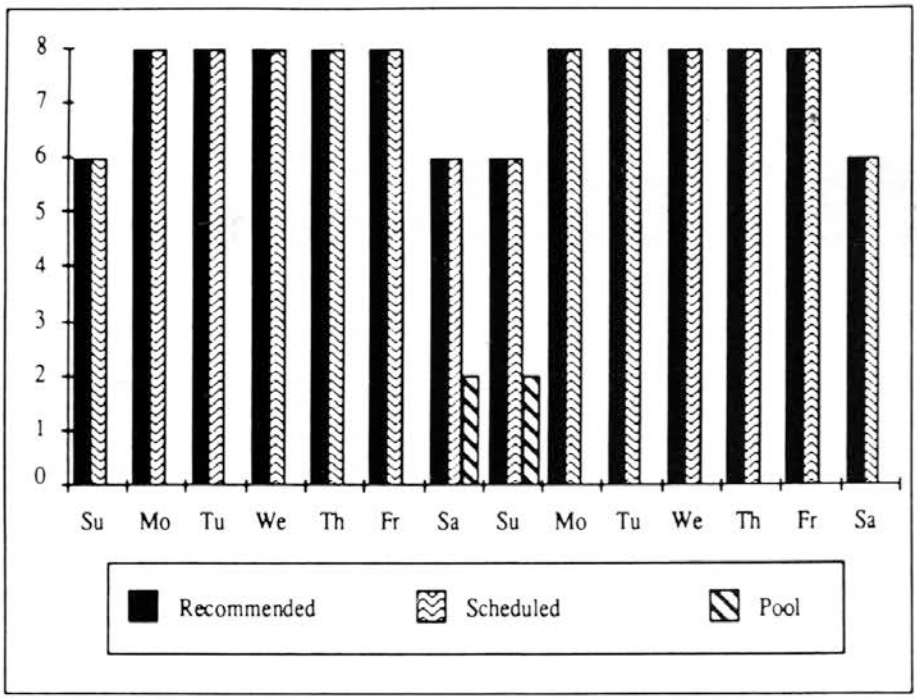
The final step is to request optimisation. What's Best! automatically saves the worksheet to disk, exits Lotus 1-2-3 or Symphony and proceeds to search for an optimum solution to the problem. When the answer is arrived at, What's Best! reloads Lotus and the user's worksheet and slots in the appropriate data.

What's Best! features a dual value command that calculates the cost or penalty of producing a unit that the program wouldn't recommend producing. As described above, the package is easily invoked and at lightning speed calculates the answer.

The program disk includes sample worksheets incorporating problems relating to product mix, staff scheduling, optimal routing and blending. Used in conjunction with the manual, these sample worksheets make it easy for the first time user to understand how to use What's Best!




| = 5000 Exposures | Group 1 | Group 2 | Group 3 | Group 4 | Group 5 | Group 6 |
|---|---|---|---|---|---|---|
| TIMES | | | | | | |
| Mirror | | | | | | |
| TRIBUNE | | | | | | |
| HERALD | | | | | | |
| Post | | | | | | |




More advanced worksheets containing non linear examples are also provided.

The manual supplied with What's Best! is well laid out in a concise manner and includes sections on basic linear programming and error messages.

## Specifications

What's Best! features mathematical optimisation utilising linear programming – revised simplex algorithm. The program supports Lotus 1-2-3 release 1A or higher, and Symphony release 1.1. or higher, operating on IBM compatible machines, either dual floppy drives or hard disk.

What's Best! is available in three different versions as follows:

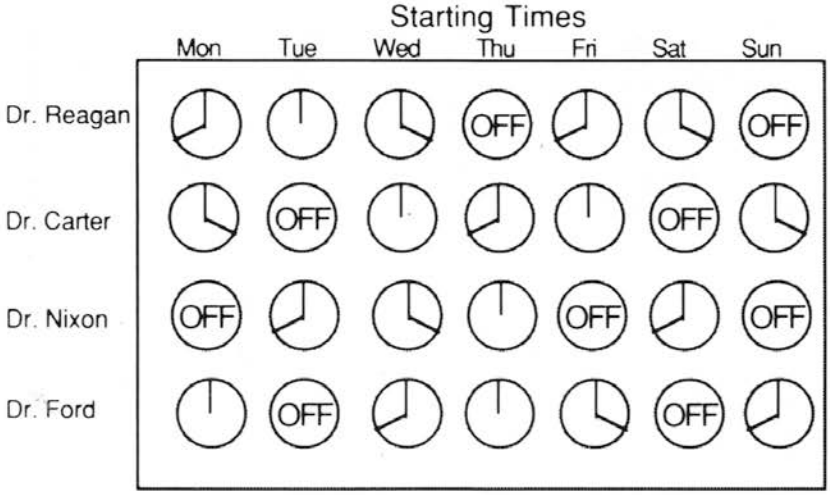
- **Professional** – solves large scale problems with up to 4,000 variable cells when a full 640kb of RAM is available. Cost $2,295 excluding GST.
- **Commercial** – solves problems with up to 1,500 variable cells in 448kb of RAM. Cost $1,595 excluding GST.
- **Personal** – solves problems with up to 250 variable cells on a 256kb machine. Cost $495 excluding GST.

What's Best! is copy protected.

While rearranging a workshop file into an acceptable format for What's Best! can take some time, it is nothing compared to the hours and costs saved in scheduling or production management on an ongoing basis. Lotus 1-2-3 users will find What's Best! easy to use and readily identify with its strengths. ■

*Evaluation program provided by the New Zealand distributor, Remarkable Enterprises Ltd, Dunedin.*

**8-Hour Shift Assignments**

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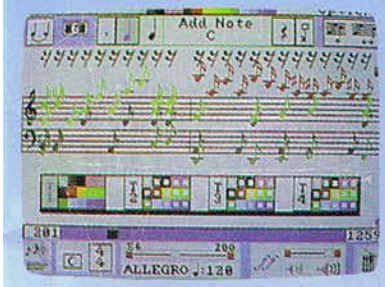
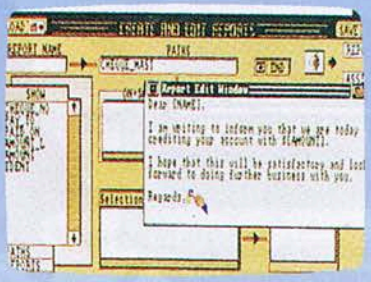



* The Amiga 500 makes music brilliantly. It's built-in synthesiser will produce almost every musical instrument. You can write a melody or a symphony. The Amiga will digitally store the music on its 3½" disc drive and play it back in stereo.



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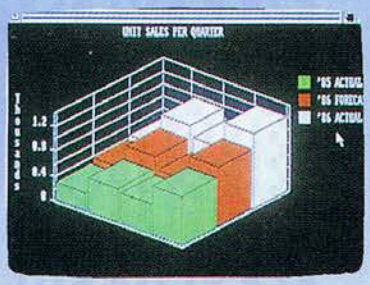
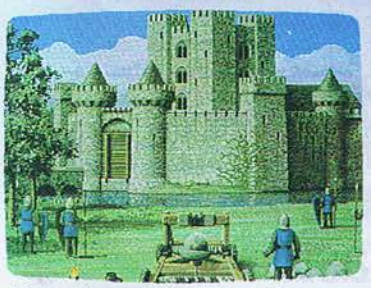



*Desktop publishing, spreadsheet, wordprocessing, data base and accounting software, in fact software for most business applications, is available for the Amiga 500. It has Telecommunications capabilities as well.



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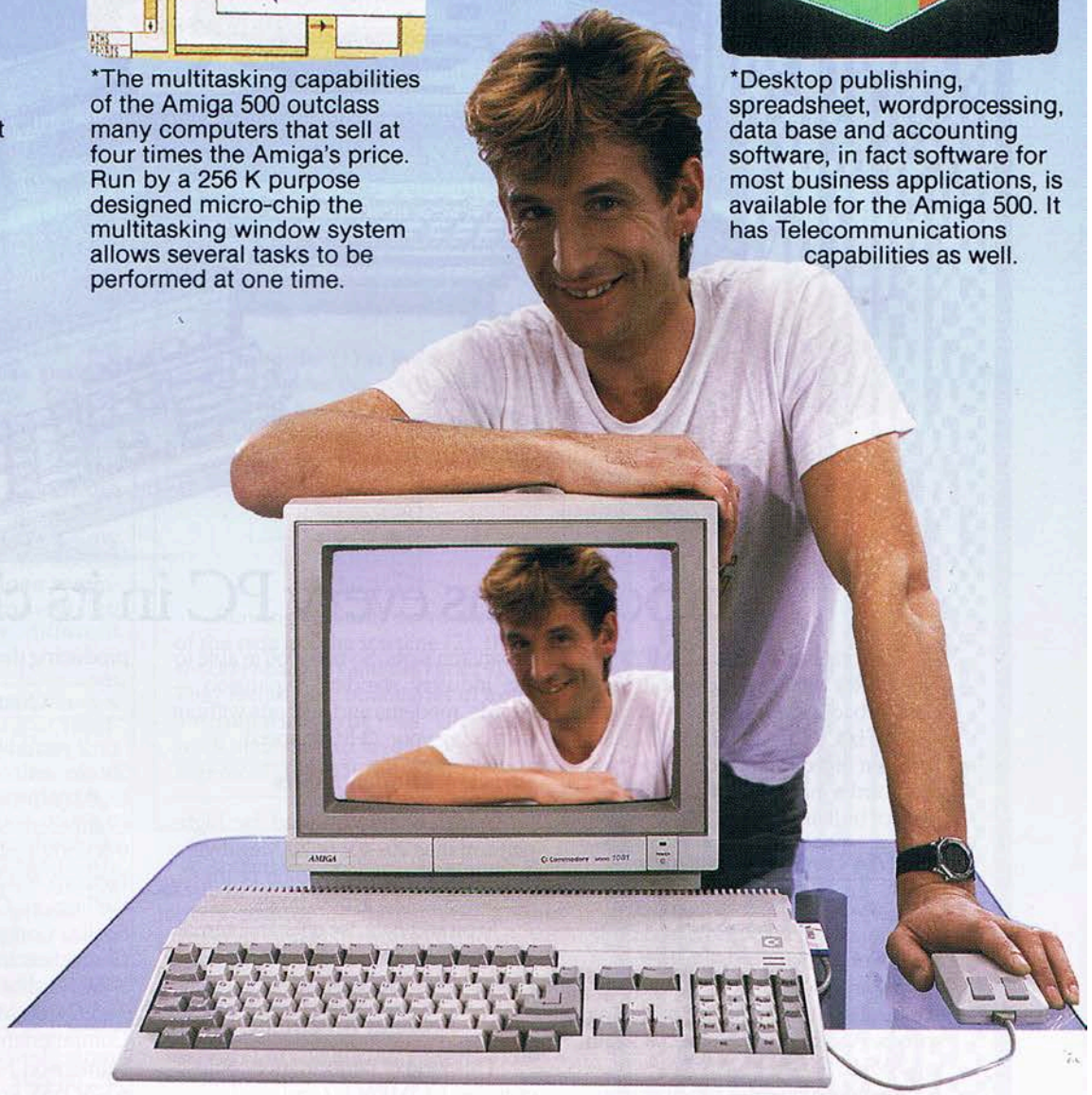

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# Softening up the data

**Have you ever wanted something to read in data found in publications, and also store it in reduced but secure form to withstand dust, dirt, bending and folding, the postal system and coffee spills? Selwyn Arrow thinks this might be the answer.**

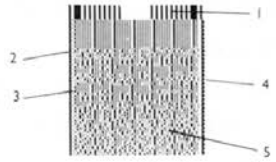
With the ever-increasing deluge of information these days it would certainly be of great benefit to be able to convert the most useful data into some form that could be directly read by your computer, instead of having to sit at the keyboard painstakingly keying it in yourself. Many times I have been turned right off some useful program in a magazine when I would have had to type in a lot of data.

Now help has arrived, in the form of a new product released here last month by Verbatim, the disk people. It is a device called the Cauzin Softstrip Reader which allows your computer to read programs and text directly off the printed page. You may have seen those strips of code printed in overseas computer magazines; now we have the means here in New Zealand to read them. As an added bonus, Softstrip also provides a simple and secure means of transferring data between completely different types of computers.

To fully appreciated just how useful such a device can be, let's have a quick look at current means of reading data, including programs and text, into your computer. The main medium is of course a magnetic coating, either on a rotating disk or on a long strip of tape. Either form is highly susceptible to stray magnetic fields, wear and tear, and of course sticky fingers and coffee stains. In any case the magnetic material is not suitable for dissemination in the mass media via computer magazines and books.

Over the years a variety of methods have been tried, from punched paper tape to bar code readers similar to those now used in supermarkets. Both of these suffered from not being able to pack much data in a small space, while bar code readers were quite expensive and needed a very steady hand to guide the device accurately over the length of a printed page.

The header (1) at the top tells the Softstrip Reader the number of bytes in a line, the height of each line, and the paper to ink contrast level.

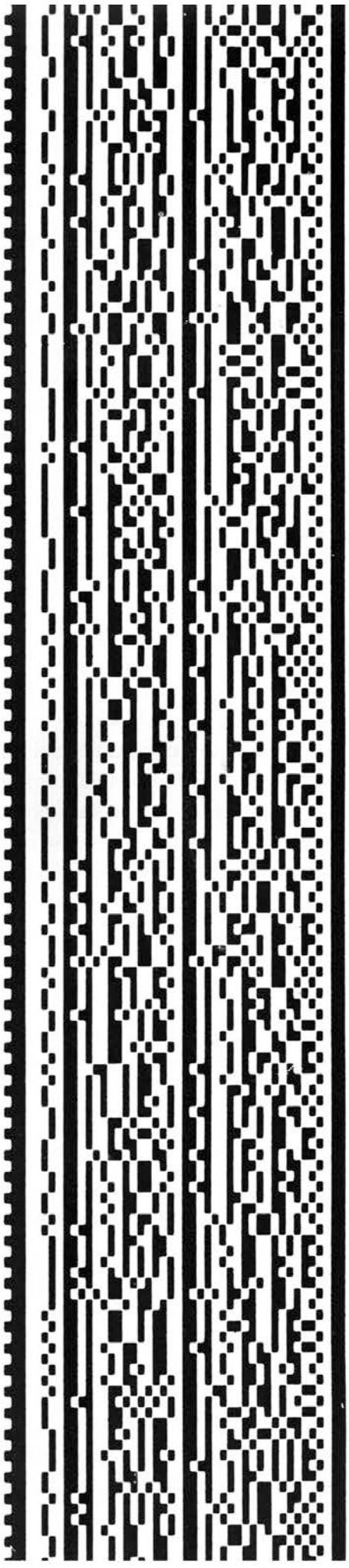



Running vertically down the sides of the strip are the startline (2), the checkerboard (3) and the rack (4). They identify the boundaries of every horizontal line to be read. They also work in tandem to feed the Reader alignment information.

A softstrip, on the other hand, is easily printed using your ordinary dot matrix printer or better still a laser printer. It will then stand up to photocopying, folding, wrinkles, scratches, ink marks, the postal system, even fax machines and, best of all, the dreaded coffee stain! Just wipe off the worst of the stains,smooth it out a bit and it can still be read into your computer.

## Ingenious strips

The Softstrip system is ingenious and makes me wonder why no one



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The night owl you see is not on the company's payroll, nor is he a spy.

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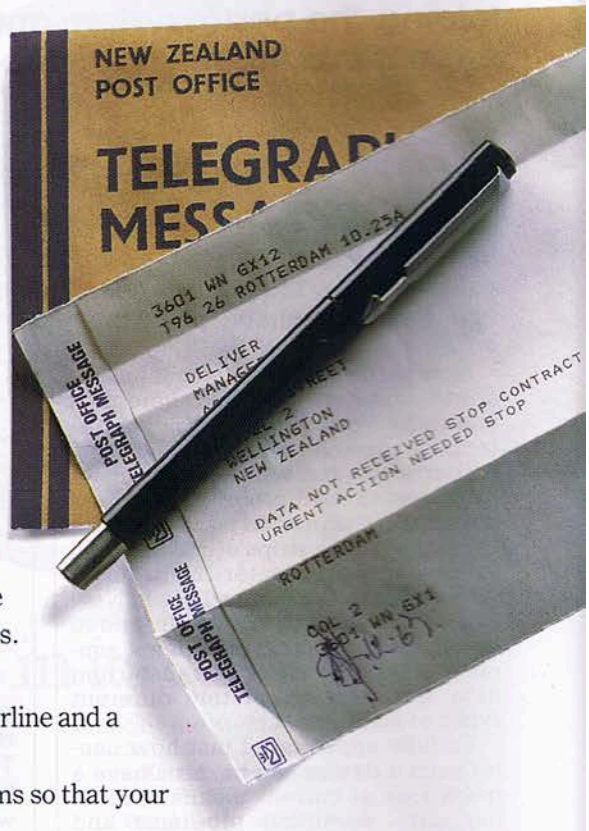


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This low density strip contains over 40 possible uses of the Softstrip technology.

has succeeded with it before. The reason is that, although it is simple to use, it is in fact quite a complex invention.

Softstrips are composed of a series of black and white rectangles printed on paper. On each strip a zero is represented by a black block followed by a white block, while a one is represented by a white block followed by a black block. Each of these two-block units is called a DiBit. A DiBit which is all white or all black is interpreted as an error.

***Just wipe off the worst of the stains, smooth it out a bit and it can still be read into your computer.***

Each strip comprises four parts. The header contains the number of bytes per line, the height of each line, the size of the DiBits and the alignment of the optics. The data section contains the length of the strip in bytes, checksum, unique ID number, multiple strip sequence number, strip file directory, computer type, file type (program/data), file lengths and file names. The file section contains the actual files (up to ten), while the fourth part is the boundary lines which contain information for optical alignment and synchronisation.

Softstrips can vary in length from about 25mm to 237.5mm. A 237.5mm strip takes around 25 seconds to read with a high-tech optical reader which uses a VSLI chip to translate the encoded pattern into serial data suitable for transmission to the computer.

The Softstrip Reader itself is an oblong plastic shell 419mm long by 76mm wide and 63mm high, weighing just 600g. This is placed over the strip, aligned by means of a locating dot and a line, and presto! the strip is read into the computer at 4800 bits per second.

The secret is inside the device. It is a 'truck' which moves uniformly down the length of the strip, constantly checking its own lateralmovement for precision. This is absolutely essential as each data line is scanned at right angles to the length of the strip, with each scanning spot approximately 0.0762mm wide by 1.1016mm high. Each scan moves 0.0635mm down the strip and provides between four and sixteen scans per line.

The reader's optical scanning system contains eight rotating cylindrical lenses and an aspherical corrector lens to provide focus. A further 160 cylindrical lenses control the reader's speed of rotation, and the scanning system is driven by the same motor that drives the truck.

But there is more to it than that. The optical scanner uses near infra-red light so that it can see through colours, ink and dirt. But how, you ask? Simple really; it relies on the fact that printer's ink, dot matrix ribbons and photocopier toner contain a percentage of carbon or oxides. The near infra-red light makes these heat up and it is that particular wavelength that is detected and converted to useful datia. For added reliability the data strip code also contains two levels of redundancy and error detection as well as error correction.

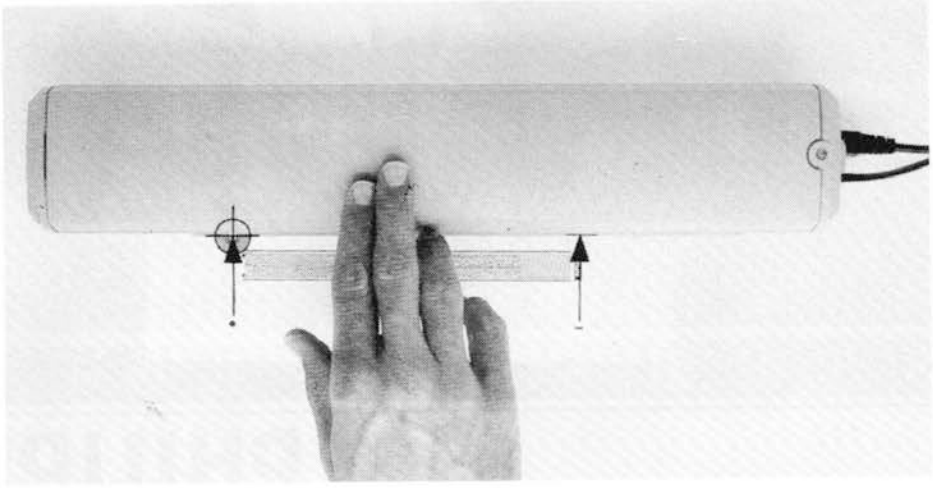
It is even possible to easily make an uncopyable (but not unreadable) Softstrip if you desire. Just scribble over it with a coloured felt pen. If anyone tries to photocopy it they will end up with both the data and the colour as black so it cannot be read, while the original is still readable.

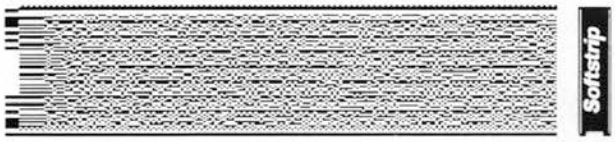
Of course the data can also be encrypted before being printed for even more security.

## Photographic process

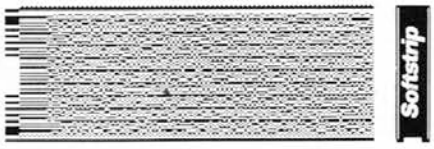
The strips are available in three densities: high, medium and low. The strips as supplied with the manual are high density, providing 5.5kb per strip, produced by a photographic process specially for use in books and magazines. They cannot be produced directly, nor can they be photocopied as the detail is too fine for this.

The medium density strips are produced with a standard laser printer to provide around 3.5kb per strip. Using the industry standard Epson FXIRX compatible dot matrix printer in 240 dots per inch graphics mode, it is possible to produce up to 1,075 bytes on a low density strip. Up to eight Softstrips can be printed on an A4 page, which is equivalent to six single-spaced pages of text in medium density.






A medium density strip containing the same file.




This strip contains the same 600 bytes in a high density format.

All of the above may make it sound complicated to use, but this is not so. After reading the very slim manual, connecting it up and inserting the program disk, I was reading strips from both the collection provided with the device and from 18 months' worth of *Byte* advertisements. Most strips were read in at the first try, but in one case I spent 20 minutes trying to read in a five-strip set. Each needed several attempts, but it could have been a printing problem as the paper in that particular issue (*Byte*, May 1986) is very thin and shows more than the usual print-through from the other side.

***For added reliability the data strip code also contains two levels of redundancy and error detection as well as error correction.***

The reader has a separate power pack and comes with a base cradle to protect the optics when not in use and a serial cable and disk suitable for each type of computer. I tested the PC compatible version which provides a choice of two serial connectors, DB25 for the XT compatible and DB9 for the AT compatible. The StripMaker software is included inside its own manual, as a Softstrip of course! It is 7.8kb long and takes 3⅓ strips. Also included on Softstrip is a short (118m) program (1.4kb) called DiBi Test to ensure your printer prints Softstrips correctly. The StripMaker is also sold separately on a disk.

I used an Epson FX-80 to print a copy of DiBi Test, but unfortunately my ribbon was too far gone and DiBi Test advised my data strip should be discarded! The manual suggests in this case that a photocopy be made as that will increase the carbon content and possibly make it usable. Incidentally, my low-density copy measured three times longer than the original in the manual.

Other versions of the software are also available for the Apple, Macintosh and BBC, these also including serial cables specific to each model. I was assured that an Amstrad version is due soon. Also available is an accessory kit for each of these computers so that one reader can be shared between different types of computer. And that of course allows easy conversion of text and data between dissimilar computers, especially when it is not practical to connect them serially or via a network.

## Valuable business tool

Softstrip first appeared in January 1986 in US computer magazine advertisements aimed at the home user, but it is now being used in the USA and Europe as a valuable business tool. One large company apparently now insists that its suppliers use Softstrip on their invoices, or they must wait to get paid! Apart from this, Softstrip is currently being tested by a Spanish bank to save its clients the tedium of typing in details from their bank statements, a welcome idea which I hope will catch on here.

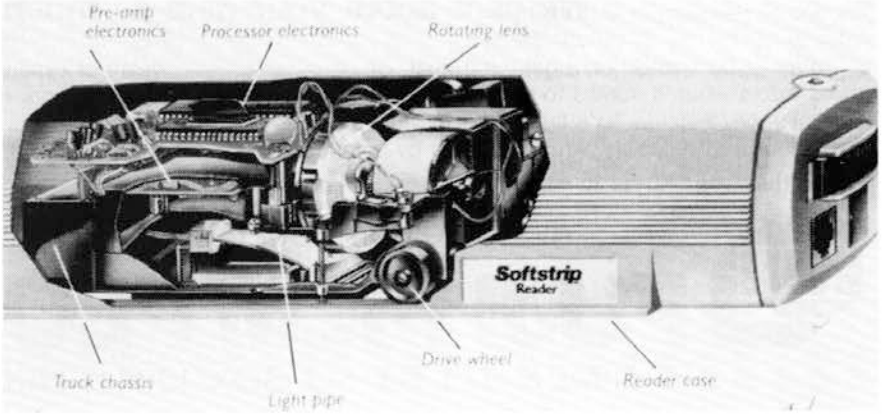
The Softstrip system available here originated from the UK (Softstrip International), via Australia, and therein lies the cause of its major problem: it costs far too much. In the USA it retails for a realistic $US199.95 for the reader plus $US19.95 for the StripMaker. You might expect it to cost us no more than say $600. But no, here it will set you back $900 plus GST for those same two items, $60 plus for just the StripReader program and $120 plus GST for your choice of accessory kit.

Allowing for the current $US/$NZ exchange rate (and the inevitable markups etc), we are being asked to pay too much. I can only assume this is mainly due to the multiple exchange rates (USA/UK/AUS/NZ) involved in getting them to us.

The bottom line is that they will not sell like hot cakes, as they rightfully should. What we have is the typical chicken-and-egg situation. Until the price is low enough to make them readily available then magazines and books will not be too keen to use valuable page space to provide machine-readable programs etc, and until that happens only those with a specific business requirement will buy them.

So far I have heard of only one US magazine that prints Softstrips regularly, so let's hope that the business uses can provide the impetus to really start the ball rolling. We need it. ■

*Review system supplied by Verbatim (New Zealand) Limited, Avondale, Auckland.*



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# Corporate power – packaged and priced accordingly

**The corporate sector is showing willingness to pay a premium for an AT-compatible that's powerful, fast, and can be easily transported between the office, home, and any overseas destination. John Lau reacquaints himself with the top end of the Compaq portable range.**

It was barely over a year ago that I did a review of the Compaq Portable II (80286 8MHz). Now I have with me the Portable III which is a rather handsome and neat looking system. It is lighter by 25 per cent, smaller by 33 per cent and runs 50 per cent faster. All you need to do is plug it in and switch it on and be ready for some high-speed computing.

Compaq calls this a portable computer but I would have to say it is in between a desktop and a laptop. Weighing in at 9.1 kg it is not too heavy to carry between offices, carparks and home. It is also well constructed; the screen, keyboard and power cord all close up securely into a very tidy unit.

The main reason I cannot call this unit a true portable is that it runs only on 110/240 volts AC, instead of battery, so you will be best to keep close to a power outlet. Compaq feels that 99 per cent of its business customers do not wander off into the jungle or the outback.

The Portable III uses a most powerful 12 MHz 80286 microprocessor plus the latest in display technology – gas plasma monitor. The model 20 comes complete with 640kb of RAM, one 1.2 Mb 5¼-inch floppy diskette drive, one 20Mb fixed hard disk and an 84-key keyboard. Other standard features include provision for a 8MHz 80287 coprocessor, real time clock with battery, two full size slots, RGB, parallel and asynchronous ports.

Optional equipment for the Portable III includes an internal modem, which I was informed is to be type-approved for New Zealand. External expansion unit, nylon or leather padded arrying case, memory expansion board (512kb or 2Mb) and desktop pedestal can be added to the basic Portable III at additional cost.

## Real disk world

Compaq Corporaation has not joined the 3½-inch diskette camp

**PERFORMANCE**

| | IBM AT | PORTABLE II | PORTABLE III |
|---|---|---|---|
| Spreadsheet 23 x 103 | | | |
| Load | 53.6 | 67 | 54 |
| Save | 105.5 | 67 | 55.4 |
| Recalculate | 4.4 | 3.4 | 2.5 |
| Spreadsheet 30 x 100 | | | |
| Load | 38 | 47.8 | 38 |
| Save | 75 | 49 | 39.4 |
| Recalculate | 15 | 13.3 | 9 |
| Boot Up | 29 | 27 | 22 |
| Norton's Performance Index | 5.7 | 7.7 | 11.5 |
| Format Diskette | 95 | 49* | 110 |

All times are in seconds.

* Portable II uses 360kb floppy disks.

yet, and this Portable III still uses the 5¼-inch disk. I have to agree with the company that it is still very much a 5¼-inch real world out there. There are a lot of people with heaps of 5¼-inch disks in their possession with both applications and data they have accumulated throughout the years, which would be an expensive exercise to convert to 3½-inch format. Furthermore, anyone picking up a computer magazine will see a horde of ads for 5¼-inch disks for a few dollars each. Have you tried looking for a 3½-inch disk lately? More like a novelty item and an inconvenience.

