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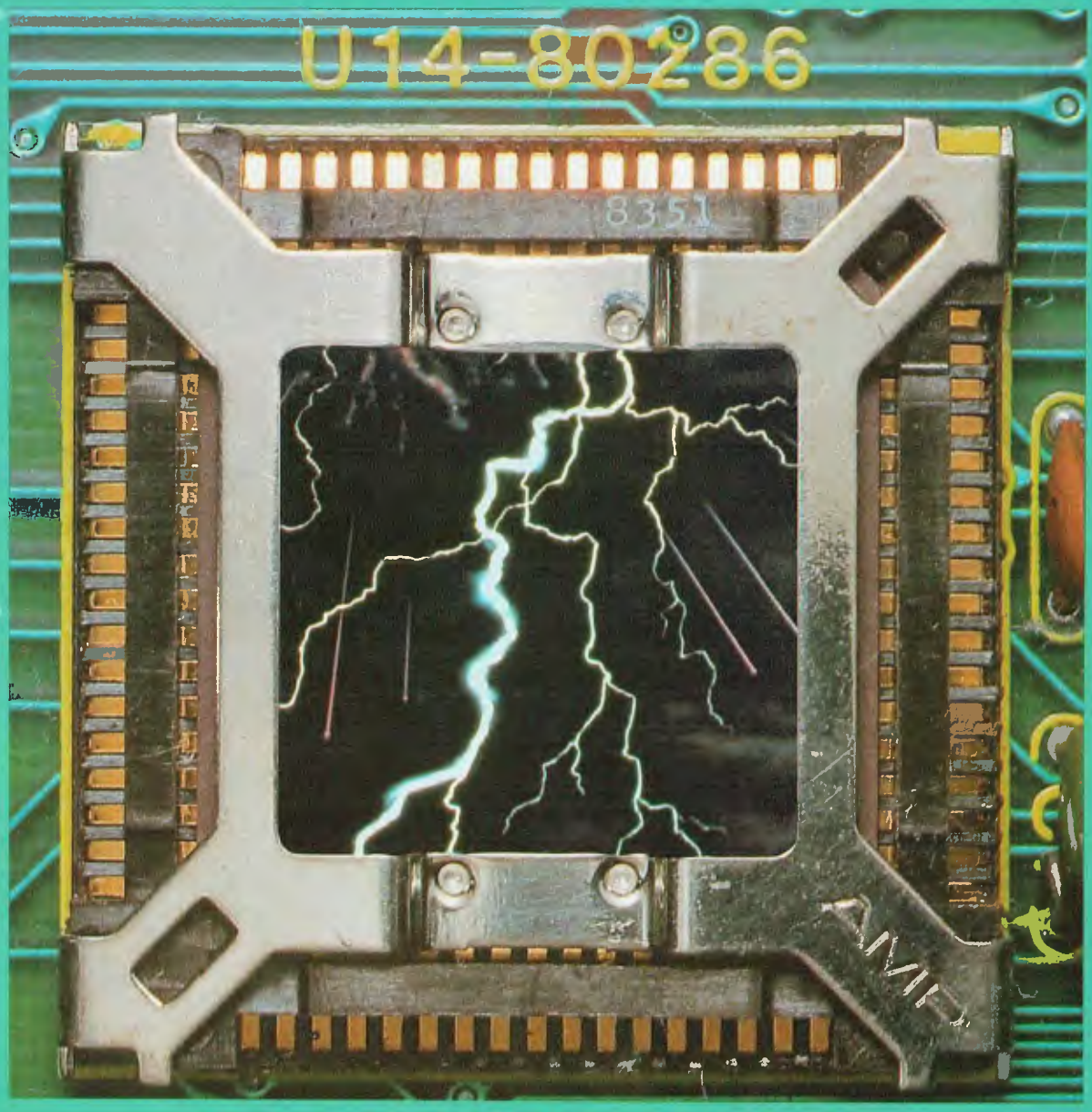