The unit will read and write both 1.2Mb and 360kb disks. An orange light is supposed to light up indicating 360kb operation, but during all the time in my possession it never changed from the green light for 1.2Mb. Other than that, both floppy and hard disk operated quietly and flawlessly. The shock mounted fixed disk has an impressive 30-millisecond average access time.

This Portable III will outperform many a desktop PC with the exception of the latest 80386 series of machines; so there is virtually no comparison in the "portable" market. It is some 11½ times faster than the original IBM PC according to the performance index in Norton Utility. The speed of the microprocessor can be altered by using a combination of CTRL ALT \ to toggle between 8 and 12 MHz. On starting up the computer, two beeps will indicate that you have set the Portable III at 12 MHz automatic mode, while the auto mode uses 8 MHz speed when accessing the floppy disk drive. This is to minimise problems with copy -protected disks, although copy protection for software packages seems to be on the way out.

## High resolution

The notable feature with this Compaq will have to be the orange gas plasma display unit. It is mounted on a tilt and height adjustable slot that swings into action after sliding inwards the two latches located on top of the display and giving it a little lift. However, the viewing angle is not quite in the comfortable range if you are sitting on a lounge suite with the coffee table at the same height. In this instance the optional swivel stand at $207 would come in handy.

The 10-inch screen is a dual mode device, displaying both high resolution text and graphics at 640 by 400 pixels. The unit's display is very sharp and crisp and quite legible in bright light. Brightness control is provided but not used frequently, because this gas plasma display emulates all the different colours into the correct brightness. The standard 720 by 350 text is also converted into 640 by 400 mode with no side-effects and is transparent to the user.

If you feel you need a colour monitor or you have a spare colour monitor lying about, an RGB interface is provided for you to plug straight in. However this only supports the lower resolution CGA mode, with the need for the optional enhanced colour graphics board for higher resolution colour text and graphics display.

A memory resident utility, Advanced Display Attribute Programming Tool (ADAPT), is provided with the Portable III to allow you to change highlighted text into various combinations of underline, half intensity, reverse video, alternate character set or no change at all. The default setting is half intensity where highlighted characters are shown at a lower intensity than the surrounding text. The utility can be activated using a combination of CTRL and left SHIFT keys.

The toggle feature of the utility can be used when you find that the main text contains a lot of the highlighted option you have chosen, for example underline. In this case the highlighted text will become non-underlined, a reversible effect.

A screen save feature is included in the MODE command. This option allows you to set the number of minutes between 0 and 63 (zero means disable screen save) before the gas plasma display goes blank. Pressing the SHIFT key will redisplay the screen. Compaq literature mentions that this feature gives additional privacy, but I doubt it very much as it is so easy to rectivate. It might be more useful if a password is required to reactivate the display.

## Full-sized keyboard

The keyboard is full-sized and complete with 84 keys, unlike the typical smallish keyboard usually found with a laptop or portable. The function keys are arranged in a row across the top as on the Portable II's keyboard. There is also a group of separate numeric keys to the right.

The cable connecting the keyboard to the computer is far too short and

**Microcomputer Summary**

| | | |
|---|---|---|
| Product: | Compaq Portable III model 20 | |
| Manufacturer: | Compaq Computer Corporation, USA | |
| Processor: | 12MHz Intel 80286 | |
| Memory: | 640kb of 100ns RAM expandable to 6.6Mb | |
| Mass Storage: | one 1.2Mb diskette drive,<br>one 20Mb 3½-inch fixed disk drive | |
| Keyboard: | 84 full-size keys, standard layout | |
| Display: | DC 10-inch plasma display<br>dual mode (both text and graphics) | |
| Interfaces: | parallel printer, asynchronous communications<br>external RGB monitor | |
| Software: | ADAPT | |
| Operation System: | MS-DOS 3.2 | |
| Dimensions: | 24.9 cm H by 40.6 cm W by 19.8 cm D | |
| Weight: | 9.1 kg | |
| Prices: | Model 20 | $11,140 |
| | DOS 3.2 | $225 |
| | nylon carry bag | $196 |
| | leather carry bag | $447 |
| | desk pedestal | $207 |
| | expansion unit | $436 |
| | internal modem | $1,146 |
| | *All prices exclude GST* | |

tightly coiled for my liking. The keyboard cannot be placed more than 50 cm away, so resting the keyboard on your lap or knees will cause it to be pulled back towards the system unit. This is rather annoying and is not helped by the cable positioning, as the point of attachment is the left corner of the keyboard to the right corner of the system unit. A much better location would be right corner of keyboard to right corner of system unit.

The keyclick volume can be increased by entering a combination of CTRL ALT + or decreased by CTRL ALT – . There are a couple of plastic feet under the keyboard that raise it by a couple of centimetres.

## Business companion

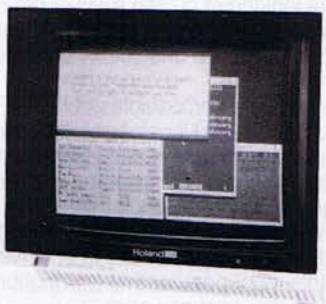
The price is on the expensive side. I do not like the keyboard attachment and no reset button is provided, and its weight is hovering on the heavy side. Also this portable cannot run on DC.

However, all things considered, this is an excellent business companion. The basic unit will be sufficient for most general applications (after acquiring your software application packages). It is well constructed, has a super fast 12MHz processor, quiet and fast disk drives, quiet and efficient cooling fan, high tech gas plasma display, and a full-size keyboard.

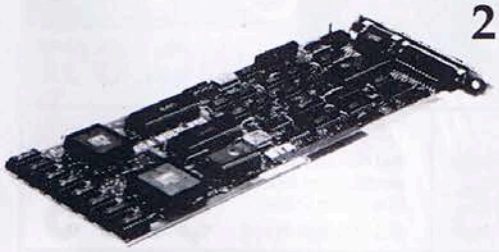
It is a recommended machine. The main competition will come from Toshiba's T3100. ■

*Review unit supplied by AXON Computer Systems, Auckland*


# A WINNING PAIR!



1. ROLAND CD-240 HI-RES COLOUR MONITOR 12-inch anti-Glare, 720 x 400 line crisp definition, yet easy on the eyes. top Quality from Japan.



2. STB MULTI-RES CARD for IBM PC/XT/AT and compatibles. Drives EGA, CGA, Mono or Multi-sync monitors. Accepts EGA, CGA, IBM mono drivers. With 256K video Ram, double buffering, parallel port, Accelerator software, Ramdisc, Spooling, optional Clock/Calendar. Top quality from USA.

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- *Optional 8087 co-processor socket*
- *Dual 360K floppy drives*
- *640K RAM*
- *84-key IBM style keyboard*
- *Parallel Centronics Printer Port*
- *Hercules Compatible Graphics Card*
- *8 Expansion Slots*
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- *MS-DOS 3.2 & Manual*
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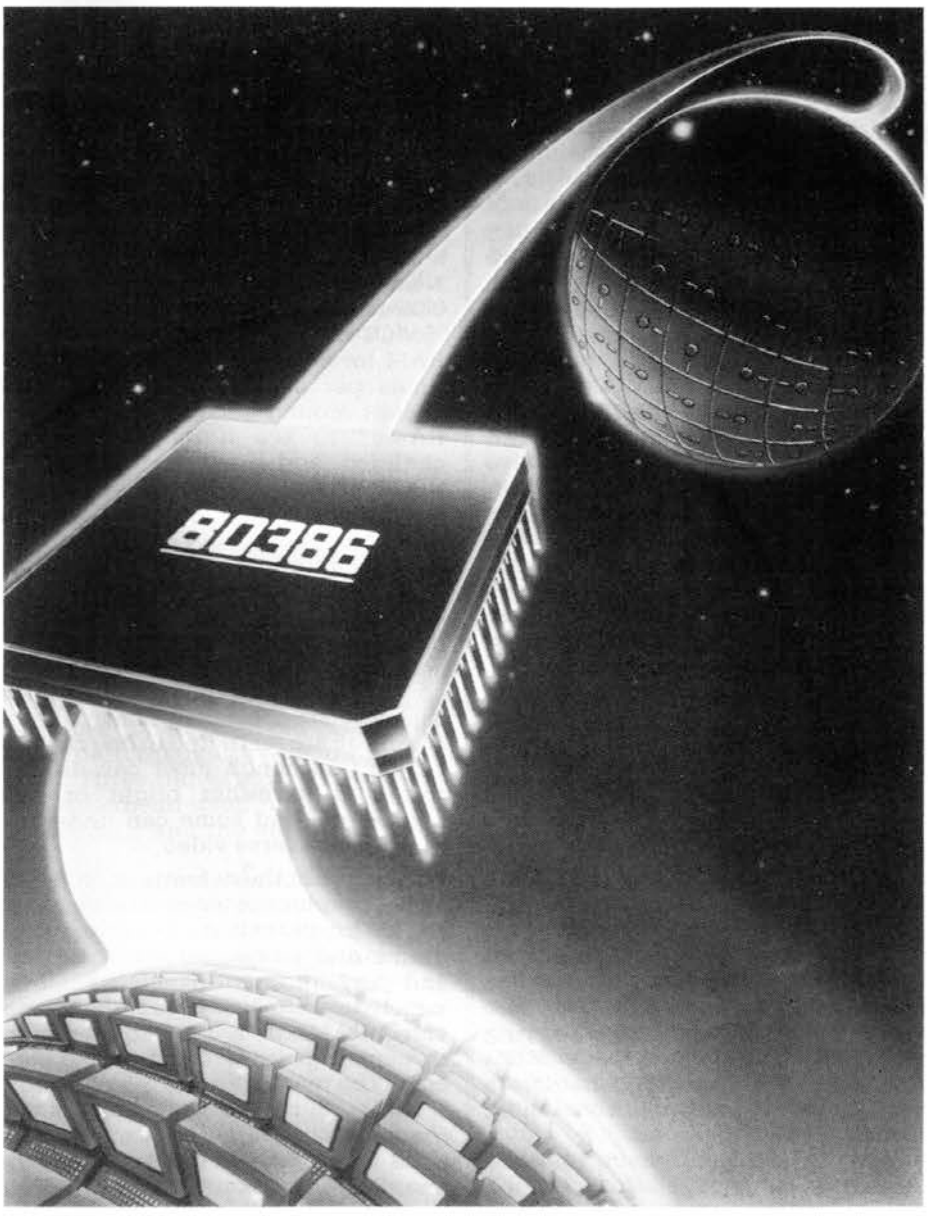
PC210

# The wave of the future

**The advent of the 80386-based microcomputer has not (until now) been matched by the availability of purpose-written operating software. Mark James takes a hard look at a software package which runs terminals as linked PCs.**




First, a little bit of history.

In the beginning was RT-11, Digital Corporation's single-user operating system for the enormously successful PDP-11 minicomputer, and considered by many to be one of the most efficient and influential operating systems ever written. First released in 1973, it quickly acquired a large software base of scientific and business applications. Its only problem was that it was single-user.

Then came a product called TSX, put out by S&H Systems. TSX runs on top of RT-11 and fakes a number of RT-11 interfaces on serial terminals attached to the PDP-11. Since RT-11 itself runs on a serial terminal, TSX gives each of its users the impression that he or she has sole control over RT-11 and the computer. It was a simple and elegant concept, and it has sold well.

The whiz kids who grew up on RT-11 in the 1970s went on to write the single-user operating systems for microcomputers, such as CP/M and MS-DOS. The question often arose: could there be a TSX-type system for micros? Could you have an operating system which, for example, faked MS-DOS for a number of users running on the same machine?

The first system to try this was called MultiLink, and its debt to TSX is shown in the name TSL (for The Software Link), the company which produced it. MultiLink runs on IBM PCs and compatibles, and fakes MS-DOS interfaces on "dumb" terminals attached to the PC's serial ports. Although MultiLink is as simple and elegant as TSX, it suffers from poor response times, limited memory for each task, and an inability to handle graphics.

The ideal solution for the first two of these problems is, or should be, to develop a version of MultiLink specifically designed for the powerful 80386 chip, and this is what TSL has done with PC-MOS/386.

PC-MOS/386, called simply "MOS" in its documentation, is a control program for the 80386 chip. (See the separate Multi-user column in this issue on types of 80386 operating systems.) Underneath this control program sit several MS-DOS-type tasks, each of which has the usual 640kb of address space. The MOS control program, which runs in the 80386's protected mode, takes advantage of the ability of the processor to emulate a bunch of 8088 chips, and so runs each of the MS-DOS tasks in turn.

None of the tasks is aware that anything else is going on on the computer; each thinks that it is running, alone, on an IBM PC. MOS switches from one to the next according to a

crude time-slice mechanism. This presents very little overhead, for two reasons: first, since each task has its own self-contained memory (or "partition"), which no other task can corrupt, there is no need to save away vast amounts of work space during the time whena task is not active. Second, the process of task switching has been largely implemented in one protected-mode instruction on the 80386.

When the computer is booted up, only one MOS task is active. This has its own COMMAND.COM (a total of two bytes long), several special drivers, and a MOS command shell program. The MOS prompt looks like an MS-DOS prompt except that it has square brackets around it.

***The fact that MOS is not really a multi-user MS-DOS, but only fakes it, is both an advantage and a disadvantage.***

Since MOS is not really DOS, but only fakes it, there is some delicious scope here for improvements on a few of the worst features of DOS. For example, the DIR command tells you, at the end, not only how much disk space is free, but how much is used in total by the files listed. The command editing functions of MOS are much more flexible than the function-key editing business of MS-DOS; MOS has built in the multi-command history available only with add-on products under DOS.

DOS's atrocious EDLIN has been replaced with a simple but usable full-screen editor. The MOS DEBUG facility has some enhanced features, such as the ability to use more than one terminal in a debugging session, but TSL has missed a bet here by not including 80386 instructions – DEBUG works only in 8086 mode.

The most important enhancements of MOS over MS-DOS, of course, relate to its multi-user capability. The command ADDTASK starts up a dumb terminal attached to the computer, while REMTASK shuts it out again. Commands are available to monitor what the other terminals are doing, to do minor tweaking to the time-sharing priorities, and to manage print spoolers and the like.

When a dumb terminal is started up, a MOS prompt appears on its screen, and from here until the terminal is shut down, the user may type any MOS command and run many MS-DOS programs at that terminal. The terminal is attached by an ordinary three-wire serial cable to a serial port on the computer. Remote terminals may be attached through a telephone modem.

**Table 1**

Performance degradation with the addition of inactive terminals
Formula: 1 – (0.1532 / <result>)

| Number of terminals | Prime number test (secs) | Percent add'l degradation |
|---|---|---|
| 1 | 0.1532 | – |
| 2 | 0.1598 | 4.3 |
| 3 | 0.1658 | 3.8 |
| 4 | 0.1718 | 3.4 |
| 5 | 0.1785 | 3.9 |

**Table 2**

Performance degradation with the addition of processor-intensive tasks
Formula: 1 – (0.1532 x <num terminals> / <result>)

| Number of terminals | Prime number test (secs) | Percent add'l degradation |
|---|---|---|
| 1 | 0.1532 | – |
| 2 | 0.3176 | 3.5 |
| 3 | 0.4737 | 3.0 |

## Replacing DOS calls

When an MS-DOS program makes a call to DOS or BIOS routines for such purposes as disk and screen operations, it expects a single-user DOS to be there to handle the requests. Under MOS, it gets the MOS routines instead; these replace the DOS calls. Some of the MOS routines travel with each task partition, while others live in protected mode with the MOS kernel itself. In each case, MOS has to intercept the call. In simple BIOS calls such as directory lookups, MOS simply passes the call to the machine's ROM BIOS, but when it comes to video output, MOS has to go through an elaborate translation process.

Single-user microcomputers mostly use memory-mapped video. Displaying something on the screen involves calling a DOS or BIOS routine that simply places it in the video RAM.

For example, if you were writing a program that wrote the word "Hello" at position 40 on line 5, your program would call two routines: one to position the cursor at line 5, position 40; and the other to place the word "hello" into video RAM. Once the video RAM was modified, the video hardware would take care of copying the word "Hello" from the video RAM to the screen. The video hardware does this kind of thing constantly, several times per second.

Under MOS, things have to work differently, since all terminals except the console are attached through the serial ports. If you ran the same "Hello" program on, say, a Wyse-50 terminal, MOS would have to intercept the two system calls and figure out what they were trying to do. Then, to position the cursor on line 5, position 40, MOS would send a burst of eight control characters down the serial line to the Wyse-50 terminal. Next, it would send the five ASCII characters of "Hello" down the line.

MOS maintains its own fake video RAM for each task partition. Several times per second (if it can), MOS chases around each of these "video RAMs" to see if its content has changed, and if it has, it translates the changes into control sequences and ASCII codes, and sends these down the appropriate serial line.

The limitations of this should be pretty clear: MOS can handle only those video characteristics which it can fake on a dumb screen. Most screens these days can do at least some crude box graphics, and a few of the more expensive ones have colour. Nearly all are restricted to one character font, although most can display this font in either bright or dim characters, and some can underline and/or do reverse video.

Apart from these features, you can forget graphics or video effects under MOS. In particular, drawing programs and games will fail horribly, and any program (such as CAD) which tries to write directly to the video RAM (that is, without going through the BIOS calls) is likely to crash the machine.

Although the video problem is the greatest incompatibility between MOS and MS-DOS, it is not the only one. Some copy-protection schemes, for example, will inhibit a program's

**Table 3**

Performance degradation with the addition of sequential disk-bound tasks
Formula: 1 – (0.1532 x <num terminals> / <result>)

| Number of terminals | Prime number test (secs) | Percent add'l degradation |
|---|---|---|
| 1 | 0.1532 | – |
| 2 | 0.3678 | 16.7 |
| 3 | 0.5571 | 18.5 |

**Table 4**

Performance degradation with the addition of text display tasks
Formula: 1 – (0.1532 x <num terminals> / <result>)

| Number of terminals | Prime number test (secs) | Percent add'l degradation |
|---|---|---|
| 1 | 0.1532 | – |
| 2 | 0.7982 | 61.6 |
| 3 | 1.1627 | 60.4 |

operations under MOS, which is the case for timing loop tests. Also, Lotus 1-2-3 cannot be installed on a hard disk unless you first reformat the disk under MOS. Sidekick will appear to load properly, then kill the machine a few seconds later, probably because it tries to fool DOS as to how much memory is in the machine, but of course DOS is not there. The unofficial list of MOS-supported programs does not include any such "terminate and stay resident" software.

## Slowing down

In raw processing power in its virtual 8086 mode, the Intel 80386 chip is rated at about 15 times the speed of the original IBM PC. 80386 configurations with 15 times the memory of a PC are also possible. This means that, ignoring the overhead of MOS itself, the machine could run 15 partitions of MS-DOS-like tasks, and each one would, in theory, have the same response times as an old PC. In fact, MOS performance is not quite that good. Three things slow it down: the MOS overhead itself; multi-user disk contention; and the serial port overhead.

The MOS kernel has to keep watch over what each terminal on the system is up to, which is in effect another task on the system, and one that gets more burdensome as the number of users increases. Table 1 shows the time required for a prime numbers test as the number of tasks increases. None of the extra tasks was active during the test. The table shows a performance degradation of approximately three to four per cent each time a new task is added. This is not bad.

Table 2 shows the same prime numbers test, but this time each terminal which was added to the system also performed the test. With three terminals doing prime numbers, the test took more than three times as long as with a single terminal doing it – in fact, about three times plus three per cent for the MOS overhead.

Disk contention is shown in Table 3. This time, as new tasks were added while one task was doing the prime numbers, the new tasks engaged in sequential disk accesses. This imposed an additional degradation of about 18 per cent per task. Tests with random disk accesses were inconclusive, but suggested much higher penalties. MOS apparently uses the same file allocation tables as does MS-DOS, so random disk accesses, particularly for large files, will necessarily be slow, even though the disk hardware itself might be fast.

***DOS's atrocious EDLIN has been replaced with a simple but usable full-screen editor.***

The overhead of MOS's serial line management is more difficult to measure. Table 4 shows its effect on another task (again, one doing the prime numbers test), but the real slowdown is felt by the user at the dumb terminal itself. Whereas screen changes are very rapid under MS-DOS on an 80386, on dumb terminals under MOS they are necessarily slower. For some reason, MOS terminals do not run well above 9600 baud, although the same terminals attached as COM1 or COM2 under MS-DOS will function at 38,400 baud without hiccups.

The MOS terminal drivers are not always very intelligent. For example, to clear a screen, MOS sends out a string of 1920 blank characters. This not only wastes two seconds or so at the screen, but it also generates 1920 unnecessary interrupts for MOS itself. Nearly all terminals have an escape sequence that means "clear screen"; why not use it?

In summary, for those who find the response times of an original IBM PC/XT to be acceptable, MOS should handle 10 terminals doing calculations or other processor-intensive activity; or seven or eight performing sequential disk accesses, such as file copies, spreadsheet loading and the like; or around five doing intensive screen displays; or about the same number working with random disk accesses, such as database analyses or queries. Additional terminals may be attached without much overhead, as long as they are essentially idle. These guesses take into account the rule of thumb that you should never plan on using more than 70 percent of a multi-user system's capacity, in order to have room for peak loads.

## No unauthorised access

In a multi-user system, security means two different things: keeping unauthorised users out of the system, or at least sensitive parts thereof; and the prevention of one user from accidentally (or deliberately) corrupting the work of another. MOS is much stronger in the first kind of security than in the second.

MOS contains an optional sign-on security system, whereby the partitions created with the ADDTASK command cannot do any work until a password is entered. Depending upon the password, access may or may not be given to various files, directories, and other partitions. Information identified as subject to security is stored in an encrypted form, and those without the authority to see such files wll find only rubbish if they try. The encryption method can even be changed. A hacker would have both to break into the system and to crack the current encryption method in order to gain access to unauthorised data.

If the password security system is not implemented for every file and every directory on the system – in other words, if you want shared files – then the possibility arises of two users making conflicting updates to the same (or related) data at the same time. MOS has no file or record lock-

Peter Chambers has been the Gough, Gough and Hamer information processing systems engineer since their A Series System was first installed over 15 months ago.

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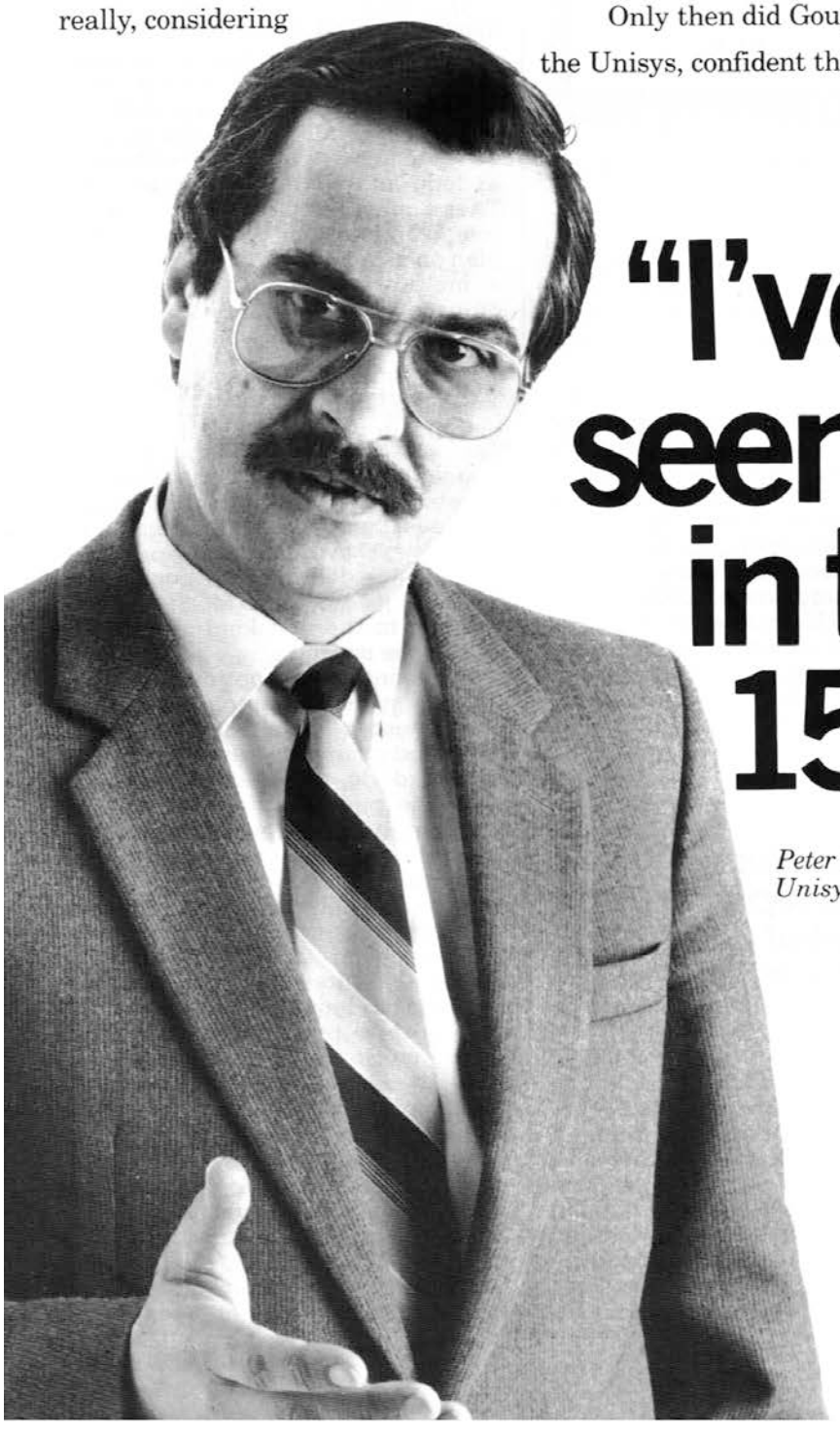

# "I've hardly seen my client in the last 15 months"

*Peter Chambers, Customer Services Engineer, Unisys, Christchurch.*

UNISYS

The power of 2

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ing to prevent this. Also, two terminals can try to use the same partition at the same time, and the results can vary between the humorous and the insidious.

MOS's only approach to this kind of security is an optional software emulation of a network controller card. Each partition gets one of these, and MOS begins to fake not just MS-DOS, but MS-NET as well. Each partition is treated as if it were a workstation on a PC network, using MOS as a file server; this way, the network file locks are in place for those programs that look for them. This "NETBIOS Emulation" feature was not tested during the review.

The machine on which we tested MOS was an Advanced Logic Research 386/2, supplied with two megabytes of memory and a 130Mb hard disk. The computer came in a tower configuration (that is, it stood vertically beside the desk), with a Casper colour monitor and 101-key keyboard to sit on the desk. Two serial ports were supplied, attached to two Wyse-60 screens, to test the multi-user features.

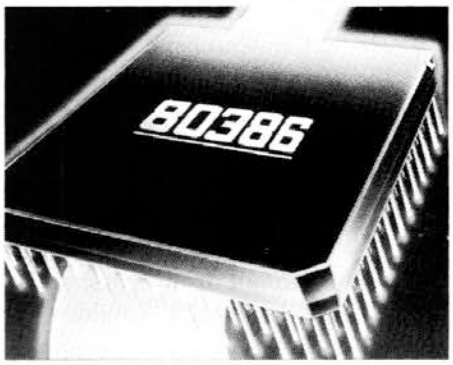
The processor is an 80386 running at 16 MHz, and under MS-DOS, the machine is highly compatible with the IBM PC/AT, with its 16-bit bus and Phoenix ROM BIOS. The only incompatibilities that we found were the usual ones: a different way from IBM's of handling keyboard LEDs; and the video board's inability to do colour borders.

The computer performs the prime numbers test on 0.1494 seconds, which is slightly slower than the Compaq Deskpro 386 (0.1312). There is said to be a 20 MHz version of the ALR 386/2, which should be in New Zealand by the time that this article sees print.

## Conclusions

The PC-MOS/386 operating system fulfils a part of the 80386 chip's promise: to run multiple MS-DOSes on a single computer. It is very possibly the first system to do this, although it will certainly not be the last. Its ability to run MS-DOS tasks on inexpensive dumb terminals is both an advantage (in cost savings) and a disadvantage (in the inefficiencies of MOS's serial line handlers).

The fact that MOS is not really a multi-user MS-DOS, but only fakes it, is again both an advantage and a disadvantage. The advantage comes in the enhancements that the system makes to DOS (in particular, better utilities and file security), while the disadvantage derives from its inability to handle graphics, "terminate




and stay resident" programs and other magic to which we have become accustomed under DOS.

Other multi-user operating systems that run on the 80386, such as XENIX, PICK and AMPS, make much more efficient use of this powerful chip than does MOS, as is evidenced by the larger number of terminals that they can run. However, these systems are exclusive; none of them can claim to run MS-DOS programs, at least not in any acceptable way.

PC-MOS/386 can. It will not by any means run all of them, and the prospective user is warned, as usual, to try before you buy; but 80386 control programs such as this one are the wave of the future.

*Review system supplied by Advance Imports, Auckland.*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| 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 |
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# Impressive features in full colour

**Some people think they will always be content with monochrome displays, often because of the better resolution for text. After trying the Hercules solution, Jim Barclay finds that returning to plain green means there's something lacking in his Lotus.**

Hercules Computer Technology provides a range of video cards for PC and PC-compatible computers. Two recent additions are high-resolution graphics cards for the PC, XT and AT: the Hercules InColor Card and the monochrome Graphics Card Plus.

Both these cards are compatible with the software for the original Hercules graphics card, but provide additional features that are impressive. They both have the Graphics Card resolution of 720 x 348 pixels but with an additional operating mode that allows fast display of up to twelve different character fonts, while the InColor card can additionally display 16 different colours that may be chosen from a palette of 64 colours.

A Hercules InColor Card was recently supplied for review by Seal Distribution. After a few weeks using the InColor card on a DMC colour monitor it was a noticeable step back to the lower resolution of a CGA card, and even more noticeable back to the plain green of my monochrome display. Lotus in green is just not the same as the multicoloured graphs I had using the InColor card.

The Hercules InColor card is packed in a robust box and includes two 5.25-inch disks and three booklets. Two of the booklets are owners manuals – one for hardware, one for software – while the third provides information on hardware and software compatibility of the Hercules product range. The booklets provide ample information, for both the user who is going to do nothing more than install the InColor card, through to the serious user who is going to program the InColor card directly.

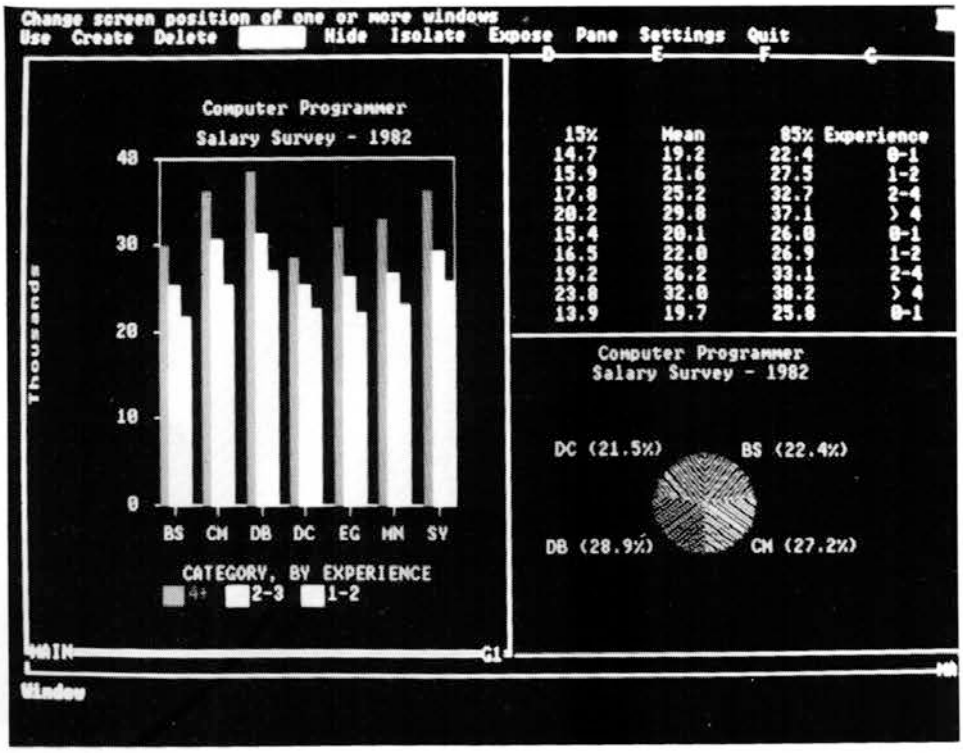
Installation is very straightforward with adequate directions given. For those upgrading from monochrome it is simply a matter of substituting the InColor card for the previous version. For those replacing a colour card, two DIP switches on the motherboard must also be changed back to the position appropriate for a monochrome display. The InColor card also has a parallel printer port, which may need to be reconfigured if there is already a parallel port in the computer.

## For the technical

The InColor card is a half-length card, still using the 6845 CRT controller, but now including two 68-pin logic arrays. The crystal frequency is 19 MHz, while the corresponding horizontal and vertical frequencies are 22 kHz and 60 Hz respectively, suitable for driving an RGB monitor. Of the two socketed integrated circuits, one contains the ROMFONT IC while the other contains the LPT 112 IC for the parallel printer port. The printer port is implemented by one custom IC, and for those users who wish to use theprinter port on another card, the IC is simply removed to prevent any address conflict.

***entirely new fonts can be created, not constrained to the 9 x 14 character matrix***

Two main features of the InColor card are the display modes and the colours. The card has three modes of operation. The Standard Text mode runs all text mode software compati-




*Lotus Symphony is brightened with colours.*

ble with the IBM Monochrome Display Adapter with 80 columns by 25 rows, using a 9 by 14 character matrix. The Graphics Mode has a resolution of 720 horizontal by 348 vertical, the same as the Hercules Graphics Card, while the RamFont Mode combines the speed and ease of use of the text mode with the versatility of the graphics mode.

Within this mode are three different operating configurations. The first is the 4kb RamFont mode of 256 characters and can best be described as a download character set of 256 characters, and the 48kb mode of 3072 characters is equivalent to 12 download character sets, each of 256 characters. The third is the expanded RamFont mode of 12,288 characters, equivalent to 48 download character sets of 256 characters. Depending on the mode, up to 16 colours may be displayed, chosen from a palette of 64, while the cursor, underline and high-intensity colours may be chosen independently of the colours used in the foreground and background of individual displays.

## Limited range

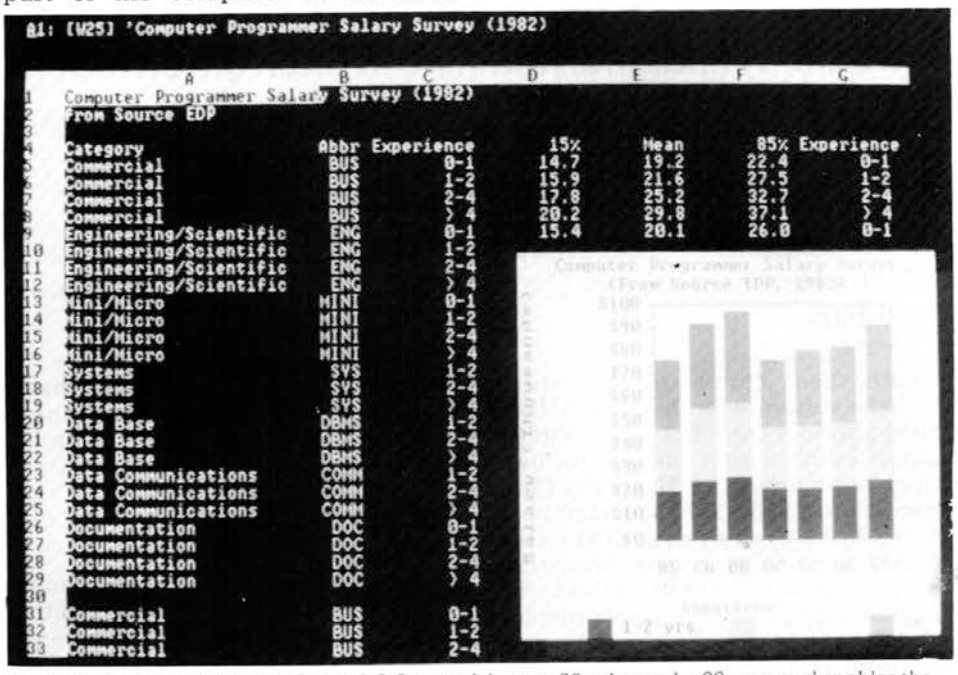
Some users will not need to know the workings of the InColor card as application programs will include the necessary display drivers. However, only a limited range of software incorporates the screen drivers at the moment, so most users will need to install the screen drivers from one of the two 5.25-inch disks supplied with the card, containing the drivers for eight popular applications programs, such as Lotus 1-2-3, Microsoft Word, AutoCad and Framework II.

Not all versions are fully supported, but generally it is the version current at April 1987. The Lotus 1-2-3 drivers are suitable for use with release 2 and 2.01. You can still run the program with release 1A, but you will not benefit from the RamFont mode of the InColor card. Similarly with Symphony: the enhanced performance is obtained with Symphony V1.1 and 1.2 rather than vl.0. The one exception is Microsoft Word, where the driver is for v3.0, while v3.1 will have RamFont support built-in. However, the Word driver in version 3.1 is monochrome only, with no specific support of colours being provided.

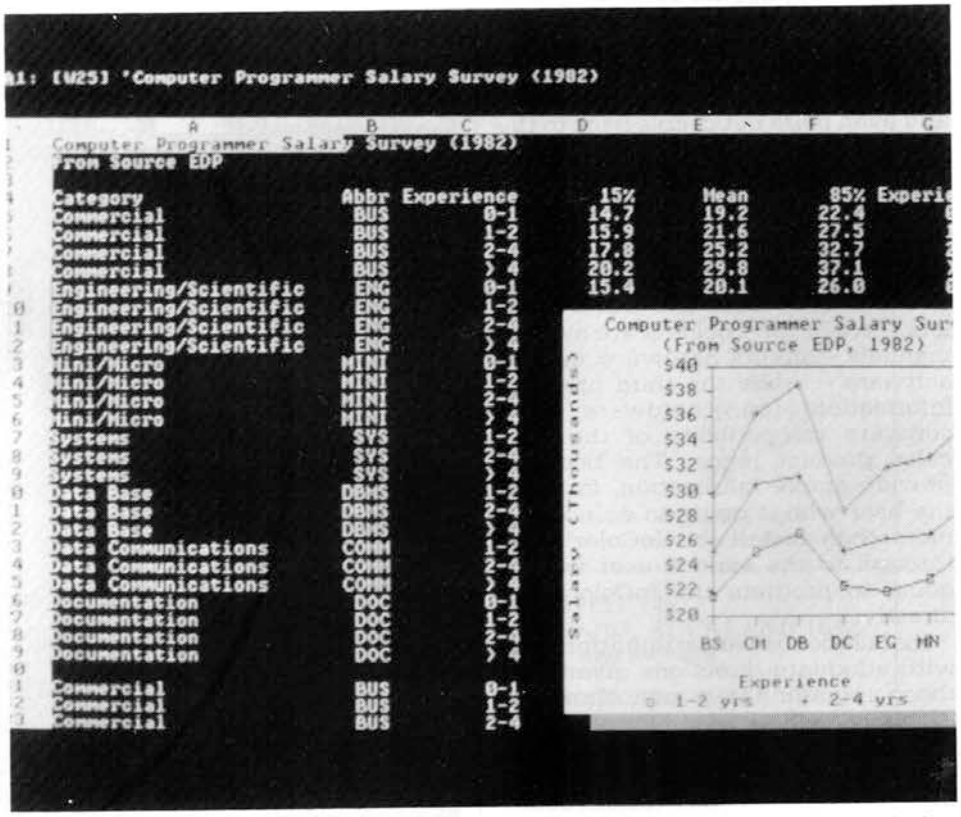
The user may also run other existing monochrome software and use the SETCOLOR utility on the other 5.25-inch disk to select the colours for the InColor card. This utility allows the user to select the colours for DOS and application programs that do not themselves control colour on the Hercules card. The user may choose the colour of the text, background, high-intensity, cursor, and underline etc, cyan cursors, yellow underlines... there are 16 different colours that may be used. The default setting is a dark background with grey text and white high-intensity, the CGA colours. These colours were quite satisfactory and I found no reason to change them.

This disk also contains a PALETTE utility that allows the user to redefine the 16 colours from a range of 64 values. These colour settings can be used directly or else saved in a file and then loaded with a batch file as part of the computer initialisation routine, and three sample palettes are provided. The disk also contains a RamFont directory of 25 font files that can be used with the InColor card, including Greek, Italic, Medieval and LCD.

With all these features, how much memory does the InColor card require? It still occupies the standard 64kb segment expected by the PC. In the text and RamFont modes two bytes are used for each character, one byte for the character and the other for the attributes and colour.




*The InColor card expands the Lotus 1-2-3 spreadsheet to 90 columns by 38 rows and enables the user to window in a 320 by 200 graph.*




*With RamFont, text and graphics can be mixed on the same screen, with a window overlaid on the graphics.*

## Create custom fonts

For those considering writing software for the card, adequate information is contained in the two manuals and on one of the disks to undertake this task. Although many preprogrammed fonts are supplied with the InColor card there will be users who wish to create their own custom fonts. The RamFont editor FONTMAN lets you view font files, make changes to them and save them to disk.

***Lotus in green is just not the same as the multi-coloured graphs I had using the InColor card.***

Alternatively, entirely new fonts can be created. Character fonts are not constrained to the 9 x 14 character matrix, but may range from 8 or 9 bits wide x 4 to 16 bits high. All of the fonts supplied on disk are 4kb RamFonts and may be loaded for general use by using loader RAMFONT. No loader is provided for the 48kb RamFont mode, so the programmer must provide a loader with his or her program.

When in text mode, such standard attributes as blink, reverse video, and high-intensity are supported. Two new attributes, boldface and overstrike, are available in the 48kb RamFont mode. Boldface illuminates the pixel one position to the right of the character pixel, making the character appear thicker, this being most useful with characters built of single-dot elements, as wider characters will tend to be smeared. The overstrike attribute draws a row of illuminated pixels across the character matrix at a height controlled by the user, and may be used for indicating text deletions but without actually deleting the character.

There is a price for colour though, and that is the tradeoff between attributes and colour. In the text mode and 4kb RamFont mode you have either the normal attributes of underline, high-intensity, reverse and blink at each character position, *or* you have a unique foreground and background colour only at each character position. In 48kb RamFont there are three choices: a common foreground and background colour with underline, overstrike and either boldface and reverse or high-intensity and blink; *or* a unique foreground colour with a common background colour.

Two methods are available of controlling the display colours. When the palette is disabled the resulting colours are the 16 4-bit standard colours as provided on CGA displays etc. When the palette is enabled the 4-bit colour code value is an index into a 16-element colour palette, each of which can store a 6-bit number. These 6 bits control directly the primary and secondary signal for the three colours of the RGB monitor.

## New jargon

To assist users in learning the intricacies of programming the InColor card, a TUTOR program is provided. A number of short tutorials show graphically the relationship between memory bytes and coloured pixels. For those into Assembly language programming with ANDs, ORs and XORs, then this is for you. New jargon too, with BBMs etc. And for the really serious there are six source code files that demonstrate various techniques for use with the InColor card. These are provided so the user (programmer) can better understand or else modify the programs.

Two other files are provided on the disk. One, HPRINT, is for printing graphics and produces a printer printout that compensates for the differing aspect ratios of the screen and the printed page. It will not produce useful results, however, if invoked from RamFont mode. The other program, SAVE, is a utility that blanks the screen after five minutes. Any keystroke may be used to restore the screen, but the shift key is recommended as other keys may have unexpected results. A diagnostic program TEST is also included and may be used to check out the graphics and RamFont text displays.

Any drawbacks? Only one. One of the features not found on the Hercules InColor Card was the ability to obtain a Print Screen of the RamFont being displayed on the screen. The Print Screen itself works, but prints only the standard text, rather than the displayed RamFont. Perhaps in the next software version.

Finally, what does this all mean for the user of the Hercules InColor Card? For some it will simply be install and forget it, and rely on the screen drivers of application programs to control the card. For others it will be writing an Autoexec file to customise the screen with one of the supplied 4kb fonts and colour palettes, while for the remainder it will open a door to customised screen displays... ■

*The Hercules InColor Card was supplied by Seal Distribution New Zealand. The price was recently reduced to $1195 excluding GST.*


AST Premium/286

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P.C. TECH JOURNAL JUNE, 1987

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# A BUYER'S GUIDE TO PRINTERS

Illustration by Sally Hollis-McLeod

# The state of the play

by Shayne Doyle

Mid '87 – the impact dot matrix workhorse still reigns supreme. Non-impact xerographic printers (laser and LED systems) are gathering momentum, with new models being announced by all the major players, and a number of new entries coming onto the New Zealand market. Other non-impact technologies – electrostatic, thermal, inkjet etc – still occupy narrow niches, while a declining market still exists for solid character daisywheel printers.

Development of the traditional dot matrix printer has not remained static. Improved print quality has been achieved by putting more pins in the print head, many models now featuring 18 or 24 pins. In place of a single column of 8 or 9 pins, there are two or three columns, in which each pin overlaps its mate in the previous column. This technique fills in the spaces between the dots and forms a more solid looking character while requiring only a single pass of the print head.

The very best of these 24 pin printers are capable of excellent letter quality print at respectable speeds – up to a nominal 106 cps. Bit-mapped graphics printing is also of correspondingly high resolution from these units.

Speed of printing has been increased, with 200 to 350 cps in draft mode being not uncommon now. Some top end models also offer plug-in font cartridges with a wide range of type styles and sizes to choose from. More attention has been paid to the user interface, bringing function switching out to the front control panel.

Some, however, are still designed with the interface cable connector in such a position that it interferes with paper feeding, showing that achieving perfection can be a slow process!

In spite of all these advances, one problem still remains – the impact dot matrix printer is a noisy beast and may need to be housed in a sound muffling kennel if it is to live and work in close proximity to its human masters. One or two models attempt to alleviate this by offering a quiet mode whereby two passes are used to form each line of characters. Sound level is appreciably reduced, but so, unfortunately, is throughput.

Increasingly sophisticated software systems, particularly in the so-called "desktop publishing" field, help to fuel the drive to develop faster, cheaper, more economical and longer lasting xerographic printers. Desktop units range in price from $6,000 for the new HP Laserjet II to around $20,000 for IBM and Laser Pro models, and they are almost mandatory for desktop publishing applications.

The current generation of laser printers operate at 4-12 pages per minute, with a resolution of 300 dots per inch, have on average a projected life span of 600,000 pages and are expensive to run and maintain. The next major development push in lasers is likely to be colour printing – Impact Systems expects to have a version available at about this time in 1988. Whether or not they will be economically viable remains to be seen.

Another non-impact technology that has been around for some time is the inkjet printer. Several models are available, including 7-colour units, from around $1600. They are quiet, but have tended to suffer from inkjet clogging problems. Development of inkjet technology is still proceeding and advances in ink formulation may see these units take off in performance and popularity.

The daisywheel printer, while probably not heading for total extinction, will almost certainly decline in popularity. There will always be a place for it in smaller offices, but in larger installations it will not be able to compete with the rising performance advantage of the xerographic printer. Daisywheels tend to be expensive, large, extremely noisy (it is essential to add up to $1000 to the purchase price for an acoustic hood), and are of use only for text applications.

The current prices of laser printers are still not low enough to start massive encroachment into the existing daisywheel and dot matrix territory, but with the arrival on the local market of dedicated printer sharing networks such as the BIT PEP system, it becomes economical to give a number of PCs access to a central laser printer without going to the expense of a full LAN system.

One thing is certain – the coming year will definitely be interesting for technology watchers in the printer field. ■

## MPS 801

Dot matrix

| | |
|---|---|
| Pins in print head: | 6 |
| Print speed: | 50 cps |
| Max chars/line: | 80 characters |
| Point sizes: | – pica, Expanded |
| Paper width: | 10" |
| Paper feed: | tractor |
| Buffer size: | 1 line |
| Ribbon type: | carbon |
| Graphics mode: | uppercase/lowercase, uppercase/graphics |
| Interface: | Commodore serial |
| Features: | Selectable device number |
| Options: | |
| Retail price: | $399.00 (inc GST) |
| Agent: | Commodore Computer (NZ) Ltd |

## EPSON P-40

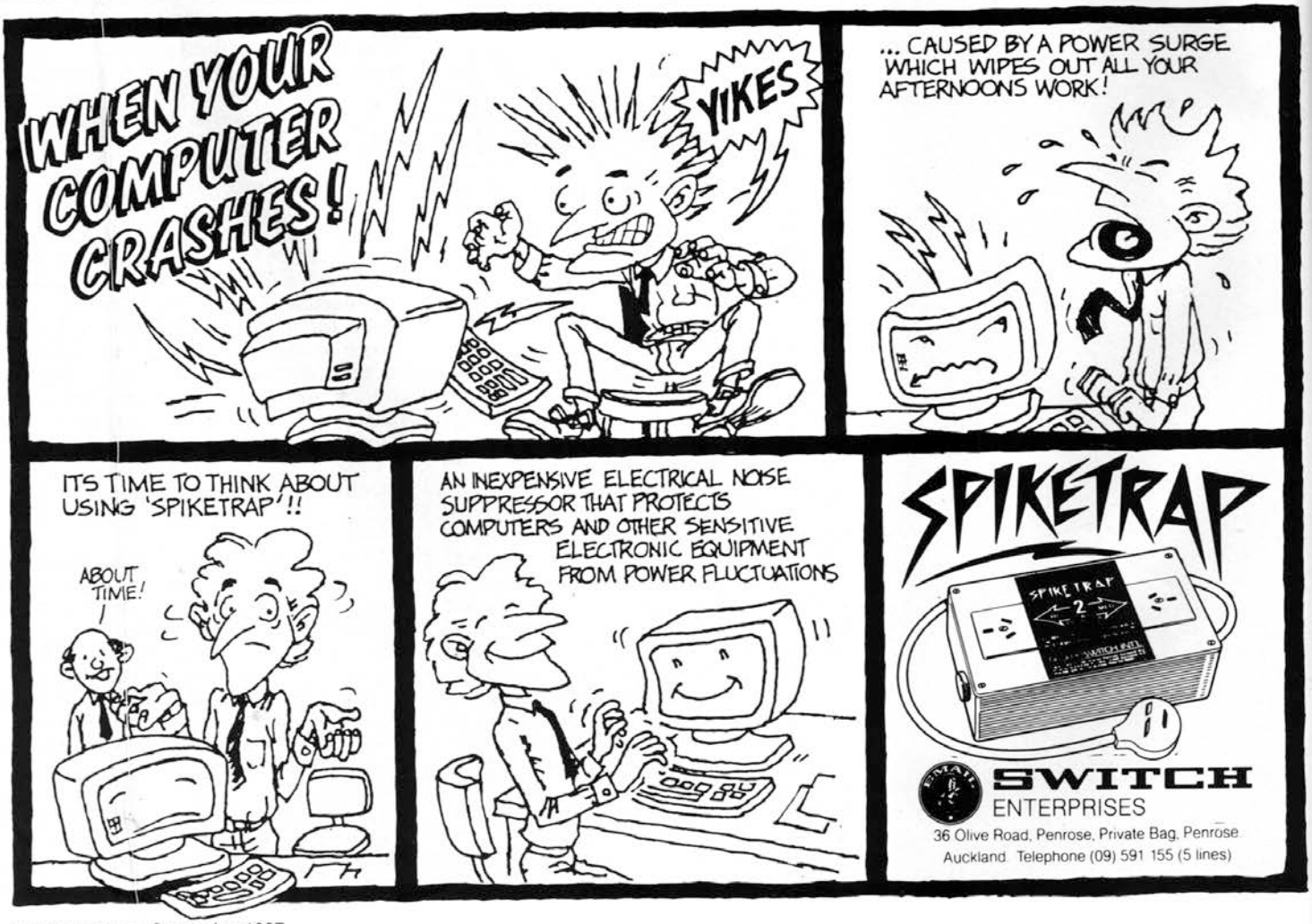
Thermal dot matrix

| | |
|---|---|
| Pins in print head: | 9 |
| NLQ feature: | no |
| Print speed: | 45 cps (12 cps draft) |
| Max chars/line: | 40 at 10 cpi; 80 (condensed) |
| Point sizes: | |
| Paper width: | 112 mm |
| Paper feed: | friction |
| Buffer size: | 240k |
| Graphics mode: | Bit imaging |
| Interface: | Serial: RS232C Parallel: industry std/EPSON style, 8 bit parallel |
| Features: | portable/compact; battery operated; good resolution for a portable printer |
| Options: | thermal transfer ribbon |
| Retail price: | $433 |
| Agent: | Epson New Zealand |

## PANASONIC KX-P1080

Dot matrix

| | |
|---|---|
| Pins in print head: | 9 |
| NLQ feature: | yes |
| Print speed in NLQ mode: | 20 cps |
| Print speed: | 100 cps |
| Max chars/line: | 80/137 |
| Paper width: | 3"-10" |
| Paper feed: | tractor feed and friction feed |
| Buffer size: | 1k |
| Ribbon type: | nylon cartridge |
| Graphics mode: | bit image |
| Interface: | parallel, serial |
| Features: | NLQ printing in all pitches, operator accessible mode switch, proportional spacing, word processing commands, RX-80 compatible. |
| Options: | Serial Interface, Macintosh or Apple IIc serial interfaces, 4k text buffer |
| Retail price: | $630 plus GST |
| Agent: | The Microcomputer Electronic Company Ltd |

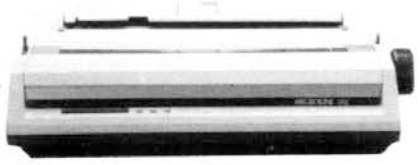
## STAR NP10

| | |
|---|---|
| Dot matrix | |
| Pins in print head: | 9 |
| NLQ feature: | yes |
| Print speed in | |
| NLQ mode: | 25 cps |
| Print speed: | 100 cps |
| Max chars/line: | 80 (10 cpi) 160 (condensed) |
| Paper width: | 10" |
| Paper feed: | friction and push tractor feed |
| Buffer size: | 2k |
| Ribbon type: | cartridge multistrike |
| Graphics mode: | full IBM graphics |
| Interface: | parallel (centronics compatible) |
| Features: | front panel control, forward and reverse micro feed, skip over perforation, auto paper load |
| Retail price: | $650.00 |
| Agent: | Star Micronics (NZ) Ltd |

## CENTRONICS GLP II

| | |
|---|---|
| Dot matrix | |
| Pins in print head: | 9 |
| NLQ feature: | yes |
| Print speed in | |
| NLQ mode: | 25 cps |
| Print speed: | 100 cps |
| Max chars/line: | 132 |
| Paper width: | fanfold 4"-10". cut sheet 4"-10" |
| Paper feed: | friction |
| Buffer size: | 2k |
| Ribbon type: | Continuous Loop Reinking |
| Graphics mode: | IBM PC block graphics and Bit Image graphics |
| Interface: | Centronics Parallel and RS232 |
| Features: | Slimline, character switchable, Bi-directional |
| Options: | Tractor feed |
| Retail price: | $680 + GST |
| Agent: | Rakon Computers Ltd |

## AWA/OKI MICROLINE 182



| | |
|---|---|
| Impact dot matrix | |
| Pins in print head: | 9 |
| NLQ feature: | yes |
| Print speed in | |
| NLQ mode: | 20 cps |
| Print speed: | 120 cps |
| Max chars/line: | 80,132 compressed |
| Point sizes: | 5 6 8.5 10 12 17.1 |
| Paper width: | 254mm (10") |
| Paper feed: | friction feed & pin |
| Buffer size: | 2k |
| Ribbon type: | Re-inking |
| Graphics mode: | 5 densities. IBM or Microline |
| Interface: | Parallel centronics or optionally RS232, RS422 & current loop |
| Options: | tractor feed, roll paper stand, RS232, RS422 + current loop |
| Retail price: | $695 plus GST |
| Agent: | AWA New Zealand Ltd |

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- Unique On-Line Help System
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dBASEIII+ is a trademark of Ashton-Tate, Inc.

* *Price subject to GST.*

## RITEMAN BLUE PLUS

Dot matrix

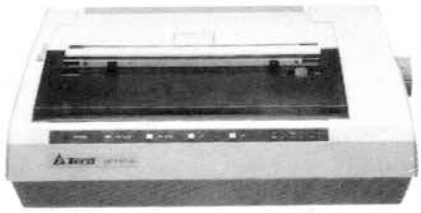
| | |
|---|---|
| Pins in print head: | 9 |
| NLQ feature: | no |
| Print speed: | 140 cps |
| Max chars/line: | 30 |
| Paper width: | cut sheet & roll paper 4"-9"/fanfold – 9.5" |
| Paper feed: | friction & tractor & pinfeed |
| Buffer size: | |
| Ribbon type: | re-inking compact blk ribbon |
| Graphics mode: | bit image graphics |
| Interface: | 8 bit parallel |
| Features: | front switch selection: draft, compressed expanded, elite,emphasised, italic, double strike, underline, superscript, subscript, skip perforation |
| Options: | serial interface |
| Retail price: | $699 inc GST |
| Agent: | Anitech |

## PANASONIC KX-P1081

Dot matrix

| | |
|---|---|
| Pins in print head: | 9 |
| NLQ feature: | yes |
| Print speed in NLQ mode: | 24 cps |
| Print speed: | 120 cps |
| Max chars/line: | 80/137 |
| Point sizes: | |
| Paper width: | 3"-10" |
| Paper feed: | tractor feed and friction feed |
| Buffer size: | 1k |
| Ribbon type: | nylon cartridge |
| Graphics mode: | bit image, IBM block |
| Interface: | parallel |
| Features: | NLQ in all pitches, IBM printer and RX80 compatible, proportional printing, word processing commands. |
| Options: | Serial interface, Macintosh or Apple 11c serial interfaces. 4k text buffer. |
| Retail price: | $750 plus GST |
| Agent: | The Microcomputer Electronic Company Ltd |

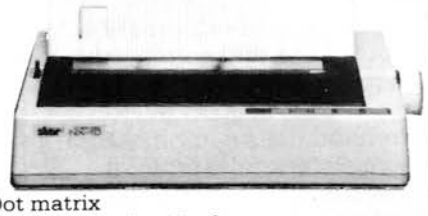
## TECO VP 1814



Dot matrix

| | |
|---|---|
| Pins in print head: | 9 |
| NLQ feature: | yes |
| Print speed in NLQ mode: | 36 cps |
| Print speed: | 180 cps |
| Max chars/line: | 136 |
| Point sizes: | 9 x 9 NLQ 18 x 20 |
| Paper width: | 10" |
| Paper feed: | tractor & friction |
| Buffer size: | 7k |
| Ribbon type: | multistrike cassette |
| Graphics mode: | 8 x 1920 |
| Interface: | centronics |
| Features: | Both IBM & Epson compatible; printing modes selectable at front panel; double-width condensed characters can be mixed on same line |
| Options: | RS232C interface & 15k buffer |
| Retail price: | $795 + GST |
| Agent: | ProfCom Systems Ltd |

## STAR NL10



Dot matrix

| | |
|---|---|
| Pins in print head: | 9 |
| NLQ feature: | yes |
| Print speed in NLQ mode: | 30 cps |
| Print speed: | 120 |
| Max chars/line: | 80 (10 cpi) 160 (condensed) |
| Paper width: | 10" |
| Paper feed: | friction and push tractor feed |
| Buffer size: | 5k |
| Ribbon type: | cartridge multistrike |
| Graphics mode: | full IBM graphics |
| Interface: | optional Apple IIC, IBM PC, parallel serial RS232C |
| Features: | Optional interface cartridges, front panel control, italic mode, forward and reverse micro feed, |
| Options: | auto cut sheet feeder |
| Retail price: | $860.00 |
| Agent: | Star Micronics (NZ) Ltd |

## STAR NX-10C

Dot matrix

| | |
|---|---|
| Pins in print head: | 9 |
| NLQ feature: | yes |
| Print speed in NLQ mode: | 30 cps |
| Print speed: | 120 cps |
| Max chars/line: | 136 |
| Point sizes: | Pica, elite, condensed, superscript, subscript |
| Paper width: | 10" |
| Paper feed: | friction/tractor, |
| Buffer size: | 1 line |
| Ribbon type: | carbon |
| Graphics mode: | Uppercase/lowercase, Uppercase/graphics, normal & double density |
| Interface: | Commodore serial |
| Features: | feeding forwards and reverse, short tear-off, hex dump |
| Options: | sheet feeder |
| Retail price: | $895.00 (inc GST) |
| Agent: | Commodore Computer (NZ) Ltd |

## RITEMAN SUPER C+

Dot matrix

| | |
|---|---|
| Pins in print head: | 9 |
| NLQ feature: | yes |
| Print speed in NLQ mode: | 25 cps |
| Print speed: | 120 cps |
| Max chars/line: | 132 |
| Paper width: | roll and cut sheet 4-9.5"/fanfold 4.5-10" |
| Paper feed: | friction and tractor |
| Buffer size: | 8k |
| Ribbon type: | Reinking black ribbon |
| Graphics mode: | Bit image graphics |
| Interface: | Commodore serial bus |
| Features: | Front panel selection, straight through paper path, 9 international character sets, high print speed |
| Options: | serial interface |
| Retail price: | $899.00 (inc GST) |
| Agent: | Anitech |

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Avery Labels are made of rehumidified backing paper, which gives excellent re-fan folding characteristics — with jam free performance! That solves one Bug problem!

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Post to: Business Systems Product Manager, Avery Labels (NZ) Ltd
P.O. Box 2578, Auckland. Telephone 765-146

NAME: .....

POSITION: .....

COMPANY: .....

ADDRESS: .....

## RITEMAN SUPER F=III

Dot matrix

| | |
|---|---|
| Pins in print head: | 9 |
| NLQ feature: | yes |
| Print speed in | |
| NLQ mode: | 42 cps |
| Print speed: | 160 cps |
| Max chars/line: | 132 |
| Paper width: | roll and cut sheet 4-9.5"/fanfold 4.5-10" |
| Paper feed: | friction and tractor |
| Buffer size: | 8k |
| Ribbon type: | Reinking black ribbon |
| Graphics mode: | Bits image graphics |
| Interface: | 8 bit parallel |
| Features: | Front panel selection of: straight through paper path, 9 international character sets, high print speed |
| Options: | serial interface |
| Retail price: | $899.00 (inc GST) |
| Agent: | Anitech |

## RITEMAN SUPER II

Dot matrix

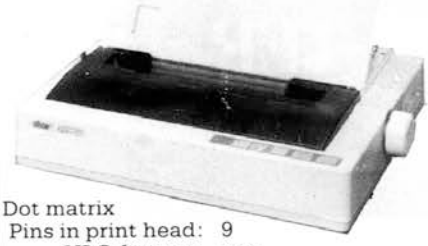
| | |
|---|---|
| Pins in print head: | 9 |
| NLQ feature: | yes |
| Print speed in | |
| NLQ mode: | 42 cps |
| Print speed: | 160 cps |
| Max chars/line: | 132 |
| Paper width: | cut sheet & roll paper 4-9"/fanfold 4-9.5" |
| Paper feed: | friction, tractor, pin feed |
| Buffer size: | 8k |
| Ribbon type: | Reinking compact black ribbon |
| Graphics mode: | bit image graphics |
| Interface: | 8 bit parallel |
| Features: | front switch selection: 9 international character sets, high print speed. |
| Options: | serial interface |
| Retail price: | $899 inc GST |
| Agent: | Anitech |

## PANASONIC KX-P1082

Dot matrix

| | |
|---|---|
| Pins in print head: | 9 |
| NLQ feature: | yes |
| Print speed in | |
| NLQ mode: | 32 cps |
| Print speed: | 160 cps |
| Max chars/line: | 80/137 |
| Point sizes: | |
| Paper width: | 3"-10" |
| Paper feed: | tractor feed and friction feed |
| Buffer size: | 1k |
| Ribbon type: | nylon cartridge |
| Graphics mode: | bit image, IBM block |
| Interface: | parallel |
| Features: | IBM Proprinter and RX80 compatible, in all pitches, proportional printing, |
| Options: | Serial interface |
| Retail price: | $900 plus GST |
| Agent: | The Microcomputer Electronic Company Ltd |

## STAR NX10/15



Dot matrix

| | |
|---|---|
| Pins in print head: | 9 |
| NLQ feature: | yes |
| Print speed in | |
| NLQ mode: | 30 cps |
| Print speed: | 120 cps |
| Max chars/line: | condensed 160/233 |
| Paper width: | 4" to 10"/15.5" |
| Paper feed: | friction and push tractor |
| Buffer size: | 4k |
| Ribbon type: | cartridge multistrike |
| Graphics mode: | full IBM graphics |
| Interface: | parallel |
| Features: | front panel control, italic mode forward and reverse micro feed, skip over perforation, auto paper load. |
| Opotion: | auto cut sheet feed, serial interface (15" only) |
| Retail price: | $920.00/$1420.00 |
| Agent: | Star Micronics (NZ) Ltd |

## AWA/OKI MICROLINE 183

Impact dot matrix

| | |
|---|---|
| Pins in print head: | 9 |
| NLQ feature: | yes |
| Print speed in | |
| NLQ mode: | 20 |
| Print speed: | 120 cps |
| Max chars/line: | 136,233 Condensed |
| Point sizes: | 5, 6, 8.5, 10, 12, 17.1 |
| Paper width: | 406.4mm (16") |
| Paper feed: | friction, tractor |
| Buffer size: | 2k |
| Ribbon type: | Reinking |
| Graphics mode: | IBM or Microline |
| Interface: | parallel centronics or optionally RS232 RS422 and current loop |
| Options: | RS232, RS422, Current Loop |
| Retail price: | $1100 plus GST |
| Agent: | AWA New Zealand Ltd |

## PS358 TX IMAGEWRITER II

Dot matrix

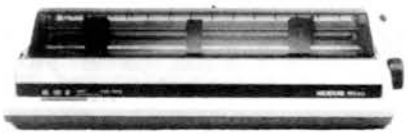
| | |
|---|---|
| Pins in print head: | 18 |
| NLQ feature: | yes |
| Print speed in | |
| NLQ mode: | 100 cps |
| Print speed: | 400 cps |
| Max chars/line: | 255 |
| Paper width: | 5"-15" fanfold 6 part |
| Paper feed: | push feed tractors; plus single sheet feed |
| Buffer size: | 4k |
| Ribbon type: | continuous loop reinking nylon ribbon |
| Graphics mode: | pin addressable graphics |
| Interface: | twinax & parallel as standard |
| Features: | 20 million character ribbon life, demand document feature, front panel selection |
| Options: | 1-3 bin automatic cut sheet feeder |
| Agent: | Rakon Computers Ltd |

## AWA/OKI MICROLINE 192+

Impact dot matrix

| | |
|---|---|
| Pins in print head: | 9 |
| NLQ feature: | yes |
| Print speed in NLQ mode: | 40 |
| Print speed: | 200 cps |
| Max chars/line: | 80, 137 compressed |
| Point sizes: | 5, 6, 8.5, 10, 12, 17.1 |
| Paper width: | 8.5" |
| Paper feed: | cut sheet and tractor, Friction & Pin feed (adjustable) |
| Buffer size: | 8k |
| Ribbon type: | Reinking |
| Graphics mode: | 15 densitys IBM or Microline |
| Interface: | Serial or Centronics Parallel,RS422A, Ready/Busy XON/XOFF. |
| Options: | Paper roll stand, sheet insertion guide, automatic sheet faders, |
| Retail price: | $1100 plus GST |
| Agent: | AWA New Zealand 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: | $1150 plus GST |
| Agent: | AWA New Zealand Ltd |

## NEC SPINWRITER ELF

Fully formed character printer (Thimble)

| | |
|---|---|
| Print speed: | 19 cps |
| Max chars/line: | 165 |
| Paper width: | 76-330 mm |
| Paper feed: | tractor, sheet feeder (standard), cut sheet |
| Buffer size: | 3k |
| Ribbon type: | multistrike fabric and carbon |
| Interface: | serial and parallel (standard) |
| Features: | up to 128 character in each thimble, low cost, wide variety of fonts available |
| Retail price: | $1155.00 plus GST |
| Agent: | NEC Information Systems Ltd |

## THINKJET 2225A/B/C/D/P

Dot matrix

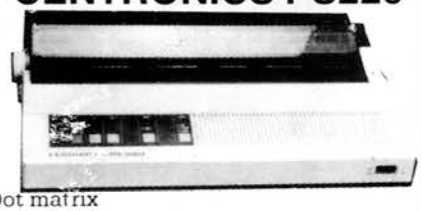
| | |
|---|---|
| Pins in print head: | 19 (nozzles) |
| NLQ feature: | yes |
| Print speed in NLQ mode: | 150 (12 cpi) |
| Print speed: | 150 cps (12 cpi) |
| Max chars/line: | 80 (12 cpi) 142 (21.3 cpi) |
| Point sizes: | 5.63, 10, 11, 27, 20 |
| Paper width: | 8.5" 21 cm |
| Paper feed: | tractor and sheet |
| Buffer size: | 1k |
| Ribbon type: | ink cartridge |
| Graphics mode: | HP & Epson (alternate) – C/D/P |
| Interface: | A-HPIB, B-HPIL, c-Centronics, Parallel, d-Serial, P-Parrallel |
| Features: | Quiet (less than 50dB), light, small |
| Retail price: | $1203 |
| Agent: | Hewlett-Packard and authorised Dealers |

## RITEMAN SUPER 15

Dot matrix

| | |
|---|---|
| Pins in print head: | 9 |
| NLQ feature: | yes |
| Print speed in NLQ mode: | 42 cps |
| Print speed: | 160 cps |
| Max chars/line: | 233 |
| Paper width: | roll and cut sheet 4-10"/fanfold 4-15.5" |
| Paper feed: | friction & tractor |
| Buffer size: | 8k |
| Ribbon type: | Reinking black ribbon |
| Graphics mode: | bit image graphics |
| Interface: | 8 bit parallel |
| Features: | front panel selection, straight through papaer path, 9 international character sets, high print-speed |
| Options: | serial interface |
| Retail price: | $1,339.00 inc GST |
| Agent: | Anitech |

## CENTRONICS PS220



Dot matrix

| | |
|---|---|
| Pins in print head: | 9 |
| NLQ feature: | yes |
| Print speed in NLQ mode: | 45 |
| Print speed: | 180 |
| Max chars/line: | 232 |
| Paper width: | fanfold 5"-16", cut sheet 5"-16.5" |
| Paper feed: | push tractor, friction |
| Buffer size: | 3k |
| Ribbon type: | Continuous loop Reinking |
| Graphics mode: | IBM PC block graphics and Bit Image graphics |
| Interface: | centronics parallel and RS232 |
| Features: | Push feed tractors, Automatic paper insertion, character sets switchable, Bi-directional, |
| Options: | cut sheet feeder, LQ100 font module, LQ200 font module & 16kb buffer expansion |
| Retail price: | $1350 + GST |
| Agent: | Rakon Computers Ltd |

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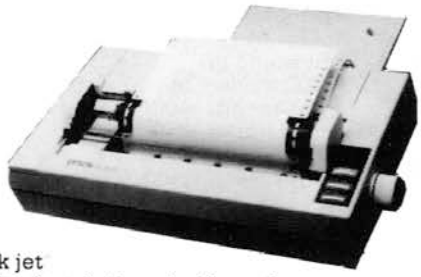
## PANASONIC KX-P1083

Dot matrix

| | |
|---|---|
| Pins in print head: | 9 |
| NLQ feature: | yes |
| Print speed in NLQ mode: | 48 cps |
| Print speed: | 240 cps |
| Max chars/line: | 80/137 |
| Point sizes: | |
| Paper width: | 4"-10" |
| Paper feed: | tractor and friction feed |
| Buffer size: | 6k |
| Ribbon type: | nylon cartridge |
| Graphics mode: | bit image, IBM block |
| Interface: | parallel |
| Features: | NLQ in all pitches with Courier or Bold PS fonts, proportional printing, IBM Proprinter or FX80 compatible. |
| Options: | Serial interface, 32k test buffer |
| Retail price: | $1350 plus GST |
| Agent: | The Microcomputer Electronic Company Ltd |

## EPSON IX-800



Ink jet

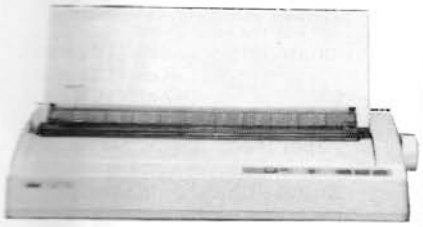
| | |
|---|---|
| Pins in print head: | 9 nozzles |
| NLQ feature: | yes |
| Print speed in NLQ mode: | 54 cps (pica) |
| Print speed: | 240 cps (12 pitch draft); 200 cps (10 pitch draft) 45 cps (10 pitch LQ) |
| Max chars/line: | 80 (at 10 cpi) 160 (condensed elite) |
| Paper width: | fanfold: 101-254 mm cutsheet: 182-216 mm |
| Paper feed: | friction & tractor |
| Buffer size: | 8k |
| Graphics mode: | IBM & international |
| Interface: | centronics & SSI; optional 81xx communications |
| Features: | Key panel; IBM printer emulation mode; bi-directional printing. |
| Options: | tractor unit, interfaces |
| Agent: | Epson New Zealand |

## 2228AG QUIETJET

Dot matrix

| | |
|---|---|
| Pins in print head: | 19 (nozzles) |
| NLQ feature: | yes |
| Print speed in NLQ mode: | 40 (10 cpi) |
| Print speed: | 160 cps 10 cpi |
| Max chars/line: | (Normal 10 cpi) 88 (compressed 21.3 cpi) 170 |
| Point sizes: | 5.63, 10, 11.21, 12, 20, 24 |
| Paper width: | (4 to 9.75) inch (10.2 to 24.8) cm |
| Paper feed: | sheet & tractor |
| Buffer size: | 2k |
| Ribbon type: | ink cartridge |
| Graphics mode: | HP & Epson |
| Interface: | Serial & centronics parallel |
| Features: | speed, quiet (less than 50dB), small, light |
| Retail price: | $1368 |
| Agent: | Hewlett-Packard and authorised Dealers |

## STAR ND10/15



Dot matrix

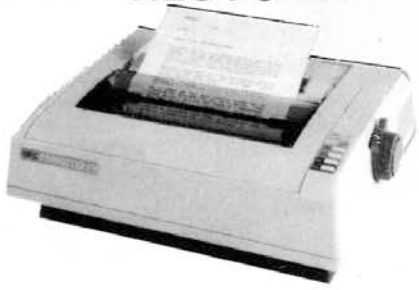
| | |
|---|---|
| Pins in print head: | 9 |
| NLQ feature: | yes |
| Print speed in NLQ mode: | 45 cps |
| Print speed: | 180 cps |
| Max chars/line: | condensed 160/272 |
| Paper width: | 10/15" |
| Paper feed: | friction and push tractor feed |
| Buffer size: | 12.6k |
| Ribbon type: | cartridge multistrike |
| Graphics mode: | full IBM graphics |
| Interface: | parallel |
| Features: | front panel control, skip over perforation, auto paper load, foward and reverse micro feed, left and right margin set. |
| Option: | auto cut sheet feed, serial interface. |
| Retail price: | $1350.00 / $1800.00 |
| Agent: | Star Micronics (NZ) Ltd |

## EPSON FX-800

Dot matrix

| | |
|---|---|
| Pins in print head: | 9 |
| NLQ feature: | yes |
| Print speed in NLQ mode: | 40 cps (pica) |
| Print speed: | 240 cps (draft elite) 200 cps (draft pica) |
| Max chars/line: | 80 (pica) 160 condensed elite |
| Paper width: | cut sheet: 182-216 mm fanfold: 101-254 |
| Paper feed: | automatic paper load |
| Buffer size: | 8k |
| Ribbon type: | multistrike |
| Graphics mode: | IBM & international |
| Interface: | centronics-type 8 bit parallel optional: IEEE-488, RS-232C/ current loop |
| Features: | SelecType function; 2 Built-in NLQ fonts IBM proprinter emulation; upward compatibility |
| Options: | cut sheet feeder, optional interfaces |
| Retail price: | $1395 |
| Agent: | Epson New Zealand |

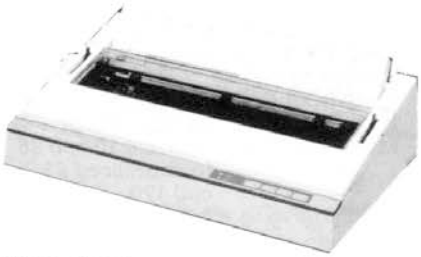
## NEC P6



Dot matrix

| | |
|---|---|
| Pins in print head: | 24 |
| NLQ feature: | yes |
| Print speed in NLQ mode: | 76 cps (single pass) |
| Print speed: | 216 cps |
| Max chars/line: | 160 |
| Paper width: | 114-254 mm |
| Paper feed: | uni-directional, bi-directional tractor and cut sheet feeder |
| Buffer size: | 8k standard |
| Ribbon type: | black fabric |
| Graphics mode: | 360 x 360 dots per inch |
| Interface: | serial and parallel |
| Features: | low noise and quiet mode, 22 built-in fonts selectable by operator, emulates LQ1500 |
| Retail price: | $1431.00 plus GST |
| Agent: | NEC Information System Ltd |

## PANASONIC KX-P3151



Daisy wheel

| | |
|---|---|
| Print speed: | 22 cps |
| Max chars/line: | 132 (10cpi), 158 (12 cpi), 198 (15 cpi) |
| Paper width: | 16.5" |
| Paper feed: | friction |
| Buffer size: | 7k |
| Ribbon type: | multistrike |
| Interface: | parallel |
| Features: | Diablo 630 compatible, printwheel and ribbon compatible, bi directional printing and logic seeking |
| Options: | Serial interface, bi-directional tractor feed, 48k text buffer |
| Retail price: | $1450 plus GST |
| Agent: | The Microcomputer Electronic Company Ltd |

## CENTRONICS PS359

Dot matrix

| | |
|---|---|
| Pins in print head: | 18 |
| NLQ feature: | yes |
| Print speed in NLQ mode: | 95 |
| Print speed: | 400 |
| Max chars/line: | 255 |
| Paper width: | 5"-15.5" |
| Paper feed: | push feed tractor & single sheet |
| Buffer size: | 4k |
| Ribbon type: | continuous loop reinking nylon ribbon |
| Graphics mode: | Pin addressable graphics |
| Interface: | parallel & serial as standard |
| Features: | 20 million character ribbon life, demand document feature, front panel selection |
| Options: | 1-3 bin automatic cut sheet feeder |
| Agent: | Rakon Computers Ltd |

## GENICOM GE1025

Dot matrix

| | |
|---|---|
| Pins in print head: | 18 wine staggered |
| NLQ feature: | yes |
| Print speed in NLQ mode: | 100 cps |
| Print speed: | 200 cps |
| Max chars/line: | 130 in 17 cpi mode |
| Point sizes: | determined by font |
| Paper width: | 8" (203mm) |
| Paper feed: | friction and tractor |
| Buffer size: | 2k std 8k and 64k |
| Ribbon type: | multistrike up to 2.5 million characters |
| Graphics modes: | IBM graphics |
| Interface: | serial or parallel |
| Features: | intergral printer stand, selection of plug in font styles and personality module. |
| Options: | single bin feeder, font cartridges, colour option kit |
| Retail price: | $1495 plus GST |
| Agent: | AWA Computers |

## PANASONIC KX-P1592

Dot matrix

| | |
|---|---|
| Pins in print head: | 9 |
| NLQ feature: | yes |
| Print speed in NLQ mode: | 38 cps |
| Print speed: | 180 cps |
| Max chars/line: | 136/233 |
| Paper width: | 4" to 15.5" fanfold, 7.25" to 16.5" singlesheet |
| Paper feed: | tractor feed and friction feed |
| Buffer size: | 7k |
| Ribbon type: | nylon cartridge |
| Graphics mode: | bit image, IBM block |
| Interface: | parallel |
| Features: | NLQ in all pitches, proportional printing, FX100 and IBM matrix/graphic/ compatible |
| Options: | 32k text buffer, serial interface |
| Retail price: | $1540 plus GST |
| Agent: | The Microcomputer Electronic Company Ltd |

## FACIT 4513

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: | 133 compressed, 80 col |
| Point sizes: | 9 x 9; 18 x 17 NLQ |
| Paper width: | 10⅔" |
| Paper feed: | friction and tractor |
| Buffer size: | 2k |
| Ribbon type: | cassette |
| Graphics mode: | 9 and 8 pin bit image |
| Interface: | RS232c serial and centronics parallel |
| Features: | Epson FX-80/IBM emulations. Switch selectable fonts, rugged/heavy duty capabilities. |
| Options: | cut sheet feeder |
| Retail price: | $1549 plus GST |
| Agent: | Northrop Instruments and Systems Ltd |

## SILVER REED EXP 600

Daisy wheel

| | |
|---|---|
| Print speed: | 25 cps |
| Max chars/line: | 132 ch (10 pitch), 158 ch (12 pitch), 197 ch (15 pitch) |
| Paper width: | 17" |
| Paper feed: | cut sheet feeder or tractor |
| Buffer size: | 3k std can be expanded 40 kb |
| Ribbon type: | multistrike |
| Interface: | parallel, serial and IEEE-488 |
| Features: | Front switch selection: form feed, toe set, pitch select, copy, sub and superscript and underline |
| Retail price: | $1569 inc GST |
| Agent: | Anitech |

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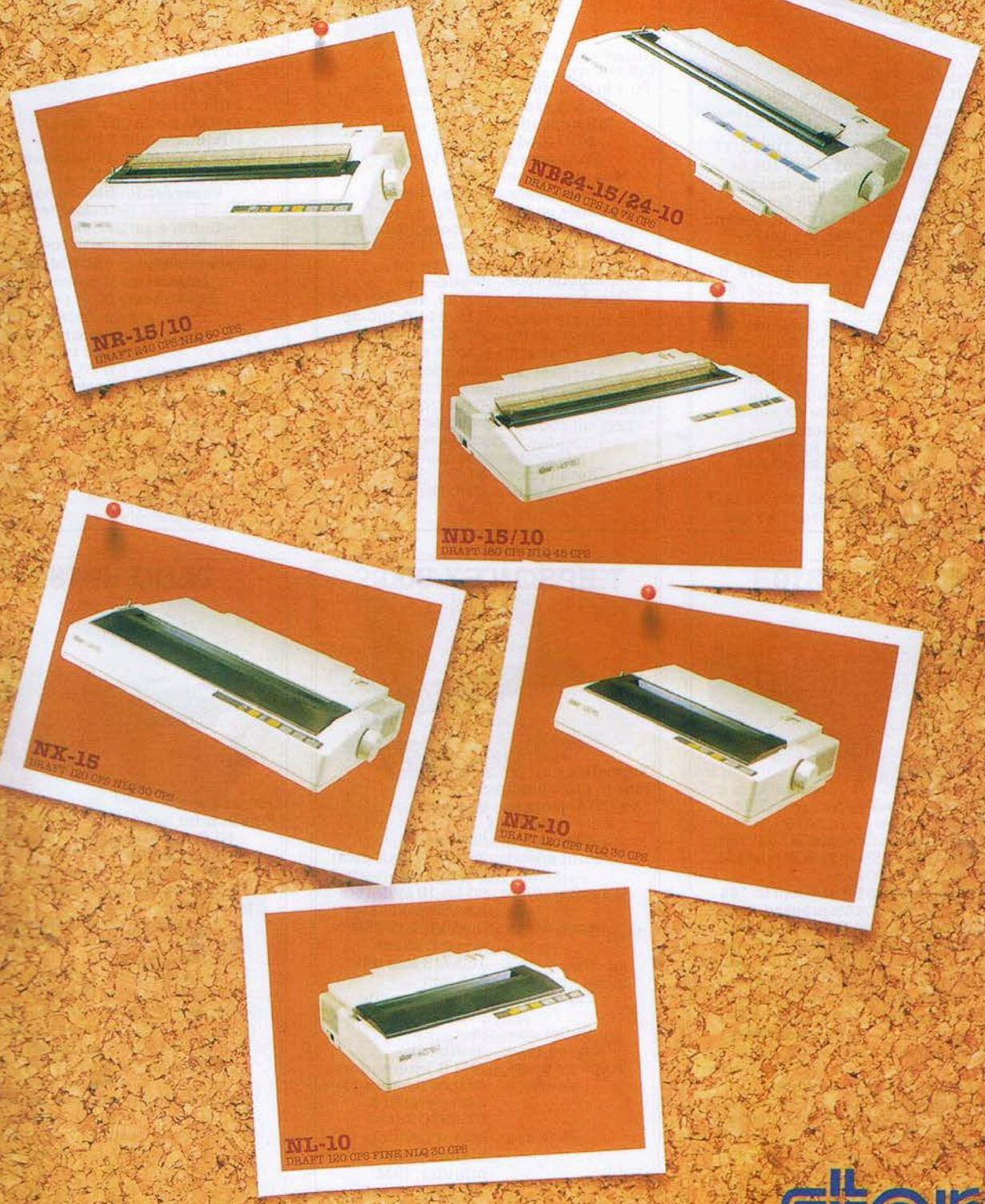


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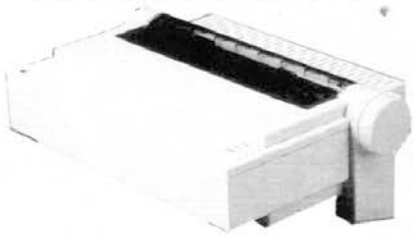
star micronics

## BROTHER M1709

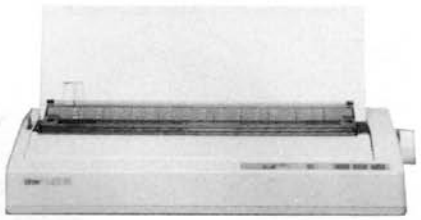
| | |
|---|---|
| Dot matrix | |
| Pins in print head: | 9 |
| NLQ feature: | yes |
| Print speed in NLQ mode: | 50 (pica)/60 (elite) |
| Print speed: | 200 (pica)/240 (elite) |
| Max chars/line: | 136 (pica) |
| Point sizes: | 5, 6, 8.5, 10, 12, 17 |
| Paper width: | cut sheet 101.6-420mm, fanfold 104-408.4mm |
| Paper feed: | friction and tractor |
| Buffer size: | 24kb standard, |
| Ribbon type: | nylon ribbon |
| Graphics modes: | 8 x 816, 8 x 978, 8 x 1088, 8 x 1224, 8 x 1632, 8 x 1956, 8 x 3264 dots/line |
| Interface: | centronics (parallel) and RS-232C (serial) |
| Features: | emulates IBM proprinter and Epson FX series printers |
| Options: | NLQ font board, NLQ font/RAM board |
| Retail price: | $1,595.00 plus GST |
| Agent: | Selected Dealers |

## APPLE IMAGEWRITER II



| | |
|---|---|
| Dot matrix | |
| Pins in print head: | 9 |
| NLQ feature: | yes |
| Print speed in NLQ mode: | 45 cps |
| Print speed: | 250/2½ cps |
| Max chars/line: | 136 |
| Point sizes: | 4.5 to 17 cpi |
| Paper width: | 3-10" |
| Paper feed: | friction, pin feed, optional cut sheet |
| Buffer size: | 2k |
| Ribbon type: | fabric |
| Graphics mode: | 72, 80, 96, 107, 120, 136, 144 & 160 dpi |
| Interface: | RS-232 (serial) |
| Features: | choice of speeds/ qualities, cut-sheet or continuous paper, quiet and compact, different colours. |
| Options: | cut sheet feeder |
| Retail price: | $1695 |
| Agent: | CED Distributors Ltd |

## STAR NR10



| | |
|---|---|
| Dot matrix | |
| Pins in print head: | 9 |
| NLQ feature: | yes |
| Print speed in NLQ mode: | 60 cps |
| Print speed: | 240 cps |
| Max chars/line: | 160 condensed |
| Paper width: | 10" |
| Paper feed: | friction and push tractor feed |
| Buffer size: | 12.6k |
| Ribbon type: | cartridge multistrike |
| Graphics modes: | full IBM graphics |
| Interface: | parallel |
| Features: | front panel control, auto paper load, italic mode, forward and reverse micro feed, skip over perforation |
| Options: | auto cut sheet feeder, serial interface |
| Retail price: | $1700.00 |
| Agent: | Star Micronics (NZ) Ltd |

## C. ITOH C310

| | |
|---|---|
| Dot matrix impact | |
| Pins in print head: | 9 |
| NLQ feature: | yes |
| Print speed in NLQ mode: | 50 cps LQ 33 cps |
| Print speed: | Up to 300 cps/135 lpm |
| Max chars/line: | 80 at 10cpi to 144 compressed |
| Paper width: | 4.5-10" |
| Paper feed: | rear push tractor/ bottom pull tractor/ cut paper |
| Buffer size: | 10k |
| Ribbon type: | black fabric or 4 colour cartridge |
| Graphics mode: | Epon & IBM or C.Itoh & Macintosh compatible. |
| Interface: | centronics parallel or RS-232-C/V24 |
| Features: | special version for credit card/POS, 7 colour printing |
| Options: | font cartridge, bar code cartridgte |
| Retail price: | $1750.00 plus GST |
| Agent: | Control Microcomputers |

## EPSON EX-800

| | |
|---|---|
| Dot matrix | |
| Pins in print head: | 9 |
| NLQ feature: | yes |
| Print speed in NLQ mode: | 50 cps |
| Print speed: | 250 cps (draft pica) 300 cps (draft elite) |
| Max chars/line: | 80 (at 10 cpi), 160 (condensed elite) |
| Paper width: | fanfold: 101-254 mm cut sheet: 182-218 mm roll: 216 mm |
| Paper feed: | semi-automatic paper loading |
| Buffer size: | 8k |
| Ribbon type: | multistrike |
| Graphics mode: | IBM & international |
| Interface: | std: centronics-type 8 bit parallel & RS-232C serial |
| Features: | colour printing bi-directional printing; IBM emulation mode |
| Options: | cut sheet feeder, colour kit, interfaces |
| Retail price: | $1750 |
| Agent: | Epson New Zealand |

## TECO VP1821

| | |
|---|---|
| Dot matrix | |
| Pins in print head: | 24 |
| NLQ feature: | yes |
| Print speed in NLQ mode: | 90 cps |
| Print speed: | 180 cps |
| Max chars/line: | 277 |
| Point sizes: | 9 x 24 draft 18 x 24 NLQ |
| Paper width: | 16" |
| Paper feed: | tractor & friction |
| Buffer size: | 6.5k |
| Ribbon type: | snap in cassette |
| Graphics mode: | 180 x 180 (dots/in) |
| Interface: | centronics |
| Features: | Both IBM & Epson compatible; printing modes selectable at front panel; double-width condensed characters can be mixed on same line |
| Options: | RS232C interface, Chinese font |
| Retail price: | $1800 + GST |
| Agent: | ProfCom Systems Ltd |

## BROTHER M1724L

| | |
|---|---|
| Dot matrix | |
| Pins in print head: | 24 |
| NLQ feature: | LQ |
| Print speed in NLQ mode: | 60 (pica)/72 (elite) |
| Print speed: | 180 (pica)/216 (elite) |
| Max chars/line: | 136 (pica) |
| Point sizes: | 5, 6, 8.5, 10, 12, 17 and 20 cpi |
| Paper width: | cut sheet 101.6-420mm, fanfold 101.6-408.4mm |
| Paper feed: | friction and tractor |
| Buffer size: | 16kb standard, optional 32kb |
| Ribbon type: | nylon ribbon |
| Graphics modes: | 24 x 816, 24 x 1224, 24 x 1632, 24 x 2448, 24 x 4896 dots/line |
| Interface: | centronics (parallel) and RS-232C (serial) |
| Features: | Emulates Epson, IBM and Diablo printers |
| Options: | cut sheet feeder, |
| Retail price: | $1,849.00 plus GST |
| Agent: | Selected Dealers |

## NEC P7

| | |
|---|---|
| Dot matrix | |
| Pins in print head: | 24 |
| NLQ feature: | yes |
| Print speed in NLQ mode: | 76 cps (single pass) |
| Print speed: | 216 cps |
| Max chars/line: | 272 |
| Paper width: | 127-406 mm |
| Paper feed: | uni-directional, bi-directional tractor and cut sheet feeder |
| Buffer size: | 8k standard |
| Ribbon type: | black fabric |
| Graphics mode: | 360 x 360 dots per inch |
| Interface: | serial and parallel |
| Features: | low noise and quiet mode, 22 built-in fonts selectable by operator, emulates LQ1500 |
| Options: | serial interface, eight colour printing, cut sheet feeder |
| Retail price: | $1863.00 plus GST |
| Agents: | NEC Information Systems Ltd |

## EPSON FX-1000

| | |
|---|---|
| Dot matrix | |
| Pins in print head: | 9 |
| NLQ feature: | yes |
| Print speed in NLQ mode: | 40 cps (pica) |
| Print speed: | 240 cps (draft elite) 200 cps (draft pica) |
| Max chars/line: | 136 (pica) 272 (condensed elite) |
| Paper width: | cut sheet: 182-366mm fanfold: 101-406.4mm |
| Paper feed: | automatic paper load |
| Buffer size: | 8k |
| Ribbon type: | multistrike |
| Graphics mode: | IBM & International |
| Interface: | std: centronics-type & bit parallel optional: IEEE-488, RS-232C/current loop |
| Features: | SelecType function; built-in 2 NLQ fonts; IBM Proprinter emulation; upward compatibility |
| Options: | cut sheet feeder optional interfaces |
| Retail price: | $1875 |
| Agent: | Epson New Zealand |

## STAR NB2410

| | |
|---|---|
| Dot matrix | |
| Pins in print head: | 24 |
| NLQ feature: | yes |
| Print speed in NLQ mode: | 72 cps |
| Print speed: | 216 cps |
| Max chars/line: | 80 (10 cpi) 137 (17 cpi) |
| Paper width: | 10" |
| Paper feed: | friction and push tractor feed |
| Buffer size: | 8k |
| Ribbon type: | cartridge multistrike |
| Graphics mode: | full graphics (IBM) |
| Interface: | standard parallel |
| Features: | front panel control, auto paper feed, buffer upgrade, forward reverse micro feed, right and left margin set, italic. |
| Option: | auto cut sheet feed, serial interface, font cartridges |
| Retail price: | $1900.00 |
| Agent: | Star Micronics (NZ) Ltd |

## 2227AG QUIETJET PLUS

| | |
|---|---|
| Dot matrix | |
| Pins in print head: | 19 nozzles |
| NLQ feature: | yes |
| Print speed in NLQ mode: | 40 (10 cpi) |
| Print speed: | 160 cps 10 cpi |
| Max chars/line: | 132 (10 cpi) 281 (21.3 cpi) |
| Point sizes: | 5.63, 10, 11.21, 12, 20, 24 |
| Paper width: | (4 to 15) inch (10.2 to 38.1) cm |
| Paper feed: | sheet and tractor |
| Buffer size: | 2k |
| Ribbon type: | ink cartridge |
| Graphics mode: | HP & Epson (alternate) |
| Interface: | Serial or Centronics (parallel) |
| Features: | speed, quiet (less than 50dB), small, light |
| Retail price: | $1934 |
| Agent: | Hewlett-Packard and authorised dealers |

## EPSON LX-800

| | |
|---|---|
| Dot matrix | |
| Pins in print head: | 9 |
| NLQ feature: | yes |
| Print speed in NLQ mode: | 30 at 12 cpi |
| Print speed: | 150 cps (10 cpi draft) 180 cps (12 cpi draft) 25 cps (10 cpi LQ) |
| Max chars/line: | 80 at 10 cpi |
| Paper width: | cut sheet: 182-216 mm fanfold: 101.6-254 mm roll: 216 mm |
| Paper feed: | friction, tractor |
| Buffer size: | 3k |
| Ribbon type: | multistrike |
| Graphics mode: | IBM & international |
| Interface: | centronics parallel + 81xx |
| Features: | 3 standard fonts; autosheet loading for single sheets; SelecType control panel; IBM compatibility |
| Options: | Paper roll holder, single bin cutsheet feeder, interfaces |
| Retail price: | $1950 |
| Agent: | Epson New Zealand |

# PRINTERS $2000 and under

## EPSON LQ-800

| | |
|---|---|
| Impact dot matrix | |
| Pins in print head: | 24 |
| NLQ feature: | yes |
| Print speed in NLQ mode: | 60 cps |
| Print speed: | 180 cps (draft) |
| Max chars/line: | 80 cpl (10 pitch) 160 cpl (condensed elite) |
| Paper width: | cut sheet: 182-257mm fanfold: 101-254 mm |
| Paper feed: | standard: friction |
| Buffer size: | 8k |
| Ribbon type: | multistrike |
| Graphics mode: | IBM & International |
| Interface: | std: centronics-style 8 bit parallel & RS-232C serial |
| Features: | bi-directional printing; proportional spacing; built-in serial interface |
| Options: | tractor feed unit, single bin cut sheet |
| Retail price: | $1950 |
| Agent: | Epson New Zealand |

## BROTHER HR40

| | |
|---|---|
| Daisywheel printer | |
| Print speed: | 40 cps |
| Max chars/line: | 136 (pica) |
| Point sizes: | 10, 12, 15 cpi |
| Paper width: | 420 mm |
| Paper feed: | friction, tractor and cut sheet feeder |
| Buffer size: | 8 kb standard, upgradeable to 16 |
| Ribbon type: | carbon, multistrike, nylon and coloured |
| Interface: | centronics (parallel) and RS-232C (serial) |
| Features: | designed for heavy volume word processing. Memory typewriter function. Text reprinting from buffer. |
| Options: | keyboard with display, dual bin sheet feeder/ envelope feeder |
| Retail price: | $1995 plus GST |
| Agent: | Selected Dealers |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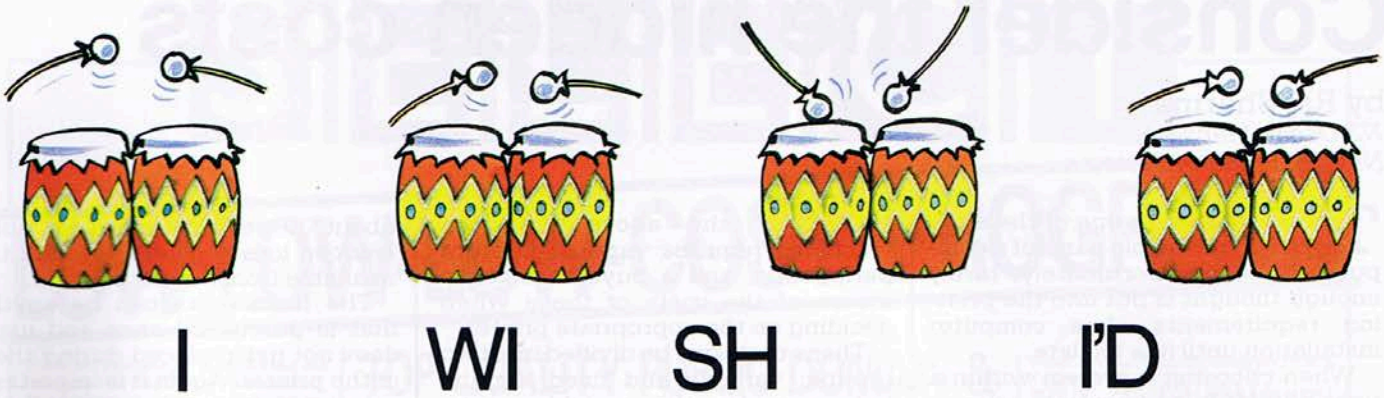


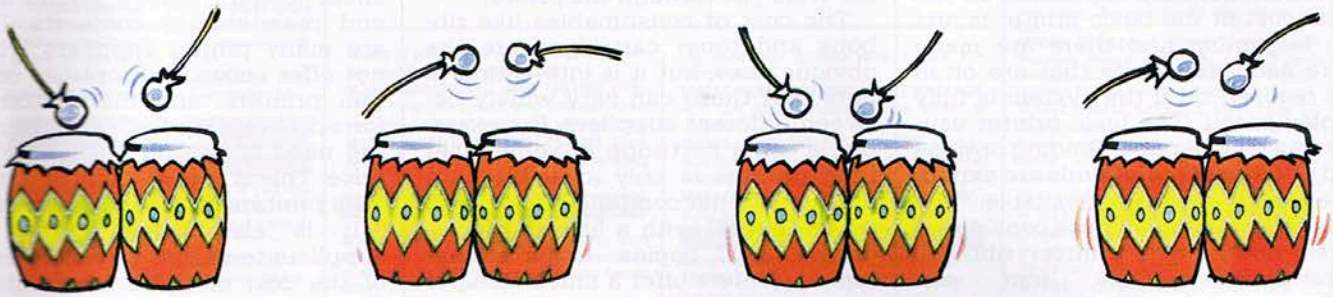


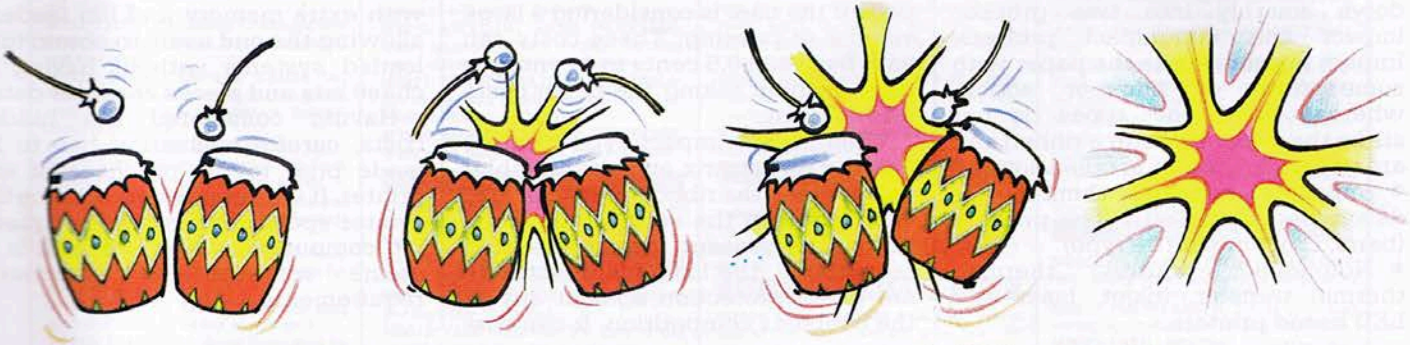


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SAATCHI RM 05

# Consider the hidden costs

by Raj Sharma,
*NZ Dealer Manager,*
*NEC Information Systems*

The printer forms one of the most crucial and visible parts of a computer system. Unfortunately, rarely enough thought is put into the printing requirements of a computer installation until it is too late.

When choosing a system within a tight budget it is common to select a printer on price alone. Quite often this proves to be very expensive as the intial cost of the basic printer is just the beginning and there are many more asociated costs that are often not realised until the system is fully implemented. The base printer usually has simple paper feeding options and additional peripherals are expensive or sometimes not available.

Several costs have to be considered when choosing a printer: ribbons, thimbles/daisywheels, font cartridges, paper handling options, extra memory, maintenance contracts, sound hoods, paper, cables and interfaces.

There is a wide range of printers on the market today. These are broken down roughly into two groups: impact and non-impact printers. Impact printers strike the paper with some form of hammer action, whereas non-impact types do not strike the paper through a ribbon and are generally quieter in operation.

- Impact printers: thimble or daisywheel, dot matrix, line printers (band, drum or shuttle type).
- Non-impact printers: thermal, thermal transfer, inkjet, laser and LED based printers.

Each of the above types of machines requires various different peripherals, and a buyer has to be aware of the costs of these when deciding on the appropriate printer.

These costs can be divided into two groups: variable and fixed. Firstly, let's consider the variable costs, which increase in direct proportion to the work put through the printer.

The cost of consumables like ribbons and toner cartridges are the obvious ones, but it is interesting to note that these can vary widely between different suppliers. For example, a toner cartridge in some laser type printers is only available as a drum and toner combination, costing up to $300.00 with a life of approximately 3000 copies. Other xerographic printers offer a much cheaper toner cartridge, with the drum as a separate consumable which requires changing only when the user sees the need.

It is therefore very important to consider the cost of consumables per page if the user is considering a large volume of printing. These costs can vary between 0.5 cents to 4 cents per page without taking the paper costs into account.

When using impact type printers like the dot matrix and the thimble/daisywheel, the ribbon costs can also vary between the various suppliers. Under the present import licensing regulations, the local manufacturers are given protection against any of the overseas competition. It can cost about 30 per cent more for ribbons sourced locally compared with those available from Japan, USA etc.

The fixed costs can be anything that is purchased once and usually does not get replaced during the life of the printer. Again it is important to select appropriate peripherals such as font cartridges, extra memory, sheet feeders, cables, sound hoods, and maintenance contracts. There are many printer suppliers who do not offer second bin options on certain printers, and the customer is forced to replace the entire printer if the need of second bin feeder does arise. This is true in many of the laser type printers on the market today.

It is also common for some suppliers to charge up to 50 per cent of the cost of the basic printer for some of these options, so the initial printer cost is often very deceptive and buyers should always compare prices with similar options and accessories. Some of the larger suppliers often offer fully-configured printers with extra memory and bin feeders, allowing the end users to obtain fully loaded systems without having to chase bits and pieces at a later date.

Having considered the hidden costs, careful evaluation has to be made prior to the purchase of any printer. It is as important to define the printer specifications when requesting computerised systems as it is to define software and hardware requirements. ■

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# IBM compatible – and addressing the wider market

by Nigel Burrell

With the fairly recent drop of sales in the home computer market, it seems that potential customers of today's computer systems are urged to spend their hard earned dollars on business machines, and why not. Most people require much more powerful machines nowadays to suit their application, and a definite increase of excellent quality software and expandability back-up is apparent. On top of that, business computers are getting more affordable.

The SVI-640 IBM compatible computer from Spectravideo is no exception. The unit is available in three configurations, as listed below, with the recommended retail prices, which include GST.

1. SVI-640SF, single floppy drive, $1995.00
2. SVI-640FF, dual floppy drives, $2995.00
3. SVI-640FH, 20Mb and floppy drive, $3295.00.

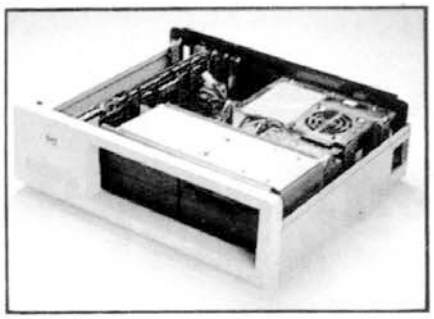
Each model includes a green screen monitor, PC compatible keyboard, plus MS-DOS 2.11 & GW-BASIC 2.02 operating systems, with appropriate manual books as part of the price.

Being IBM compatible, the computer is able to execute the familiar "Integrated 7+" software package as well as supporting very high resolution games packages.

## Disk system

The disk system of the unit is able to utilise up to 4 drives (5.25-inch Double-sided/Double-density 360k formatted capacity of 20MB hard drive) in any chosen configuration although only 3 types of configuration are allowed for at the point of sale, as shown above. As I was supplied the SVI-640FF model to review I was unable to try out and comment on the hard disk system. But I can tell you that the floppy disk drives are astoundingly quiet. So quiet in fact, that each time you wish to change or insert a disk, you are often reminded to check that the drive light is off (disk drive is not in action) before doing so because no sound is apparent when the drive is going. A spring-type insertion unit located at the back of each drive ensures the disk is properly inserted for read/write access and gives a nice push out result when the disk is required to be changed.

The inbuilt 8088 CPU runs at a clock speed of 4.77 MHz. 640k of random-access memory (RAM) plus 8k of read-only memory (ROM) is available and the system fully supports MS DOS, PC-DOS, CP/M-86, and GW-BASIC operating systems. Five full size expansion slots are included inside the disk drive unit for optional peripherals as well as a fan, which, like the disk drive, is very quiet and is



necessary for cooling the power supply unit when in use. The whole computer unit runs off a low 150 watts of power which is practically the same amount of power that is required to illuminate your average light bulb.

## Keyboard

The full-stroke stylish keyboard has a total of 84 low profile keys including 10 function keys situated on the left hand side of the keyboard. The positive click feel of each key accompanies the standard QWERTY layout. A numeric keypad with cursor control is positioned on the right hand side of the keyboard. LOCK functions include CapsLock, Numeric Lock, and Scroll Lock keys, all equipped with separate inbuilt LED lights. Although all keys are slightly dished, the "F" and "J" keys are marked with uplifted points to escort proper hand positioning when typing. Grey and white coloured keys distinguish alphabetic and numeric keys from the multi-purpose functional keys such as ENTER, SHIFT, CTRL, TAB, ESC, and all 10 function keys. Cursor control can easily be attained by utilising the numeric keypad keys 2, 4, 6 and 8 in which arrow symbols are shown on these particular keys. Back-positioned lifters can optionally be pulled down for uplifting the back of the keyboard to sustain desired comfort.

## Software

All the business software and entertainment games thatI have tried out on the computer were easy to use and had fantastic resolution display. What do you expect from IBM compatibility? The software prices seem to range from $30.00 (NZ) upwards. Business software can easily be priced in the hundreds of dollars and in most cases those I perused looked to be worth it. An extensive list of IBM compatible software is available for the computer and therefore software support presents no problem what-so-ever. User groups too, are in big numbers and support is easy to find. Just imagine the amount of public domain software that is available from these groups.

Along with the bundled software of operating systems that you receive at the point of sale you also receive all of the appropriate manuals. Personal Computer User's Manual, GW Basic User's Guide, MS-DOS User's Guide. Monitor User's Manual. Each book is fairly comprehensive, requiring a lot of reading. Beginners to either MS-DOS and/or GW-BASIC are fully catered for with plain English step-by-step examples of system commands.

## Expandability

Expandability plays a big role with this computer system. On catalogue are 8 optional peripherals that Spectravideo International produce in support of this computer. Recommended retail prices, including GST, are:– Shinedisk 20 Meg Hardcard, $1495.00; Chinnon 360, Floppy disk drive, $349.00; SV13105 green TTL monitor, $295.00; Multi I/O card & cables, $295.00; RS232 card, $130,00; Centronics card, $99.00; Mono/graphics card, $199.00; Colour/graphics card, $199.00.

Don't forget, IBM compatibility means that other IBM compatible peripherals may in fact be used in conjunction with the unit. Expansion sockets on the back of unit include a monitor jack, printer plug, keyboard jack, and the power supply socket. The off/on switch is positioned towards the back on the right hand side of the unit and is a positive sized lever.

By the way, just for the record, I am doing this review on the SVI-640FF computer with the aid of a word-processing software package. The 80-column display is very clear and what a change it makes from my old SVI328 home computer. Even with the 80 column display card in place on my 328 system, it never comes out as good as what I am being witness to now. With 640k of RAM available, options are included on this word-processor which I have only just been able to dream about over the years. Shifting blocks of text and including business graphs for example is a breeze. It's great when you think about this being the type of software an SVI640 computer owner now has access to. Spectravideo – you have done well!

*Review system supplied by Pegasus (NZ) Ltd, Hamilton*

### Microcomputer Summary

| | |
|---|---|
| Name: | Spectravideo SVI-640 (SF/FF/FH) |
| Manufacturer: | Spectravideo International Ltd. |
| Microprocessor: | 8088 (16 bit), 4.77 MHz. |
| RAM: | 640kb on board, expandable to over 1.5MB |
| ROM: | 8kb |
| Disk: | SF model, One 5.25-inch 720kb floppy drive.<br>FF model, Dual 5.25-inch 720kb floppy drives.<br>FH model, One 5.25-inch 720kb floppy drive with 20MB hard drive. |
| Video: | 80 columns by 25 lines.<br>640 by 200 pixels in 16 colours.<br>320 by 200 pixels in 256 colours. |
| Keyboard: | 84 full-stroke, low profile keys. 10 programmable function keys. Numeric keypad with cursor control keys. |
| Communications: | RS-232 expansion slot (IBM compatable)<br>Parallel port (IBM compat.)<br>Centronics expansion slot (IBM compat.) |
| Power Supply: | Fan cooled switching power supply unit.<br>Output: 150 watts. |
| Expansion: | 5 full-size expansion slots.<br>4 drive cavities. |
| Operating Systems: | MS-DOS, PC-DOS, CP/M-86, GW-BASIC. |
| Bundled Software: | MS-DOS 2.11 (with utilities).<br>GW-BASIC 2.0 |
| Price: | SF model, $1995.00 (inc. GST)<br>FF model, $2295.00 (inc. GST)<br>FH model, $3295.00 (inc. GST) |
| Options: | Shinedisk 20 Meg Hardcard ($1495.00 inc. GST).<br>Chinnon 5.25-inch 720kb flpppy disk drive ($349.00 inc. GST).<br>Multi I/O card & cables ($295.00 inc. GST).<br>RS232 Card ($130.00 inc. GST)<br>Centronics Card ($99.00 inc. GST)<br>Mono/Graphics Card ($199.000 inc. GST)<br>Colour/Graphics Card ($199.00 inc. GST) |

# Taking control of your personal computer

In recent years, large sums of money have been spent on the purchase of microcomputers and software, and an impressive number of PCs have now reached individual desks in a large number of organisations. However, many of these computer systems fail to produce productive support for those businesses which have acquired them as a majority of corporate executives and managers are "computer illiterate".

In our experience, many organisations make the elementary error of trying to install their newly acquired hardware and software without any professional assistance. This comment also applies to the areas of training and ongoing support services. Common areas of neglect include adequate back-up procedures and the printing of audit trails – potential disaster areas!

Many organisations such as ATI, University of Auckland, community colleges, accounting firms, Computerland etc run business microcomputer workshops covering such topics as MS-DOS, spreadsheets, database and word-processing. Such courses are a must for first-time users and courses for advanced users are also very beneficial. In addition, DOS Corner in *Bits & Bytes* is very good.

When one considers the capital investment in a microcomputer and its potential uses, it makes sense to spend some time and money learning how to use your PC effectively. Software houses have also tried to resolve this problem by producing self-teach packages that cover subjects from MS-DOS to spreadsheets.

An excellent package that we have discovered is The Complete PC Tutorial, by Intouch Computing.

The Complete PC Tutorial is a systematic guide to using and programming the IBM PC and compatibles. This course leads the chief executive or receptionist through the complete spectrum of computing, all contained on two diskettes.

As well as being an ideal introduction for a new computer user, the more experienced and ambitious programmer may take up the course at any point and be led into advanced programming.

The Tutorial is divided into 20 lessons, each of which is a separate file on one of the Tutorial diskettes. When a lesson is loaded from diskette, it resides in memory and operates independently of any other program or software that may be loaded while the Tutorial is being used. The Complete PC Tutorial uses a unique windowing technique, its text appearing in the window while the normal operation of the computer is not affected.

The Tutorial works concurrently with almost any other program, software or operating system, making an ideal teaching method. All Tutorial commands are invoked by tapping various keys on the numeric pad.

The package incorporates three groups of lessons:

- For the beginner
  - Introduction to computing
  - Introduction to DOS
  - General usage of the computer
- For the programmer
  - Basic language programming
  - Assembly language programming
  - Advanced DOS commands
  - Advanced programming techniques
- For the enthusiast
  - Direct programming of the 8088 cpu chip
  - Screen display & graphics control
  - Interrupts, calls & functions
  - Speaker and keyboard control

Overall, the Complete PC Tutorial is an excellent product that enables the user to understand the computer. It comes with a lifetime warranty card that insures the product against: spilt coffee; children with scissors; hot sun on car seats; inquisitive pets; accidental formatting and any other calamity! At around $90 it can't be beaten. ■

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# Enhancing the standard – at a lower price

Over the years Ashton-Tate's dBASE has become something of a standard database programming language in the IBM PC and compatibles world. This popularity has led to several rival companies developing both compatible compilers for dBASE and actual clones of the product itself.

Obviously, to be attractive these alternatives have to offer some sort of advantage over the original product, in the way of increased capabilities, better performance or lower price. The several compilers for dBASE offer the promise of faster execution speeds than the standard dBASE interpreter, and for those developing applications professionally also offer the ability to distribute their applications both in a protected form and without the need for the end users necessarily having the added overhead of purchasing a copy of dBASE for each copy of the application.

WordTech Systems, the publisher of dBXL, has previously published such compilers, the latest called Quicksilver, which can take existing dBASE programs and translate them into code that can be executed without dBASE or its RunTime system.

However, compilers do not offer a total solution in the case of dBASE. Database applications tend to spend most of their time waiting for disk I/O, so the increased performance of compiled code is not always particularly dramatic, especially as the dBASE language is fairly efficient in itself. In addition, one must take into account the fact that dBASE is not purely a programming language. It also offers the end user an interactive data entry and query environment which supposedly enables more skilled users to do some programming of their own, rather than being confined only to running applications developed by a skilled programmer.

WordTech Systems obviously identified a market for a clone of dBASE itself, and its experience gained in developing compilers for dBASE would have put the company in a strong position to develop such a system.

So, what does its product dBXL have to offer the prospective dBASE purchaser?

## Execute without modification

WordTech claims complete compatibility with dBASE III Plus with ability to execute existing programs without modification, using the same database, program, report, index and format files. It also claims several enchancements, such as better help facilities and ease of use for the novice, facilities to create pop-up windows, automatic initialisation of memory variables, a HELP keyword, faster indexing, smarter error messages and a prompt which keeps the user informed of current work area and database in use. Wordtech also proudly proclaims that the product is not copy protected (a definite plus in my books).

Perhaps the most important consideration would be the price. At less than one-third the cost of dBASE III Plus, it has to be attractive, especially in situations where multiple sets are required.

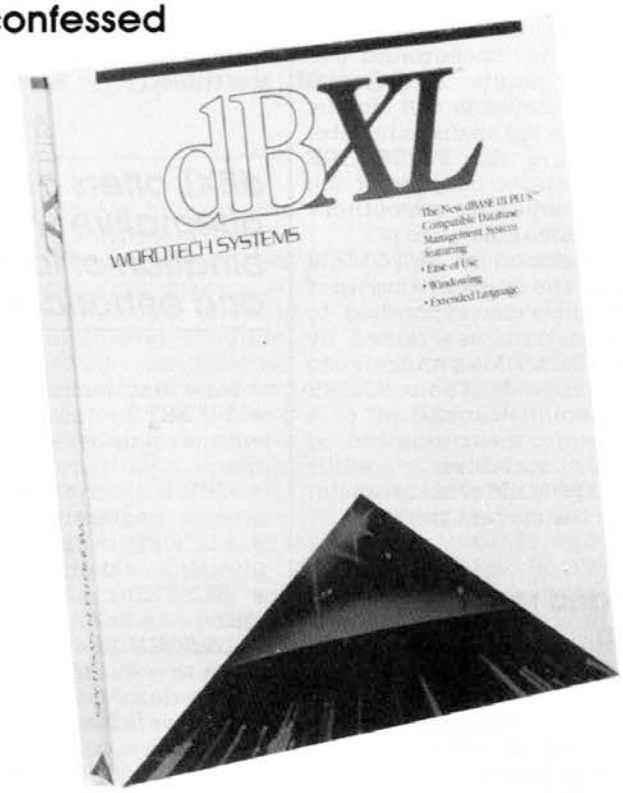
I have always had an avid interest in database systems, having been involved in the development of several customised systems using various 4GL type products. I must confess at this point to having had little recent exposure to dBASE since a brief encounter with the original dBASE II, doing most of my custom development these days using Open Access II. I therefore looked forward with some relish to tackling this review, both as a refreshing change from my familiar programming environment and as an opportunity to take a closer look at the current state of the art in the dBASE world.

***Of the enhancements, the extensive windowing capabilities would be the most useful.***

Installing dBXL onto my hard disk system was quick and painless. It was just a case of first making backup copies of the three distribution diskettes supplied, placing the first of these in drive A: and typing install. I was able to complete the entire installation process on my Zenith PC just by accepting the default replies to the prompts issued by this installation program, which copied the contents of the three diskettes into a directory named \dBXL. A nice touch was a reminder at the beginning of the installation that the user should be doing the installation from copies

09:02
dBXL Release 1.1 IMMM Utilities MMMM

**It claims complete compatibility with that database standard, dBASE, but with enhancements and a much lower price tag. John Walker, a self-confessed database enthusiast, looks at those claims of dBXL and its capabilities.**




of the distribution diskettes rather than the originals, and giving the option to quit at that point if this had not been done.

## Quick introduction

Documentation consisted of a 612-page soft-covered manual which I found to be well produced and reasonably clearly laid out in comparison with many software manuals. A guide at the beginning of the manual gave five optional paths to take in learning dBXL, depending on the skill and previous experience of the user. I chose Path II which gave a quick hands-on instruction to installation and using INTRO, the dBXL equivalent of ASSIST.

Following the first tutorial in the manual and using the menu-driven INTRO program I was quickly able to set up the example database (a simple video library cataloque) and learn how to add records into this database file and edit, delete and sort them. Creating both a printed report of the video cassettes sorted into various categories and printed labels for the cassettes was very quick and easy. I found the tutorial an excellent demonstration of the capabilities of dBXL, with INTRO providing plenty of on-screen help and descriptions of what dBXL commands were currently being executed to achieve the options selected from the INTRO menu. A new user reading the tutorial carefully and noting all the prompts and status information provided on screen should find this an easy way to learn how the basic dBXL commands operate.

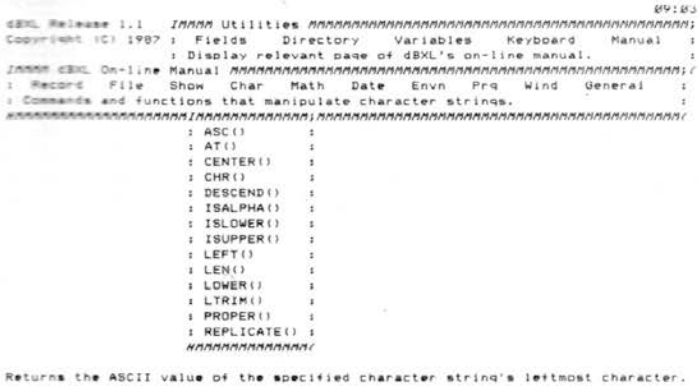
Having explored INTRO I then went on with the next part of the tutorial which used another example database (a customer file) to illustrate using dBXL's commands directly (without the help of INTRO) to achieve similar results, and then progressively moved on to some of the more complex commands. I found this easy to follow and absorb, although users less familiar with database systems might not find the going quite so simple.

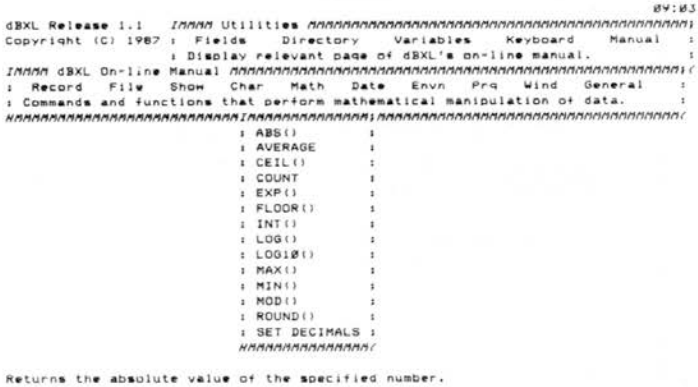
## Formidable list

The dBXL language itself should have few surprises for anyone familiar with dBASE, with the syntax being virtually identical. There is, however, quite a formidable list of additional commands and extensions to the standard dBASE language. These are described in an appendix to the manual together with surprise, surprise, a list of *unsupported* dBASE features. (Didn't they claim to be completely compatible?)

For dBASE purists it would probably be best to reproduce this list of unsupported aspects (for the release under review). These included: .cat files and related commands, .scr files and related commands, .vue files and related commands, APPEND FROM... TYPE (except SDF and DELIMITED), CLEAR FIELDS, COPY TO... TYPE (except SDF and DELIMITED), CREATE/MODIFY VIEW, EXPORT, IMPORT, SET FIELDS,SET FIELDS TO, SET HELP (with a note to see equivalent SET USERHELP), SET MENUS, SET MESSAGE, SET ORDER, SET STATUS, SET TITLE, SET VIEW, SET TYPEHEAD TO, and networking commands.

Of the enhancements, I would probably rate the extensive window-



ing capabilities as the most useful. Up to 99 windows can be defined and activated by commands such as WSET, WUSE, WCLOSE, WMOVE and so on. The user is given extensive control over the dimensions of the windows, borders, background colours and other points. Entire windows and their contents can also be saved to a screen file on disk and later redisplayed using the WRESTORE command. An entire chapter of the manual is devoted to the use of these windowing commands.

Another extension is AUTOMEM which enables the quick setting up of memory variables corresponding to the fields in a database record by specifying AUTOMEM as an option to the USE command. Then STORE AUTOMEM would transfer all of a record's fields into the corresponding AUTOMEM variables, while REPLACE AUTOMEM would transfer them back to the current record.

## Suspend and resume execution

Other features include provision for the setting up of environmental variables when invoking a program with dBXL, and a FIX option for debugging a program, which allows the user to suspend program execution, display the program file for editing and then resume program execution, all in one step. However, it is not possible to use this option to edit lines prior to the one on which the error occurred, since these would already have been executed.

***dBXL offers an attractive alternative with its combination of lower price and enhanced features.***

New functions include:

- BITSET() – tests the status of bits within a number's binary representation.
- CEIL() – returns the smallest integer greater than or equal in value.
- FLOOR() – returns the largest integer less than or equal in value.
- CENTER() – centres a character string on a line.
- DESCEND() – calculates a complement to a string – allows the user to create descending order indexes on character fields.
- DTOS() – converts a date expression to a string format independent of the current SET DATE format.
- EMPTY()– tests if a field or memory variable contains data.
- FCOL() – returns the current column position in a file.
- FROW() – returns the current row position in a file.
- IN() – receives a byte from the system port. Allows direct access to system ports from dBXL.
- LOG10() – returns the logarithm base 10 of a value.
- PROPER() – converts a string to proper noun format, with initial capitals.
- SELECT() – returns the number of the currently selected work area.
- SOUNDEX() – converts a string to Soundex form, a phonetically equivalent string. Allows programs to match strings which sound similar.
- WACTIVE() – tests if there is a window being used in the current window area.
- WSELECT() – returns the currently selected window area number.

There were no sample applications supplied on the distribution diskettes, nor were there any lengthy program listings in the manual, only short examples of using various commands. I generally find a complete sample application a nice way to quickly pick up the basics of a new programming language.

It would seem then that WordTech is aiming this product more at users already familiar with dBASE. I did run a few sample dBASE III applications that I was able to obtain, just to confirm that dBXL would handle these existing programs which accessed databases created under dBASE III. I encountered no problems.

## Conclusions

dBXL offers an attractive alternative to purchasing dBASE III plus with its combination of lower price and enhanced features. It is a very close clone of the original, but I believe that WordTech Systems and Ashton-Tate (the publishers of dBASE III) have come to some sort of understanding over any possible infringement of copyright. As I mentioned earlier, WordTech would obviously have an intimate understanding of the workings of the dBASE language through its work in developing compilers for it.

My only reservations about such a product would be in maintaining a strict compatibility with the original, and there could be some timelag in issuing upgrades to match any future changes to the Ashton-Tate product. For novice dBXL programmers, a set of sample programs on the distribution diskettes would be a welcome addition. ■

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# Multi-user operating systems for the Intel 80386

by Mark James

There are a number of false issues surrounding the introduction of the "new generation" of microcomputers based on Intel's 80386 microprocessor. The rush seems to be on for multi-user microcomputer operating systems that, supposedly, take advantage of the full power of this chip,and a widespread belief exists that a lot of venture capital is out there just waiting for the right operating system to come along.

The failure of Microsoft to be able to come to market with a true multi-tasking version of MS-DOS, even for the older 80286 chip, has left the impression that this is a near-impossible feat; thus, if anyone else can claim to have achieved this for the 80386 – and multi-user too – then surely the world must beat a path to their door.

In fact, there have been a number of operating systems available for several years that achieve multi-user, multi-tasking operations on microcomputers, and they did not need the 80386 chip, or even the 80286, to do it. These are the so-called "true" multi-user operating systems. There are at least five of these which run on the 80386 chip: AMPS, BOS, PICK, THEOS and XENIX. All of these are "portable" systems; that is, they also run, more or less identicallly, on other types of computers as well.

In addition to the "true" multi-user operating systems, there is a new class of system written specifically for the 80386 chip, called "control programs". A control program is a type of monitor that sits on top of the 80386 and orchestrates a group of programs and systems running underneath it, each of which has its own address space. The control program time-shares among its subordinate tasks, much as a mainframe or minicomputer operating system does, but without any particular communication between the various tasks. (See the review of PC-MOS/386, one such control program, elsewhere in this issue.)

## What about MS-DOS?

Will MS-DOS ever be a multi-user operating system? OS/2 (if we ever see it) is supposed to be multi-tasking, but single-user. Would it not be a short step to make the tasks run on separate screens?

It will probably never happen, and the reasons are as much marketing as technical. MS-DOS was conceived as a single-user operating system. It single-threads its interrupts, which is ridiculous for a multi-user situation; its file allocation tables are designed for sequential rather than random access of the disk, and yet nothing could be more random than several users doing different things on a computer; and it has no provision for passwords, file locking or other security considerations fundamental to a multi-user environment.

In addition, Microsoft does not want to sell MS-DOS as a multi-user system; they would rather sell XENIX. IBM does not really want to see a multi-user MS-DOS system, particularly one as powerful as an 80386-based computer, because this would eat into sales of IBM's larger, more profitable computers. Compaq and the other compatible makers do not want to sell too many multi-user computers either as they would rather sell you a network with lots of Compaqs, than one multi-user machine.

Yet even IBM admits, rather proudly, that its 80386-based PS/2 Model 80 has the power of an IBM 370/168, the most powerful general-purpose mainframe computer of the mid-1970s. A 370/168 could run over a hundred terminals. That fact alone makes the question of multi-user 80386 systems highly relevant.

## Features of the 80386

There are five important features of the 80386 chip which have inspired the frenzy of attention. They are worth examining in the context of multi-user operating systems in general.

- Larger address space: the 80386 can address, in its protected mode, up to four gigabytes of physical memory. Since memory-hungry programs such as large spreadsheets have long chafed at the 640kb limit imposed by MS-DOS, the larger memory address space will be most useful for them. However, these tend to be single-user programs. Multi-user systems have to share the available memory, whatever its size, among a number of active tasks.

  Control programs do not pay any particular attention as to how the memory is allocated among tasks; each task gets the full complement of memory to which it would have been entitled if it were running on a single-user computer. True multi-user systems allocate the memory dynamically among tasks, according to what each is doing at the time. The most efficient way to handle this is with a disk cache. In a cache, the most frequently-used records and programs are kept constantly in memory, so that no disk accesses are necessary to reach them. In this way, a large number of users may work on a microcomputer with any amount of memory.

  The increased memory available on an 80386 (or 80286) machine is thus not critical to true multi-user operations, although it is for control programs. If extended memory is available, a true multi-user system makes full use of it to provide for a bigger cache, and therefore fewer disk operations, and a more efficient system.

- Processor speed: The 80386 microprocessor can operate at speeds up to 16MHz in the case of the Compaq (and most others) and 20MHz in the case of the IBM PS/2 Model 80 (and a few others). IBM's tests indicate that there is no technical reason why the chip should not run at 30 or even 32MHz, given the appropriate memory and support chips. This is impressive, and will be important for processor-intensive tasks of all sorts, such as CAD/CAM, graphics, statistics and (to an extent) software development. However, for database-oriented operations, the speed will be of marginal impact, as disk accesses, not processor speed, tend to be the bottleneck here. Most multi-user systems, particularly in business and education, are heavily database-oriented.

  Control programs have trouble with database operations, because they tend to involve random disk accesses. The file allocation tables of MS-DOS, again, are tuned for sequential and not random disk accesses. The higher speed of the processor is thus largely wasted if disk operations are the bottleneck. True multi-user systems suffer from disk bottlenecks as well, but

the use of database caching alleviates the problem somewhat. When the desired record is found in the cache, it is necessary only to copy it from the cache to the program's work space. The higher speed of the 80386 is of genuine use in a memory-copy exercise. Therefore, true multi-user systems are in a better position than control programs to make the speed of the 80386 available to multi-user situations.

- Memory management: Under MS-DOS, and under any system which runs on the 8086 and 8088 chips, all 640kb of memory is available all the time to any task that wishes to make use of it. This can be dangerous for multi-user systems, where one program can accidentally (or deliberately) corrupt another's data. The 80286 and 80386 chips provide a hardware answer to this problem in their so-called protected mode, similar to the memory management paging common to larger computers. However, true multi-user operating systems solved this problem long ago with safeguards in the system design. Memory management is vital to the operation of control programs and is useful, but not necessary, to that of true multi-user systems.
- Context switching: The 80386 chip supports special instructions to facilitate the saving of vital information when the computer switches from one task to another, called context switching. These special instructions should make it easier to design multi-tasking and multi-user operating systems. The problem of context switching, of course, is as old as multi-user operating systems theselves, and was solved by the first such systems in the 1960s, without the benefit of special context-switching hardware. Many of the true multi-user systems were originally designed on minicomputers, and they include a full software implementation of context switching which works perfectly well even on such chips as the 8088 which have no special instructions for it. The benefit of the 80386 here is simply that context switching is now much faster.

Control programs, on the other hand, are designed entirely around the context-switching instructions of the 80386. One thing that the context-switching hardware will not do automatically, however, is to protect one user's disk files from accidental or deliberate corruption at the hands of another user. This, again, is a problem that has been solved by true multi-user operating systems, with their record and file locks.

The existence of 80386 control programs does, however, raise a very interesting possibility: the ability to run single-user MS-DOS programs simultaneously with a true multi-user system. This is something that true multi-user systems cannot do by themselves.

- 32-bit operations: The 80386 is a "true 32-bit" chip, which means that both internal and external data operations can take place 32 bits at a time. By contrast, the 8088 chip can handle 16 bits internally, while its external operations (disk accesses, principally) are limited to eight bits. Under MS-DOS, the 80386 chip must run in an emulation mode in which its 32-bit capabilities are not available.

Control programs run in the chip's protected mode, in which 32-bit operations are fully available. However, those tasks which run underneath the control program are generally 16-bit MS-DOS tasks, which cannot break out of the subservient "virtual-86" mode of the chip.

True multi-user operating systems, which are not subject to the restrictions of MS-DOS, can always take advantage of the 32-bit power of this chip. When an operating system is advertised as taking "full advantage" of the 80386 chip, this generally means that it uses the chip's instructions for 32-bit internal data operations. Ironically, from the point of view of multi-user operating systems, this is the least important of the chip's special features, for two reasons. First, it is trivially easy to implement; any C programmer, for example, can invoke internal 32-bit instructions simply by using an 80386 C compiler. Second, as with the higher clock speed of the chip, the faster 32-bit instructions will hardly be noticed on a system whose bottleneck lies in its disk accesses.

It is the disk accesses – the external 32-bit operations – which really define the potential of the 80386 chip. This, in turn, requires a 32-bit bus. IBM's Micro-Channel bus will most likely set the standard here, but there are as yet no general-purpose controllers (for disk, tape or multiple serial ports) which are designed to transfer data in 32-bit chunks. When such hardware become available, all operating systems will benefit from its speed; but for now, none can.

From this brief examination of the 80386 chip we can draw two conclusions. First, none of the five special features of the chip is really new. They are either improvements (particularly in terms of speed) of features that were already present in the 8088 and 80286 chips, or else hardware implementation of operating system features that have been around (in software) for 20 years. Second, the principal promise of the 80386 chip has not even been addressed: the use of a 32-bit bus to speed disk and other peripheral operations. This is important because disk operations are the main bottleneck for all multi-user systems, both "true" ones and control programs.

When 32-bit peripheral controllers finally arrive, the most efficient multi-user systems will be those with the most effective disk caching. These will be able to take advantage of the 80386 in the manner most relevant to multi-user operating systems. ■

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# Software piracy – the debate continues

## Try before you buy

Dear Sir,

I believe you have opened a huge can of worms with letters in the August edition, and I would like to see this subject given a fair and decent hearing with the end user of software packages given the opportunity of stating what they want and need.

I started off in computers just over two years ago purchasing a Lingo Apple II compatible (is this piracy?) and at that time was given some 30-40 different and mainly commercial software programs by the vendor. At least 80 per cent of these were eventually put aside for use as blank disks, but eight programs formed a core workable collection, and over a period of time I ended up purchasing six *genuine* brand-new, in unopened cartons, programs. If I had not had the chance or opportunity of actually using them beforehand I would definitely not have purchased them.

Recently I have switched from my little Apple com to a Big Blue clone (seems I can't help not buying originals), and this time my vendor (in New Zealand, not Australia) didn't treat me quite as well with extra programs. I'm not complaining: I got a good deal, am still dealing with him and will purchase software from him in the future, but in the meantime I have to sit down and sort out the wheat from the chaff to determine where I am going to spend my precious dollars.

The first thing of course is to shoot out and purchase a pile of P.D. software (and at $15-$25 per disk even this can be expensive), 90 per cent of which is completely unsuitable anyway. Like "Bear" of Rotorua, I also looked at USA vs NZ prices and have purchased one program through a friend, at a total cost to me including freight $NZ92; NZ retail $310. Where I go from here I am not quite sure, as there are additional programs I need, but with big signs up "SOFTWARE PURCHASES ARE FINAL" and "NO RETURNS ON SOFTWARE" etc. It looks like a lot of lemons are expected to be sold.

With just about anything else in this world, including computer hardware, available on a try before you buy, free test drive, 100 per cent money-back guarantee if not satisfied deal available, purchasing software seems to rank on a par with buying a French postcard. P'ssst, I've got a deal for you, and you find you've been suckered in once again.

Quite honestly, where does one go for realistic evaluation of a software package? Only the other day I was reading a review and the reviewer stated the program actually came up to the packaging and advertising claims, implying this was something novel. If by some chance a good fairy happens to leave a pirate program hanging around where I can find it, I will use it. If it happens to do the job better than an existing program does or fills a missing gap, the chances are that as finances permit I will purchase it. I am not going to spend my money on something sold to me on a take-it-or-leave-it basis, without the benefit of prior knowledge that it will definitely do the job I want it to do.

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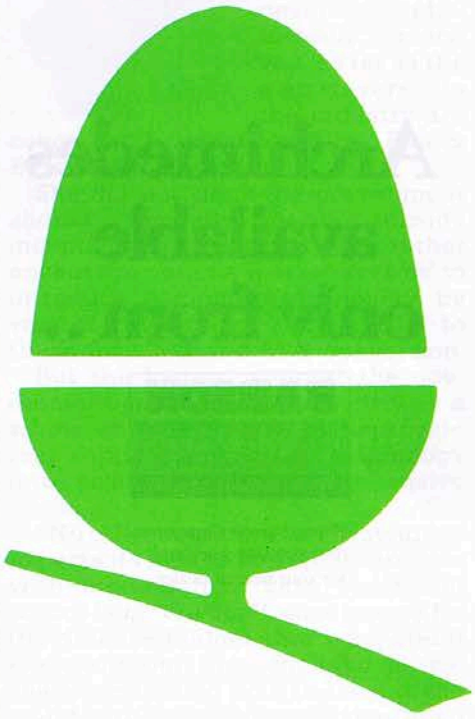


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# Public Domain

Dear Sir,

I regarded the 'Software Piracy' debate in your August 1987 issue of *Bits & Bytes* with intense interest, wondering if anybody was going to question the statement:

- use Public domain software and put up with poor support and reduced performance...

Sadly, this was accepted as fact. It is not always so. A large amount of the software available on Public Domain is of good quality and has back-up and modifications accessible which, in some cases, far exceeds that available for some commercial software.

There may be, however, a slight confusion. Public Domain software is accessible by modem as well as the limited range given by companies such as Remarkable Enerprises and the people who place a two-page advertisement in your magazine every month, but don't actually put a name to it. The modem variety are available on a number of BBSs (Bulletin Board Systems) in the United States, although I do not know of any in NZ, and often come with monthly modifications through the BBS from which they come. Indeed, some very high-performance, high-quality software is available, free, but with text-file documentation, from some BBSs.

One which springs to mind is GNU (GNUs Not Unix), a very complex operating system, written by Richard Stallman. There is in fact 'The GNU Manifesto', published in the magazine *Dr Dobb's Journal of Software Tools* which gives updates on the current version of GNU. Richard Stallman also wrote EMACS, a widely acclaimed text-editor.

There are two things in common with *all* of Richard Stallman's software:

- It is always of superb quality, and
- It is always free.

Richard Stallman believes no-one should have to pay to get good quality software, unless they find it good for their needs, in which case they should pay however much they consider it worth. (For more information about this wholly remarkable man, see the March 1987 issue of *Computer Language*.)

**Andrew Stephen,**
*Dunedin*

*(Editor's note: we presume you are referring to Select Software, whose name does in fact appear in every one of its advertisements and whose office is at 245 Trafalgar St, Nelson.)*

# Price comparisons

Dear Sir,

After having read the replies to my letter on the subject of Software Piracy I feel that I need to clarify several of the points I made.

First and foremost, I *do not encourage piracy!* In my previous letter I merely pointed out that high prices are the main causes of software piracy. This is a lesson that has been learnt by some notable software publishing houses. I also pointed out and recommended the only legal way of fighting those high prices: buy elsewhere and let market pressure force the local prices down.

Secondly, my price comparisons were made by taking the average USA price as surveyed in *Byte* magazine, converting it to NZ dollars using the formula given and comparing it with the average NZ price surveyed in *Bits & Bytes*, both magazines covering the same time period. The exchange rate used deliberately undervalued the New Zealand dollar, which only reduced the difference between New Zealand and USA prices. It has been suggested that I should have made the comparisons on the basis of recommended retail prices. This would have been difficult as very few of the USA prices even approached them and a significant number of New Zealand prices exceeded them. My comparisons were based on the real prices of the market places.

Thirdly, I did not include freight. Well, airfreight and insurance, if used, on an individual package would amount to about 12 per cent of the cheapest product surveyed, but I doubt that an importer would do business in that way. Bulk rates and surface freight would be the order of the day.

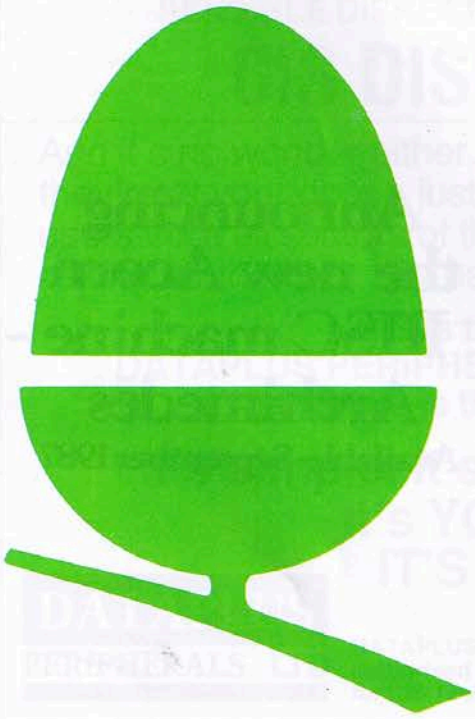
Fourthly, support is lacking in New Zealand. While many software houses here are prepared to give "training courses" in the use of their products these often only cover the basics and seem to have advertising in mind more than teaching. The people on the end of support hot lines are not, in many cases, able to answer technical questions on their product. I have also come across cases where novice users have been charged $50 to $70 per hour to have programs installed by the supplier. These are not, unfortunately, isolated instances.

Fifthly, there are in New Zealand those who would seek to prevent competitors from breaking their monopolies, thus removing choice from the New Zealand marketplace and ensuring that high profit margins are maintained. A quick skim of the computer orientated news sheets will identify those responsible and their victims.

It will, of course, be noted that I make general comparisons. There are always exceptions to any generalisation and I apologise to those exceptional firms who do make the effort to offer good backup and reasonable prices. Rest assured you have my full support.

Finally, to explain my desire to remain anonymous. It is not due to fear of prosecution for piracy, but rather due to a desire to avoid being "black banned" and/or harassed by those who stand to lose the most. I do not intend to continue the argument further as the only argument that will bring about the changes I seek is consumer pressure.

**The Bear,**
*Rotorua*

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# Where do we go from here?

**Government action is needed in the science and technology industry, says the industry. With the general elections last month still fresh in the mind, we looked at what the major political parties had to say about their policies on science and technology, and invited comment from some of New Zealand's senior computer journalists.**

## National: 'the capital of our age'

In its election pamphlet on science and technology, the National Party found it surprising that science policy had not been more prominent in the debate over New Zealand's future economic development. It believed that the fundamental change facing the country was that international competitiveness was being determined not by such natural advantages as climate and soil, but instead by those granted by technological ingenuity.

"An increasingly competitive world trading environment means that the greatest rewards will flow to those nations which have made the most intelligent use of science and technology to enhance the value of their commodities, production and services in the marketplace. In a rapidly internationalising economy, knowledge – including scientific and technical knowledge – is one of the most easily exported commodities. It is the capital of our age."

The Beattie Committee's report, recognised as a major document by the industry, recommended the establishment of a Science and Technology Council, which national incorporated into its policy with a view to seeing funds made available for long-term and strategic research on a competitive, peer review basis.

"If the Beattie Report cannot galvanise the nation into action," stated National, "nothing will. It is a definitive and authoritative statement. It must not be ignored."

Education and training priorities were described as including computer literacy throughout the school system; steps to secure new student interest in mathematics and science subjects in secondary schools; and the recognition of the contribution that industry makes to human capital through trade-related training.

According to Simon Upton, National's spokesman on science and technology, the policy signalled "an important change in direction for New Zealand science and Research and Development. The input individual scientists can make will be critical to its successful implementation."

## 'A necessary investment in our future'

"I believe the debate as to the extent of support the government should give the computer industry is one that will never be satisfactorily resolved, as far as the mainstayers in the industry are concerned," said Gaie Ellis, *Bits & Bytes* managing editor.

She did not think the government should offer any specific subsidy incentives to the industry, but rather encourage various market sectors to introduce computer technology by way of low-interest loans similar to those for CNG and LPG conversion.

But the biggest support the government could give the country as a whole, she said, would be to provide real support to get the technology into schools on a comprehensive basis.

"No other country that I'm aware of expects its kids to be kept up-to-date with funding from cake stalls and school fairs. We don't raise money for the defence budget that way, and if we want our kids to have a real chance in trading with the rest of the world in the years to come, they need to be using computers today, as tools."

Training in how computers work or anything much more than basic programming techniques should be left until specialising at tertiary or senior high school level, she thought. Instead, it was more important for students to use computers as a means to an end – "whether it's in the library accessing databases, planning projects using spreadsheets or writing assignments using word processors."

In the same way, she said, teachers should have the technology available to them to plan, co-ordinate and design lessons at all levels of the education system. "If they are comfortable with the technology, that confidence will communicate to the students. When students have grown up in an environment where computers are tools then they will go into the workplace with an approach that is uninhibited and creative.

"Creative use of the technology will lead to us developing a value-added approach to our technical abilities which will be worth its weight in gold in terms of productivity and export. This technology is universal, and low achievers as well as the brightest can excel in using it. It's a long-term but necessary investment in our future."

# Labour: industry must stand on its own feet

The strongest advocate for government non-interference in the science and technology industries has been the government itself. Minister Bob Tizard made that point clear when he spoke at the 1987 Microcomputer Software Awards in May.

He blamed the industry for under-investment in science and technology in the past, with a tendency to expect the government to solve the present difficulties. He also emphasised that it was up to all those in the industry to raise public awareness. "It is the responsibility of both the public and the industry to help improve the infrastructure for science and technology in this country," he stated.

In its election pamphlet on science and technology, Labour said it had "recognised the importance of scientific research to the nation's economic and social development. Labour has created an economic environment where innovation, originality, productivity and development are essential."

The party – still the government – said it recognised the importance of, and would encourage, publicly funded scientific research, and would ensure adequate funds were made available to them. At the same time, the industry would be encouraged to invest more in R&D and undertake co-operative research, both within sectors and with public funded research agencies.

In announcing his party's science and technology policy, Mr Tizard repeated that the industry must stand on its own feet and not look to the government for easy answers.

"Levels of public spending on research and development in New Zealand are comparable with levels in overseas countries," he said, "but private levels of spending are below those of our overseas competitors. The bulk of increased research and development must, therefore, be encouraged to come from the private sector."

# 'Maintain as much learning as possible'

One journalist who said he agreed with Bob Tizard, Minister of Science and Technology, in that the industry should be self-regulating and solve its own problems was Don Hill, editor of *Computerworld NZ*. He thought the industry was not doing all it could to help itself, but it should stand on its own feet.

But while he thought it was not a good idea for the government to get involved in the industry, Hill said it should be concerned with several things. Among those were: copyright; piracy, both overseas and in New Zealand, where the distributors had been nervous about challenging piracy; and communications, with Telecom's legacy of inadequacy and the desirability for the government to act in such areas by deregulating wide-area networks, as well as more input from private industry.

On education he said, "Whatever is put in, works to advantage in the end. The more money put into education the better, and perhaps there could be greater emphasis on computer literacy in schools, tertiary and adult education.

"It's important to have the machines there. Schools are obviously an important area, and while the industry's got to stand on its own feet, there's a strong point for incentives, particularly in education. We have to maintain as much learning as possible or fall more and more behind."

Hill pointed out that only limited opportunities were available once a student had left the education system. "Once someone graduates he or she can't get a job because the shortage of staff means there's no time for training."

# 'Victims of free market policies'

"The government should try to understand the implications of the technology," said Dave King of *The New Zealand Herald*. I don't think they do. I suspect because they don't, science and technology are victims of the government's free market policies.

"We have to take cognizance of the fact that all the principal free countries in the world regard science and technology as very important – computer technology included. Places like Ireland and Bulgaria are countries I consider have really come to grips with technology."

He put the blame squarely on the politicians who, he said, "haven't got an intellect which helps them to understand the question." Challenging anyone to name more than four or five politicians – on both sides of the House – who have an understanding of the situation he said that Bob Tizard, Minister of Science and Technology, had a large problem in caucus, being shouted down. Also, several politicians involved with computers in education had made disparaging public remarks on the topic.

King said it was no good addressing the multinational companies the way Simon Upton, National's spokesman on science and technology, had done. With the resulting offsets and R&D in this country, the multinationals were not interested in government assistance.

In Australia, he pointed out, the whole question was taken much more seriously, with the most striking example being the 150 per cent tax deduction for R&D. "New Zealand can't compete, and a lot of local developers are considering going over there. We're going to lose our scientists and engineers to Australia. How can we afford to train electronics engineers just for export? Australian companies are flying graduates from Canterbury University for job interviews the day they graduate."

# 'Critical to help industry'

Neill Birss, of *The Press* in Christchurch, believed that increased incentives for research and development were most important, pointing to the technological successes in countries where the governments were actively supporting the industry. The two most obvious, he said, were the USA, with its massive input through military R&D, and Japan, while Australia with its 150 per cent tax writeoffs was also heading in the right direction.

"We must give more tax incentives for R&D," he stated, "tax incentives to the private sector, and put more money into the public sector. It's *critical* to help the industry. The DSIR having to earn money is nonsense, and if we don't research we're in trouble."

He said it was important for the universities and business to co-operate, especially Auckland and Canterbury engineering schools. Another area, apart from straight R&D, was depreciation write-off, currently 20 per cent, as he pointed out that the average life for replacement of computer and related equipment was much less than five years.

Educational spending was another way for the government to help, said Birss. "More is needed in education. So many unskilled people are having problems at work, and computers are a great help. At election time many are taking the credit, but it's the schools that are raising all the money."

# 'Need to retain staff'

Bill Bennett, computers editor of *The Dominion,* pointed out that his was necessarily a first impression as he had been in New Zealand only a month, and in a year's time he might have a different opinion. Nevertheless, some years in the computer industry as well as studying computer science as part of a physics degree have given him some authority on the subject, and he imparted forthright views.

"The problem is nothing to do with R&D," he stated. "That makes not a jot of difference. The need is to retain staff trained in the computer industry. There are too many overseas and a shortage back here – and a lot don't come back."

He cited the pages full of advertisements for computer programmers in the *NZ-UK News,* the London-based paper for expatriate Kiwis. As soon as they started making money, he said, they cleared off to other places, making it hardly worthwhile training computer personnel.

So would the answer be tax or other incentives for employers during training? "The experience in the UK is that if you start paying them, companies will make more money training than they will actually making things. You have to create a climate where industry can help itself. It's quite buoyant, and doesn't need help the way some others do."

Bennett declared himself to be "totally against" artificial trade barriers.

"A lot of companies in the industry here are owned overseas, and it's not for the New Zealand taxpayer to help overseas companies. We need to make it easier to retain staff, and whatever party is in power will need to deal with that."


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# A useful reference source

by Selwyn Arrow

Just for a change this month I will review the book I mentioned a couple of months ago, *The Peter Norton Programmer's Guide to the IBM PC.* Published by Microsoft Press, this is the latest in a string of books and articles from a recognised authority on the IBM PC. Norton is also very well known for his highly recommended *Norton Utilities* and more recently for his *Norton Commander* utilities disks.

In this book he covers the features and distinctions of the various members of the IBM PC family, those most applicable to New Zealand being the original PC, the PC-XT, the portable PC and the PC-AT. Also included but of little use here is the PCjr.

This book is intended for the more advanced PC and compatible user. As the title suggests it is aimed at programmers, but don't let that put you off buying it, as this makes an excellent reference book and as you get to use your PC more and more you will find it very useful for delving into the finer details. I regularly use it as my reference source for this column.

Throughout the book different symbols are used to highlight information specific to each computer, a very good idea, even if it does lead to very wide left margins! The 412 pages contain 20 chapters and three appendices. With a further 13 pages of index this makes for a good solid book.

It is not without some flaws, though. His treatment of the AT is a bit sketchy, and at times the reader is referred to the IBM documentation. First published back in 1985 this was quite possibly one of the first books to cover the AT. There is no information on the latest PS/2 machines, of course, and I have also heard that there are at least three major errors. Norton, being an authority on the subject, quite obviously leads to being considered infallible by some people! I do have details of these errors if you need them.

## Pertinent information

The first seven chapters go into the basic designs of each of the PCs, including information on the microprocessors and support chips in the various models plus details on video displays, disk drives and sound generation. Assembly language is also touched upon in various places.

Next come a very useful 11 chapters on BIOS and DOS services, interrupts and functions. In many cases Norton gives advice on how and why to use these important features of our PCs, something which is certainly not found in the original hardware and DOS technical manuals. His experience in making the best use of this information is valuable.

Chapters 19 and 20 cover programming in some detail, although they are not intended as a tutorial on the subject. The three appendices cover Installable Device Drivers (ANSI.SYS), Hexadecimal Arithmetic, Character Sets and Text File Formats.

A useful feature of the book is the special symbol which is used as a pointer to help the reader cope with the complex interrelationships of the material. This is designed to make random access of the reference material much easier, and it works well. The index is comprehensive and well thought out, while the inclusion of a contents page at the beginning of each chapter certainly makes life easier for me.

Norton's aim in writing this book was to help anyone who uses PC programs and who wants to understand the technical details and working ideas behind them. In this he has been very successful. The current price for this useful book is just under $90. *The Peter Norton Programmer's Guide to the IBM PC* is distributed in New Zealand by Penguin Books. ■



# The next phase in

Up-to-date information on the weight of animals is very useful to check on animal performance. Often farmers are not aware of the actual weights of their animals. This is regrettable, because weights can clearly indicate problems in feeding or animal health.

Many relationships between liveweight and animal performance have been well documented under experimental conditions and are readily available from different publications. Some farmers know the value of a set of scales and regularly weigh 10-15 per cent of the total number of animals within their mobs.

Weighting such a percentage is sufficient for the bull beef producer where knowledge of liveweights and liveweight gains is of paramount importance for a profitable operation. As such, rapid access to weight summaries is vital. Specialized farming operations with, for example, breeding programmes may require weights of all animals. For instance, in deer farming when selecting for high velvet and venison yields, it is essential to know which animals have low yields or are lagging behind for other reasons. Are they sick? So they have to be culled? Culling may help to ensure that inferior genetics are not passed to the next generation.

It goes without saying that weighing livestock is time-consuming when tags have to be read, numbers have to be written down etc. Possibilities for errors exist at all stages. Where all animals have to be weighed they have to be herded, and they have to be driven onto weighing platforms. All this handling can upset livestock and stress may occur.

There is an obvious need for automation and to use new technology to speed up weighing and recording. The missing link in streamlining automatic recording of bodyweights has been electronic identification, but considerable progress has now been made in the use of sensing technology for animal identification and weighing.

Animal electronics sensors coupled with scales and computer technology will result in immediate and instantaneous information on the current and past performance of individual animals or mobs. This must eventually lead to considerable economic benefits for producers.

At the Agricultural Field Days in Hamilton, Allflex (electronic identification), Tru-Test (electronic weighing scales), Daisy Computer Systems (deer management software) and Computerland (IBM computers) demonstrated an integrated system developed in cooperation with deer-farmer Richard Fraser.

## How it works

- Deer are positioned on the weighing platform and identification

# electronic weighing

by Koos Baars

from an electronic eartag is (electronically) read and passed via an integrated reader to the host computer. This identification system uses sophisticated surface acoustic wave technology and proprietary signal processing techniques. The read range is up to three metres, depending on the tag used. The tags are rugged and do not contain any batteries, switches or circuitry. The reader transmits a very low power radiofrequency signal and receives the uniquely coded response which it converts to an audio frequency signal carrying the recognition data to the system controller. The reader may be located up to 1800 metres from its system controller and is connected to it with an inexpensive cable. The reader operates on a low voltage DC power supply.

- The computer, using this identification number, accesses the data file pertaining to that animal and then requests the weight information from the weighing indicator.
- On receiving the weight, the datafile is automatically updated and the relevant information displayed on the computer screen.

At this point the user is able to examine any particulars from the historic data files built up within the system. It is also possible to download data to spreadsheets for use in conjunction with for example grazing management templates.

## Top marks

This is an impressive system by anybody's standards. The software is outstanding with effective use of colour, windows, pull-down menus and versatile reporting capabilities. Top marks to Daisy Computer Systems for the high-quality software interface!

One minor disadvantage is that the computer has to be located in or near the shed, where the weighing takes place. Owning a second rugged portable computer may be useful.

The second drawback is the price. It is still a very expensive system. Electronic eartags are about $28.00 each, system controller and remote reader are approximately $5,000.00 each, and the total system including computer and software may easily add up to about $300,000. Not for the average farmer!

However, like pocket calculators and computers, prices should fall over time. There is little question that large corporate farming enterprises will purchase this equipment now or in the near future. With good management and other expertise they should reap large returns from it. ■


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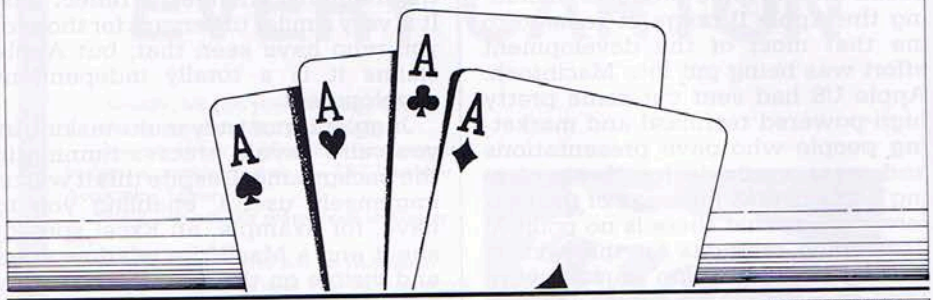

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# MacDevelopers conference

by Grant Cowie, PhD

Did you know that Macintosh software developers are a flourishing breed in Australasia? It's common knowledge that, although the Mac is extremely easy to use, it is enormously difficult to develop for. In fact the only true applications that I know of that have been developed in New Zealand are SailMaker, (a CAD/CAM system for yacht sail design) by Sails Science of Auckland, and a very impressive data logger from Otago University (which I think is called MacLab).

I was therefore surprised to hear that there would be about 15 people from New Zealand going to the Apple Australian Developers Conference held by Apple Australia in Canberra in June, and I decided (somewhat reluctantly) that I ought to attend. I was very glad that I did.

Although the conference was based on all Apple products, including the Apple II range, it seemed to me that most of the development effort was being put into Macintosh. Apple US had sent out some pretty high-powered technical and marketing people who gave presentations and were available for "brain-picking". The overall message of the conference was that there is no point in developing products for the sake of writing software. You must always have an eye on the market and some strategy for marketing your product. Here are some of the highlights.

## AAPDA

One of the most significant announcements at the conference was the formation by Apple Australia of AAPDA, the Australasian Apple Developers Association. This is to be the local version of APDA which is based in the States. Many local people have joined APDA and been very frustrated by the lack of response and erratic communications.

The Australasian version is supposed to overcome the difficulties caused by our remoteness in this part of the world. It will be solely responsible for all local development support, including the supply of technical-notes and development products such as MPW and Inside Mac. Just how well it will work for New Zealand developers remains to be seen, but there was some talk of setting up a bulletin board in Auckland in the not too distant future. Any serious developer should probably join – if you're interested contact me through *Bits & Bytes* and I will send you a copy of the application forms and price list.

## Juggler

Apple gave developers a preview of Juggler, the new multi-tasking operating system for the Mac. This is a really exciting product, enabling multiple applications to be run at once without the need for Switcher. One of the applications that you run with Juggler is the Finder, and from this you can launch other applications, each one running in its own window(s). The window which is the topmost on the screen is the application that is currently activated, and the menu bar changes to reflect this. It is very similar to Servant for those of you who have seen that, but Apple claims it is a totally independent development.

Juggler is not truly multi-tasking as you can't have a process running in the background. Despite this it will be immensely useful, enabling you to have, for example, an Excel spreadsheet and a MacWrite window open and visible on the same screen. Any program that runs under Switcher should run under Juggler, provided there is enough memory. I don't know when Juggler is due for release, but it will apparently appear as some future version of the System File, and hence should be free (?).

## MacApp

MacApp is generic (or empty) Macintosh Application written in Object Pascal. It handles all the housekeeping for those awkward things like menus, windows resizing, text scrolling and controls. Someone at Apple must have finally realised that most of the hardship in developing for the Mac is learning how to program these things. So if you're considering any sort of new development for the Macintosh I strongly recommend that you save yourself a bundle of time and invest in MacApp which is available through AAPDA. It does mean that you will have to use MPW Pascal or C, but if I recall rightly future versions of Turbo Pascal and Lightspeed Pascal will be MacApp compatible.

## Fourth Dimension

Another product that was previewed was an advanced database/4GL called Fourth Dimension. Apple was originally so impressed with this product that the company was going to market it under the revolting name of Silver Surfer, but backed off under pressure from the likes of Microsoft and Ashton-Tate.

Fourth Dimension is a really powerful database system, a sort of modern-day dBase II or III. As well as a powerful language which gives some access to the toolbox, it also has a MacDraw style system for designing windows, dialogue boxes and reports. One very useful useful feature is the ability to manipulate the database as a set, with full set operations for union, intersection and so forth. It should be released by the time you read this, so if you're interested in developing custom business or accounting applications you ought to check it out.

## Opal

Opal is an Australian developed communications package that allows communication with mainframes, minis and other micros. What is really impressive about it is that communications can be handled using the Macintosh interface. This means that you can set up dialogue boxes to send and extract information from the host machine, the dialogue operation being backed by a multi-tasking language called OpalScript.

At the conference the developers had Opal hooked up to a small Pick machine. They had prepared some custom dialogue boxes which enabled users to logon and extract information from the Pick database. By clicking on the appropriate buttons the Mac could generate English queries from the database and could even reformat the report information sent back from the host. I know that Pick aficionados say that English (or Access) is easy and user friendly, but it's like a foreign language compared with the point and click philosophy of the Mac as implemented under Opal.

# Freeze and reset buttons
## for the Commodore 64

by Evan Lewis, PhD

A reset button can be easily added to the C-64 (see *Bits & Bytes* April 1986 p49). In a similar manner the whole microcomputer can be stopped in its tracks by grounding the Non-Maskable Interupt (NMI) line via a switch. This has the very useful side-effect of freezing the display so that information can be read before it disappears off the top of the screen. It will stop the scrolling of a program listing, disk directories and even the output of a program, as long as the switch remains closed. Thus it works like a NO SCROLL button on a mainframe computer terminal.

This switch is simply installed by soldering a wire to pin 1 on the expansion port (ground) and connecting it

to a 1000 ohm resistor connected in series to a switch. The other side of the switch is connected to pin 4 of the expansion port (NMI). These pins are easily accessible from inside the C-64 case and are visible as wire links protruding up from the main printed circuit board at the back right hand corner and bending at right angles into the expansion port socket. The wires to these pins can be soldered directly onto the protruding links.

Open the C-64 by turning it upside down and removing the three self-tapping screws which hold the case together. Turn the C-64 back over to its normal typing position and then lift the keyboard section off the printed circuit board. Identify the expansion port described above. The pin at the left end nearest the front of the machine is labelled '1' and the fourth pin to the right is the NMI.

Is you wish to install a RESET button at the same time find pin 9 and connect this to ground (pin 1) via another switch and resistor. Alternatively, identify the User Port on the back left of the circuit board and connect the resistor and switch between pin 1 which in this case is on the right hand top edge of the edge connector and pin 3, which is three pins away counting towards the left! The switches themselves can be installed in the plastic case of the machine by drilling an appropriate-sized hole.

It is suggested that a momentary contact switch be used for RESET and a toggle switch or one similar to the shift-lock key on the keyboard be used for the FREEZE button.

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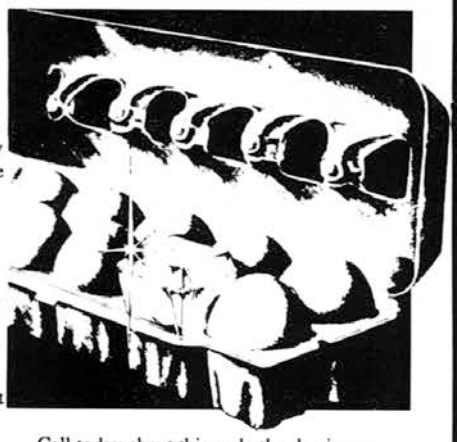

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# To BCD or not to BCD

by Joe Colquitt

*This series of articles was written with Commodore 64 6502/6510 in mind. Other 6502 machines (Apple, BBC, VIC 20 etc) will run examples if corrections are made to addresses. The C64 calls ML with SYS, other BASICs may use CALL, USR etc. If you'd like a copy of an assembler (with instructions) for the 64, drop me a disk or tape with sample save and return postage.*

The previous column showed some examples of simple arithmetic. There are routines which will cover both simple and multiple byte calculations, eliminating ad hoc code (one routine for one calculation).

Before looking at any maths in detail though, take a look at Routine 1. Until now, I've assumed that the ML routines presented have used data already in memory, or that which has been input via a BASIC host program. There are times when you may wish to incorporate inputting code into your ML routines.

The first listing loops if no key is pressed, while the second exits. The third is Commodore specific. If you haven't got a memory map for your computer, I'd suggest you get one. Besides being a reference for ML work, it will probably give you a few ideas for sub-routines.

Note that when working in 6502 machine language, you have the choice of binary mode (BM) or decimal mode (DM). Another common term for decimal mode is BCD, binary coded decimal. DM isn't as useful as it sounds, unfortunately, because only the addition (ADC) and subtraction (SBC) instructions are usable. The shift instructions (LSR, ROR, ASL and ROL), if used when the processor is in DM, still act as binary operators. This means that multiplications/divisions cannot use the shift algorithm, but instead have to be multiple additions/subtractions.

DM and BM use the bits in a byte quite differently. A byte seen through ML's eyes is seen as two half-bytes (nybbles). In BM, 28 is seen as 1C, which has a bit pattern of 0001 1100 (1*16 + 12*1). Nybbles in BM can each count from 0-15, allowing a number 0-225 per byte (ie 15 'tens' * 15 'units').

DM uses base10 counting, more familiar to us humans. In DM, 28 has a bit pattern of 0010 1000 (2*10 + 8*1). This storage is less efficient than BM, allowing only a number 0-99 per byte. The Status flags respond the same in both modes, so for example if a byte contains #FF (BM) and 1 is added (ADC#$01) the Carry will set, or #99 (DM) and ADC will also set Carry. Ineither case, the byte will end up as #00, and Carry=1. This does **not** happen with INC or DEC, only ADC and SBC.

From what you've read so far, it may seem that decimal mode isn't worth the trouble. In many instances, though, DM can save some work. Because people are used to seeing spreadsheets and the like in base10, it makes sense to send figures to the outside world in base10. While BM is very efficient at calculations, code-to-output conversions are more easily done in DM.

It's a bit swings and roundabouts, getting a balance between the two, so I'll leave the tactical decisions of using BM and DM to you. Above all, know what mode you're in and the consequences of being in it. Before constructing any mammoth number-crunching programs, run a few examples using the actual arithmetic code (and get printouts if possible).

One way out of it is to use a binary to decimal converter (Routine 2), which would output the example #1C as #28. The second part of the routine is a standard piece of code, which can be used to output (to screen, printer etc) any number in

*(Continued on page 91)*


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```
Routine 1:get character

C000 JSR#FFE4 ;ROM 'GETCHR' routine
C003 BEQ#C000 ;if A=0 then again
C005 JSR#FFD2 ;else print char
C008 ......

or

C000 JSR#FFE4 :
C003 BEQ#C008 ;if A=0 then exit
C005 JSR#FFD2 ;else print char and then
C008 .......

or

C000 LDA#00   ;POKE198,0 (198 is 'key
C002 STA#C6   ;pressed' register)
C004 LDA#C6   ;if PEEK(198)=0 THEN loop
C008 BEQ#C000
C00A ......

2: Binary to BCD (3 digit decimal)

C000 LDA#C100;get value
C003 LDY#$FF ;start count at -1
C005 SEC      ;prepare for SBC
C006 INY      ;count=0
C007 SBC#$64 ;subtract 100
C009 BCS$C006;and again if rem>100
C00B ADC#$64 ;else add last 100
C00D TAX      ;store remainder in X
C00E TYA      ;store 100's digit by push-
C00F PHA      ;ing it onto stack
C010 TXA      ;get remainder
C011 LDY#$FF :
C013 SEC      :
C014 INY      :
C015 SBC#$0A ;subtract 10
C017 BCS#C014;and again
C019 ADC#$0A ;else re-add last 10
C01B STA#F8   ;store remainder (units)
C01D TYA      ;get 10's count
C01E ASL      ;move 10's to high nybble
C01F ASL      :
C020 ASL      :
C021 ASL      :
C022 ORA#F8   ;OR in the units to the low nybble
C024 TAY      ;copy A into Y

C025 PLA      ;pull 100's off stack
C026 CLC      :
C027 ADC#$30 ;convert to ASCII
C029 JSR#FFD2;print it
C02C TYA      ;get 10's and units
C02D AND#$F0 ;strip units
C02F LSR      ;move 10's into low nybble
C030 LSR      :
C031 LSR      :
C032 LSR      :
C033 ADC#$30 ;convert to ASCII
C035 JSR#FFD2;print it

C038 TYA      ;get 10's and units
C039 AND#$0F ;strip 10's
C03B ADC#$30 ;convert to ASCII
C03D JSR#FFD2;print it
C040 RTS      :

3: 16 bit division

nb this routine, a much condensed version
of a full 16-bit routine, may not prod-
uce a correct result with a high divi-
dend or divisor

C000 LDX#$08
C002 LDA#F8
C004 STA#FB
C006 LDA#F9
C008 ASL#FB
C00A ROL
C00B CMP#FA
C00D BCC#C013
C00F SBC#FA
C011 INC#FB
C013 DEX
C014 BNE#C008
C016 STA#FC
C018 RTS

4: 16 bit multiplication

C000 LDA#$00
C002 STA#FC
C004 STA#FD
C006 LDX#$11
C008 CLC
C009 ROR#FD
C00B ROR#FC
C00D ROR#FB
C00F ROR#FA
C011 BCC#C02Ø
C013 CLC
C014 LDA#F8
C016 ADC#FC
C018 STA#FC
C01A LDA#F9
C01C ADC#FD
C01E STA#FD
C020 DEX
C021 BNE#C009
C023 RTS
```

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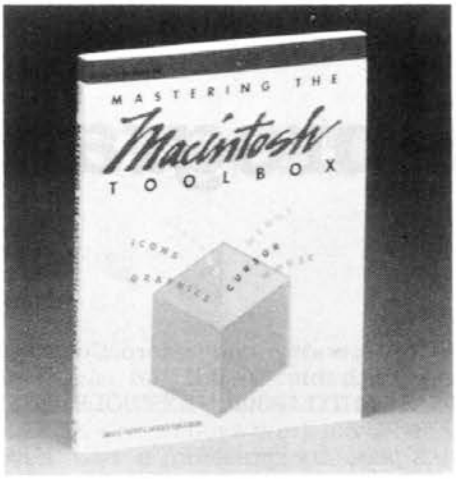


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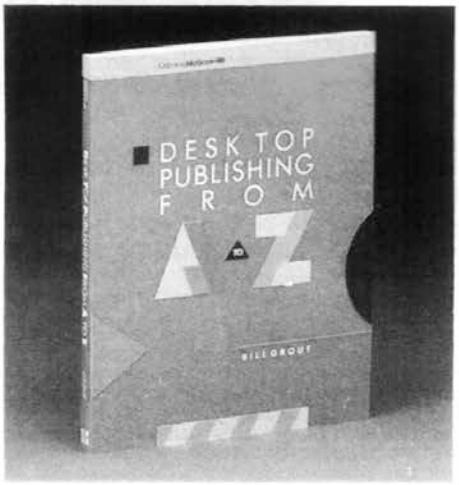


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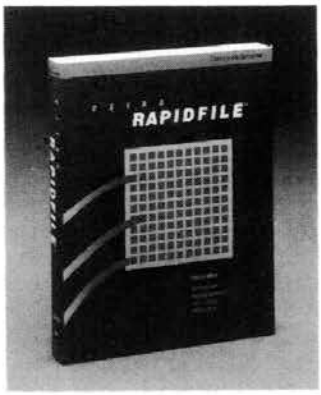


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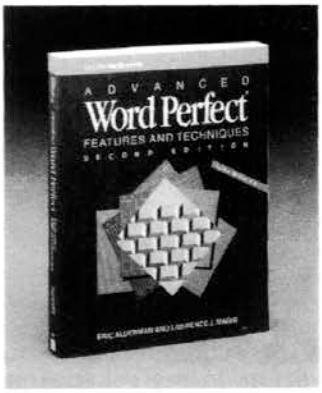


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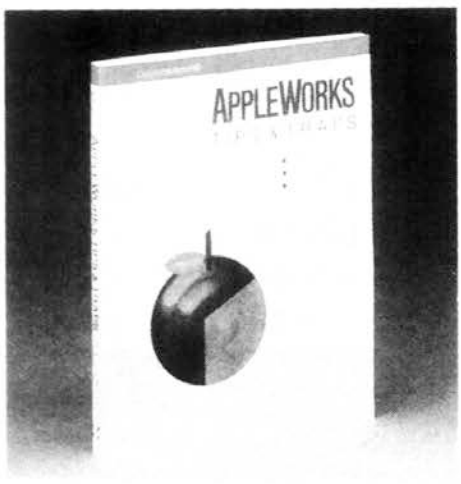

# Assisting with program

First up, apologies for a couple of slight errors in my column on RSXs two months ago. At the end of each table of names, there should be a byte containing 0. The programs run OK without this, but technically the zero byte should be there to signal the end of the name table. I also failed to mention that the name table and routines must lie between 4000 and C000 (hex) in memory. These mistakes were due to me not reading my manual properly!

Listing 1 is the promised RSX listing for the CPC464. Type the program in (the lines beginning with a single quote may be omitted, of course), RUN it, then type this to save the machine code:

```
POKE &A398,0
SAVE"RSX6128",B,&A300,&9C
```

Then, whenever you want to use the RSXs, type:

```
MEMORY &A2FF
LOAD"RSX6128"
CALL 41801
```

This could be included in a program if you wish. Notice that you can't specify an entry point in the SAVE command, and then use RUN"RSX6128" to run the program – it just doesn't work!

Now for details about the commands. |CLEARINPUT clears the keyboard buffer. If you don't know what I mean by this, try typing this in:

```
FOR i=1 TO 10000:NEXT
```

While this is executing, press several keys on the keyboard. As soon as the "Ready" prompt appears, a long string of letters appear below it. The computer remembers any keys you press while it is executing the loop, and then when more input is expected, it reads these keys in before it waits for any more. Compare that with this:

```
FOR i=1 TO 10000:NEXT:|CLEAR-
  INPUT
```

Again, try pressing a few keys while it is running. Notice the difference? |CLEARINPUT flushes the keyboard buffer, so you don't get any of the garbage appearing where it shouldn't. This command should be used in most cases immediately before you use INKEY$ or INPUT, so that there isn't anything left over from accidental key pushes. Of course, there are cases when the buffer comes in handy, e.g. if you define a function key to do several things in one keypress.

664s and 6128s have a command CLEAR INPUT (it's not an RSX) to perform this function. If you see this in a program listing and find you get a syntax error when you type it in, you can now use this RSX instead. This program line is also used sometimes, but it is quite slow, and it too can be replaced by the RSX:

```
WHILE INKEY$<>"":WEND
```

Some programs for the 464 use the firmware with CALL &BB03 to do the job, but this has other side effects such as resetting all function keys to their default settings and disabling the ESC key, so it can be replaced with |CLEARINPUT unless these side effects are required. There is a firmware call for clearing the buffer only (at &BD3B), but it only exists on the 664 and 6128.

Listing 1.

```
500 'New commands
510 'for the 464
520 'by J. Lawry
530 '
540 'Adds the following RSX's:
550 '
560 '|CLEARINPUT: Equivalent to CALL &BB03 or CLEAR INPUT
570 'on 6128 - clears the keyboard buffer
580 '
590 '|GRPEN,<p>: Equivalent to GRAPHICS PEN <p> on 6128
600 'or a third parameter on PLOT, MOVE and DRAW
610 'commands.
620 'sets pen used for lines,TAGs etc.
630 '<p> parameter range:0 to 15.
640 'parameter must be preceded by a comma
650 '
660 '|GRPAPER,<p>: Equivalent to GRAPHICS PAPER <p> on 6128
670 'Sets Background colour for CLG,TAG
680 'Parameter as for |GRPEN
690 '
700 '|CURSOR,<s>,<u>: Equivalent to CURSOR <s>,<u> on 6128.
710 'Parameters: <s>=system switch  <u>=user switch
720 'Each must be 1 or 0. <u> may be omitted. Cursor is
730 'displayed when both are 1. <s> is automatically made
740 '1 for INPUT and 0 for INKEY$
750 'Both parameters must be preceded by commas.
760 '
770 '|SCRMODE,<n>: Equivalent to a fourth parameter on
780 '6128's PLOT, MOVE and DRAW commands. Affects the
790 'way they interact with colour present on screen.
800 '<n>=0: Force mode (default)
810 '<n>=1: new ink = old ink XOR plotting ink
820 '<n>=2: new ink = old ink AND plotting ink
830 '<n>=3: new ink = old ink OR plotting ink
840 '
850 '|FRAME: Equivalent to FRAME command on a 6128.
860 'Causes the computer to wait until frame flyback occurs
870 'before continuing. This makes animation smoother and
880 'less flickery.
890 '
1000 address=&A300:IF HIMEM>address-1 THEN MEMORY address-1
1010 FOR loop=1 TO 8
1020 sum=0:READ code$,check$
1030 FOR loop2=1 TO 43 STEP 2
1040 byte=VAL("&"+MID$(code$,loop2,2))
1050 POKE address,byte
1060 sum=sum+byte:address=address+1
1070 NEXT
1080 total=total+sum
1090 IF sum<>VAL("&"+check$) THEN PRINT"Error in data in
     line";1990+loop*10:STOP
1100 NEXT
1110 CALL 41801:END
2000 DATA CD09BBDA00A3C9FE01C0DD7E00C3DEBBFE01C0DD7E00,C67
2010 DATA C3E4BBFE00C847DD7E00FE02F0FE01CC81BBFE00CC84,D0F
2020 DATA BB78FE01C8DD7E02FE02F0FE00CA7EBBC37BBBC9FE01,D09
2030 DATA C0DD7E00C359BC2198A37EFE01C83601015BA32199A3,A27
2040 DATA C3D1BC6FA3C300A3C307A3C310A3C319A3C340A3C319,BAC
2050 DATA BD434C454152494E5055D447525045CE475250415045,7EF
2060 DATA D2435552534FD25343524D4F44C54652414DC5000000,7AB
2070 DATA 000000000000000000000000000000000000000000000000,000
```

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# conversion

by James Lawry

Two more commands which the 6128 has but the 464 does not are GRAPHICS PEN <n> and GRAPHICS PAPER <n>. These work like normal PEN and PAPER commands, but select the pen for use in drawing lines on the screen, and the paper for clearing the screen with CLG and for the background of characters printed with TAG. These omissions are remedied by the RSXs |GRPEN,<n> and |GRPAPER,<n> which perform the same functions. GRAPHICS PEN on the 6128 can actually have two parameters, but the second governs the uses of a transparent background, using firmware calls not available on the 464 (and which would require a lot of work to simulate), so the second parameter is not supported by this RSX.

DRAW, PLOT and MOVE commands (and their relative variants) can only have three parameters on the 464, but a fourth is supported by the later machines. This controls how many lines and dots drawn on the screen interact with existing colours. All operations work on the binary representations of the pen colours concerned, and XOR, AND and OR may be used. Explaining how this can be used to produce animation and 3-D graphics would take several pages – if you're interested, see if you can borrow a 664 or 6128 manual. Suffice to say that if you find any command that uses a fourth parameter, change it like this:

PLOT x,y,p,m (on the 6128) becomes
|SCRMODE,m:PLOT x,y,p

Smooth animation can be achieved on the 6128 using the FRAME command. Every fiftieth of a second, the picture on your VDU is redrawn, and this is fast enough to fool your eyes into thinking that you are seeing a steady image. If something is drawn on screen while the screen is being rescanned, a slight flickering appearance is caused. The FRAME command waits for a signal from the screen that it has just finished scanning the screen and is about to start again. If a graphics command comes straight after this, the flickering can be reduced. Try this program:

```
10 MODE 1
20 FOR x= 10 TO 30
30 LOCATE x,15
40 PRINT " " CHR$(250)
50 NEXT:RUN
```

Notice the flickering. Now add the line:

35 |FRAME

This smooths it out a bit. So if you see a FRAME command in a listing for a 6128, you can do the same thing on a 464 with the RSX |FRAME.

There are still several commands and functions unable on the 464 which are not provided by this listing, such as FILL, MASK and COPYCHR$. But these RSXs could be of some help in converting programs, and could be used in your own programs as well. Remember, however, that if you require them they must be reloaded into the machine every time you switch on or reset. Also the program must be edited manually: loading the RSXs does not automatically make the machine able to run any 6128 BASIC program.

## To BCD or not to BCD *from p 86)*

decimal format. I'd recommend that you keep C025-C040 stored as a file to append to any other routines. For general usage, the PLA at C025 and TYA at C038 can be replaced with LDA[number], where [number] is the byte whose contents you want to output. C025-C040 is relocatable so can be moved around with a monitor. Assemblers such as Zoom will relocate a load, which offers another solution.

Getting back to maths, multiple-byte calculations use the operators introduced last month. The most common algorithm is the shift-add, which takes very little space, and is fast. At this stage, non-numeric characters (+ –.) aren't permitted, all routines assuming that numbers are whole and positive. Decimal point arithmetic involves string and magnitude routines, whilst negativity is dealt with by two's-complement logic.

Methods for handling these numbers are forth-coming, as well as a deeper explanation of shift/add. Entry conditions are as follows:

```
Routine 3:  dividend in F8/F9 eg  $0407 (1031)
            divisor in FA         $64 (100)
[after call] quotient in FB       $0A (10)
            remainder in FC       $1F (31)
Routine 4:  multiplicand in F8/F9
            multiplier in FA/FB
[after call] product in FA/FB/FC/FD
eg 65535*65535
entry with  F8/F9=FFF=65535
            FA/FB=FFFF
result FA/FB/FC/FD=0100FEFF=1+(0*256)
     +(254*65536)+(255*16777216).
```

BASIC truncates this figure to 4.2948363E+09, but using ML techniques, the full figure (4,294,836,225) can be elicited, and commas inserted. ■


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# Pass it on

## by Joe Colquitt

There are times when you wish to call a machine language routine from BASIC and pass values to it. The three simplest methods are to:

a. POKE values into memory before the call;
b. write a BASIC extender to use new keywords; or
c. give the machine language routine the capability to interpret a BASIC statement.

POKEing values gets tiresome when you're calling bit mapping routines or data handlers. Although b) and c) are superficially similar, a lot less is involved to use the method in c). If you've ever looked through some utilities, you may have noticed, and wondered about, statements like SYS49152,100. Usually, a call using that format would result in a SYNTAX ERROR. There's a simple technique for passing variables to machine language. A variety of parameters can be appended to the SYS address, for example a string and two addresses for a block save, or a string for a search in an adventure or records system.

To make use of the routines here, you don't need to know any machine code. Obviously if you can write some of your own utilities then that will be to your advantage.

When passing a number, the first obstacle to overcome is eliminating the error caused by the comma. A call to $AEFD checks for it and lets program flow continue. A call to $AD9E evaluates the expression after the comma, and finally calling $B7F7 puts the number away into $14/15.

At this point, you can uplift the number for use by the routine. (See example 1.) This passes a value to the sprite vertical rgisters, enabling all eight sprites to be moved right down the screen, one pixel at a time, in 34/60 sec. The BASIC equivalent takes 430/60 sec, nearly 13 times longer. Location $14 holds the low byte of the number, and $15 the high byte. So, if you enter SYS49152,1100 $15 ends up with INT(1100/256) [4] and $14 contains (1100-INT(1100/256)*256) [76].

In our moving sprite example, the high byte is ignored because vertical registers need only 0-255. In other applications, it's probable that both $14 and $15 will be used.

The directory program is one that I've found very handy, especially when you're running a BASIC program and therefore can't load the disk directory without destroying the program in memory. Type the program in and save it. To merge it with another program, follow these steps:

1. Load the main program
2. POKE43,PEEK(45-2:POKE44, PEEK(46)
3. Load the directory program
4. POKE43,1:POKE44,8

Read the data into memory with GOSUB62000. The ML is accessed with SYS828,N$. N$ (or any other

Sprite move: passing one number to ML

```
C000 JSR$AEFD  ;chech for ','
C003 JSR$AD9E  ;evaluate
C006 JSR$B7F7  ;store # in $14/15
C009 LDX#$0F   ;perform moving loop
C00B LDA$14    ;get number (low byte)
C00D STA$D000,X;into sprite V register
C010 DEX       ;step-2
C011 DEX       ;
C012 BPL$C00D  ;
C014 RTS

10 V=53248:A=49152
15 POKEV+21,255:POKEV+16,0
20 FORI=0TO7:POKEV+39+I,I+1:rem colour
30 POKEV+I*2,30+I*27        :rem horiz

40 NEXT
50 TI$="000000":FORI=40TO199:SYSA,I:NEX
   T:PRINTTI
:lines 60-70 are equivalent of ML above
60 TI$="000000":FORE=40TO199
70 FORI=1TO15STEP2:POKEV+I,E:NEXT:NEXT:
   PRINTTI
```

Blocksave source code

```
033C JSR$AEFD  ;check comma
033F JSR$AD9E  ;evaluate string
0342 LDY#$00   ;look up $47/48, which
0344 LDX#$00   ;hold address of pointer
0346 LDA($47,X);to most recently used
0348 STA$00FA,Y;variable. Get string &
034B INC$47    ;store it at $03A0. Poin-
034D INY       ;ter at address in $47/8
034E CPY#$03   ;is LEN(string), add(lo)
0350 BNE$0346  ;add(hi). Two linked
0352 LDY#$00   ;loops double-index to
0354 LDA($FB),Y;get string.
0356 STA$03A0,Y:
0359 INY       ;
035A CPY$FA    ;LEN
035C BNE$0354  ;
035E STY$0384  ;store LEN in routine
0361 NOP
0362 NOP
0363 NOP
0364 JSR$AEFD  ;get 'start'
0367 JSR$AD9E  ;low(start) is in Y & 14
036A JSR$B7F7  ;high(start) in A and 15
036D STY$F8    ;get low, store
036F STA$F9    ;get high, store
0371 JSR$AEFD  ;get 'end'
0374 JSR$AD9E  ;
0377 JSR$B7F7  ;
037A LDA#$01   ;set file parameters
037C LDX#$08   ;device
037E LDY#$FF   ;
0380 JSR$FFBA  ;
0383 LDA#$00   ;set name length
0385 LDX#$A0   ;name address
0387 LDY#$03   ;
0389 JSR$FFBD  ;
038C LDA#$36   ;BASIC off
038E STA$01    ;
0390 LDX$14    ;end (from 0377)
0392 LDY$15    ;
0394 LDA#$F8   ;index to 'start'
0396 JSR$FFD8  ;save
0399 LDA#$37   ;BASIC on
039B STA$01    ;
039D RTS
```

ML directory

```
62000 B=828:IFPEEK(B)=32THENRETURN
62005 FORI=0TO159:READML$
62010 IFLEFT$(ML$,1)="X"THENI=I-1:GOTO62030
62020 A=VAL(ML$):POKEB+I,A:CK=CK+A:GOTO62050
62030 C=VAL(RIGHT$(ML$,5))
62040 IFC<>CKTHENPRINT"ERROR",ML$,A:END
62050 NEXT:RETURN
62060 DATA 32,253,174,32,158,173,160,0,162,0,X01144
62070 DATA 161,71,153,248,0,230,71,200,192,3,X02473
62080 DATA 208,244,160,0,177,249,153,219,3,200,X04086
62090 DATA 196,248,208,246,200,200,200,140,110,3,X05837
62100 DATA 169,1,162,8,160,0,32,186,255,169,X06979
62110 DATA 5,162,216,160,3,32,189,255,32,192,X08225
62120 DATA 255,162,1,32,198,255,32,210,3,32,X09405
62130 DATA 196,3,240,53,165,198,240,19,169,0,X10688
62140 DATA 133,198,173,119,2,201,3,240,38,165,X11960
62150 DATA 198,240,252,169,0,133,198,169,13,32,X13364
62160 DATA 210,255,32,207,255,170,32,207,255,32,X15019
62170 DATA 205,189,169,32,32,210,255,32,207,255,X16605
62180 DATA 240,203,32,210,255,208,246,169,1,32,X18201
62190 DATA 195,255,32,204,255,96,32,207,255,133,X19865
62200 DATA 251,32,207,255,5,251,96,32,170,3,X21167
62210 DATA 32,207,255,76,207,255,36,48,58,66,X22407
62220 DATA 42,X22449

Possible call routine:

1000 N$="":INPUT"PATTERN ";N$
1010 IFN$=""THENN$="*"
1020 SYS828,N$

Pattern may contain ? or *, eg ??ead*
```

Blocksave

```
100 B=828:FORI=0TO97:READML$
105 IFLEFT$(ML$,1)="X"THENI=I-1:GOTO115
110 A=VAL(ML$):POKEB+I,A:CK=CK+A:GOTO125
115 C=VAL(RIGHT$(ML$,5))
120 IFC<>CKTHENPRINT"ERROR",ML$,A:END
125 NEXT:END
200 DATA 32,253,174,32,158,173,160,0,162,0,X01144
205 DATA 161,71,153,250,0,230,71,200,192,3,X02475
210 DATA 208,244,160,0,177,251,153,160,3,200,X04031
215 DATA 196,250,208,246,140,132,3,234,234,234,X05908
220 DATA 32,253,174,32,158,173,32,247,183,132,X07324
225 DATA 248,133,249,32,253,174,32,158,173,32,X08808
230 DATA 247,183,169,1,162,8,160,255,32,186,X10211
235 DATA 255,169,7,162,160,160,3,32,189,255,X11603
240 DATA 169,54,133,1,166,20,164,21,169,248,X12748
245 DATA 32,216,255,169,55,133,1,96,X13705
'8' highlighted is device#

Possible call routine:

1000 INPUT"FILENAME ";F$
1010 INPUT"START    ";SA
1020 INPUT"END      ";EN:EN=EN+1
1030 SYS828,F$,SA,EN
```

# Communications software

by Chris Draper

This column is dedicated to Bulletin Board Systems (BB systems). Its aim is to aid the exchange of news, ideas and experiences in electronic communications. If you run a BB system and would like the service publicized, drop me a line c/- *Bits & Bytes.*

Great to hear from some of you there. Mark Wal ler rang me just as this went to press. He has a list of over 1000 BB systems world-wide that includes about 25 NZ systems. I hope to receive a copy soon. Mark is happy to make this list available to anyone, so watch for details next month.

A new Auckland user says he has been ripped off. When purchasing his modem he was charged an extra $50 for the software to go with it. According to the master distributors, Netcomm is supposed to be free with the purchase of the modem, but apparently some shops are selling it as a $50 extra. So watch out!

Last month I promised to explain what software you need to operate a modem so here goes. To connect with another computer over the phone, we have to accomplish two things:

- Establish the physical connection between your computer and modem, and the remote computer and modem. This includes dialling the correct number and setting the correct speed protocols etc.
- Allow only one computer to be in charge of both ends. The computer in charge is normally referred to as the host while the other is the terminal.

The first point may or may not be under computer control (you may have to dial the number manually), and depends largely on what equipment is used. The second point, however, is the heart of any communications software. In the simplest arrangement, your machine (the terminal) sends any key pressed directly to the host, where it is processed and echoed back, along with the results to be displayed on your screen.

Getting your machine to operate like a terminal is OK for general chats and running software on the host system (a Bulletin Board system is one example of running software on a host). This setup, however, is no good for transferring files between machines. Therefore a comms program has two modes of operation: terminal mode and file transfer mode.

File transfer is quite a complex subject in its own right (to be covered in the future – watch this space!), but briefly, both ends of the link (the host and the terminal) must use a set of ground rules or protocol that is suitable for the files to be transferred.

The simplest method is to force the host to shovel the correct file down the line while your comms program pushes it out to disk. If the file was a short text one, it could be checked by a quick visual scan and any incorrect characters rectified by hand. Machine code and long important documents cannot be checked so easily, however, and will need more protection against transmission errors.

Dozens of protocols exist that can protect data integrity from even the worst interference. Most work by sending the data in small amounts and checking each block for errors before the next is requested. If an error is detected, then that block of data is re-transmitted. The most common protocol is XMODEM, otherwise known as MODEM7.

Communications software has come a long way and many features have been added to the original terminal program. Here is a list of the most useful and more common ones that I would rate as highly desirable.

**Data capture** – the ability to save every character received to a disk file. This way you can quickly scan important points while online, then print the session out after you have finished for closer study. This is a great way to get to know how to use unfamiliar BB systems.

**Script languages** – teach the comms program to do a specific job when you give the command. For example: get the computer to automatically log you onto your favourite BB system, check for mail and download any present, then get you to the main menu where you can take over.

**Estimate transfer times** – calculate how long a file will take to send at a given speed using given protocol.

**Foreign character translation** – the ability to specify translation tables for funny characters. For example, your keyboard uses ASCII character code 8 for backspace and the BB system expects code 128. By setting up a table the comms software will take care of the translation for you.

As I stated last month, I have shifted to Auckland. The Kiwifruit Coast Bulletin Board I set up in Tauranga is now run by Dennis Brown and Sel Orme. You can reach them on (075) 81 333. Let it ring a few times, hang up, then ring straight back. Press the <return> key two or three times s-l-o-w-l-y and wait for the first question.

Until I am safely installed in Auckland, if you would like to contact me please write care of *Bits & Bytes* magazine, Auckland.

This column is here to promote *your* views on this exciting branch of our hobby. If you find something hard to understand then write and I'll explain. Chances are, many others are in the same boat too! ■

---

*Continued from previous page*

string variable name) must be '*' for a whole directory.

One command Commodore BASIC lacks is BSAVE. When working with character sets, bit map screens or ML, it would be nice to save a block in the middle of memory without the inconvenience of fiddling about with pointers, which generally have to be restored after the save. The Blocksave routine accepts a string (filename) then two numbers for the start and end addresses. It's been constructed to save from under the BASIC ROM, but not the KERNAL. That's because the KERNAL can't be disabled, as it contains the save routines.

In a previous article I've mentioned the technique of transferring a block from under the KERNAL to another area, saving it, then writing the original address to the file on the disk. The ML directory routine has the string code in common with block save. It opens the sequential file "$0:*" as default, which makes use of the DOS RAM code that assembles a directory for screen presentation. Any key will pause/unpause the listing, and STOP will terminate it.

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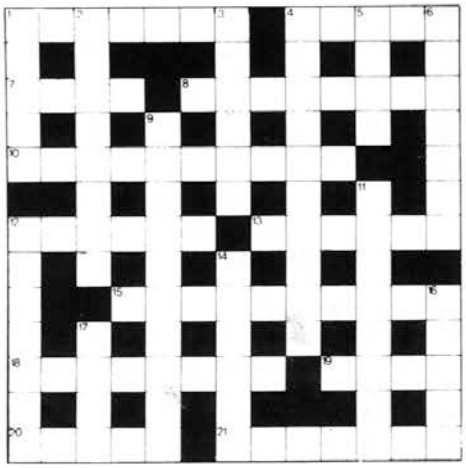
# Crossword No.3
## compiled by David Cass

### CLUES

#### Across

1. Moves the contents of a screen up or down. (7)
4. In its appeal to some businesses, we see a major US supplier of multi-user computer systems on the NZ and overseas market. (5)
7. Coleco produced this popular micro in USA, vintage 83-85. (4)
8. Screen displays, or printout, in pictorial representation form. (8)
10. IBM's dot matrix printer. (10)
12. Under control of a central processor. (6)
13. The brand name of these computers may sound ecclesiastical to some but military to others! (6)
15. Very fast processors operate in this cycle range, of one-thousand millionths of a second. (10)
18. As in – – – – – – – – Path, the sequence of operations or stages required to complete a program or project in the shortest time. (8)
19. Out of Apple's two Steves, was he the odd one? (4)
20. To enter identification data when starting to use a terminal or computer. (3/2)
21. First name of the developer of the PASCAL language. (7)



#### Down

1. One of the Japanese electronic giants, supplier of several micros, including PC 1251 and PC 7000. (5)
2. Descriptive of a memory circuit in which a stored pattern is blown during manufacture, to store a fixed program in the computer. (4/4)
3. A set or group of consecutive characters present in memory: $. (6)
4. – – – – – – – – – –writer: the high-tech printer supplied as part of the Macintosh-based DTP package. (5/5)
5. – – – – film memory: storage on a layer of magnetic material only a few millionths of an inch thick. (4)
6. This form of analysis is used to review an operation before using a computer to improve its efficiency. (7)
9. Technique for removing least significant digits or letters, to increase speed of sort at the expense of precision. (10)
11. Major US chip and electronics manufacturer, makers of the 6800 and 68000 chips. (8)
12. This form of printed character recognition uses a photo-sensitive device. (7)
14. Programs available for low-cost, non-copyright use are in the public – – – – – – (6)
16. Currently the most popular magnetic storage medium. (5)
17. A roundabout sort of grin, on seeing a chained list in which the last item is pointed back to the first. (4)

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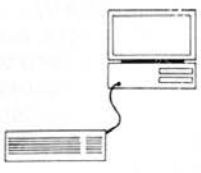

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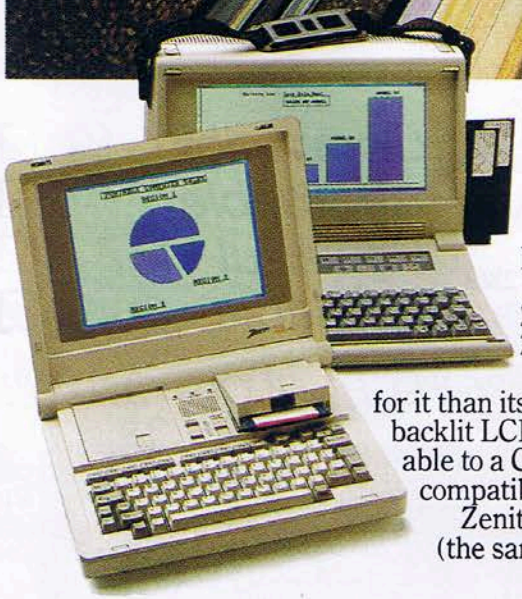

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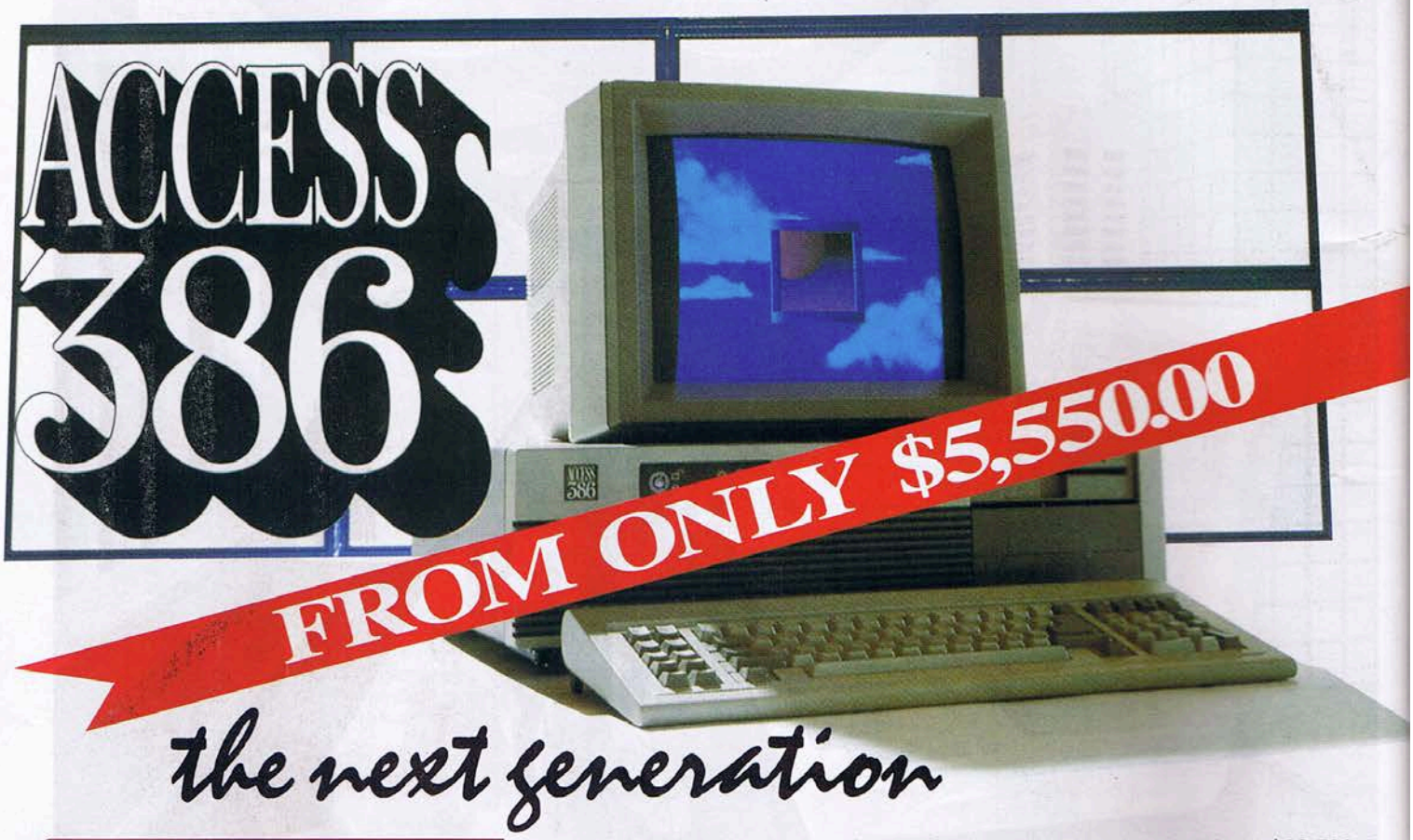


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