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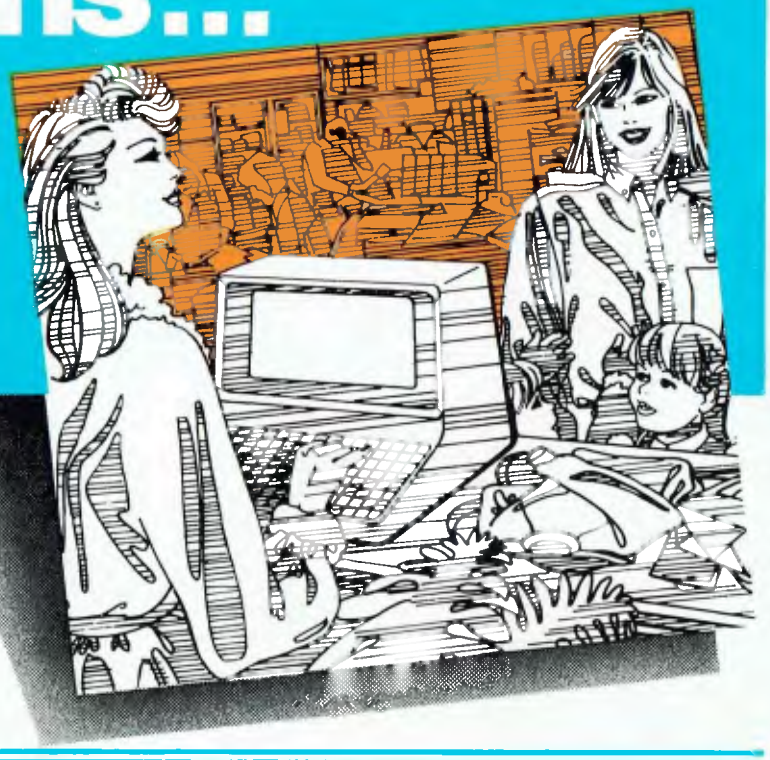

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SUPERMICROS! **26**
High-performance processors are turning micros into mini-eaters. We look at the latest wave of super-charged chips, the machines they are appearing in, and who is releasing them here.
LES BELL

COMPUTING IN THE SUNSHINE STATE **52**
The second Queensland computer show, Expo '84, is being held this month. Is the sunshine state a technological backwater, or a budding Australian Silicon Valley? We went to find out.
NATALIE FILATOFF

STATE OF THE ART **69**
Our Queensland story runneth over. High-tech state or not, there are a lot of people up North worth mentioning — so we've done a quick who's who.
NATALIE FILATOFF

PETER PUPPET **76**
One of the names you hear most often in a discussion of computing in Queensland is Arcom Pacific. We profile Peter 'Puppet' Iliffe, the man who started Arcom as a back-yard business...
NATALIE FILATOFF

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FEATURES

THE GREAT DATABASE SEARCH 36
The latest episode in our search looks at Optimum, while Les Bell also has a preliminary look at dBase III in Programmer's Workbench (Page 118).
ROSE VINES

DISKETTE TORTURE TESTS 46
Our US correspondent tried everything he could to destroy the floppies used in these torture tests. Here he reports on what will actually kill your data.
HOWARD KARTEN

EDUCATION 85
At the recent Australian Computer Education Conference teachers discussed how to best implement the new machines now occupying many a student's desk. Your Computer *attended.* NATALIE FILATOFF

FINDING A WORKING NET 107
Following up on our communications special last month, we look at the PC networks available currently. LES BELL

HOW NETSWORK 115
This backgrounder to micro networking explains how they work, and what impact they'll have on the office of the future. LES BELL

PROGRAMMER'S WORKBENCH 118
Les debugs his Lisa, buys a Compupro system, hots up his IBM PC and muses on Unix, while Brendan Akhurst tries yet again to get Les to sue him.
LES BELL

PACKET-SWITCHING EXPLAINED 133
Our US correspondent looks at the big packet-switching networks like Telenet (on which Telecom's Austpac is based) HOWARD KARTEN

REVIEWS

MEMOTECH 93
The Memotech falls into the $600-$800 price bracket, and has some unusual features not offered by other computers in this category. LANCE WILSON

JANE'S INTEGRATED APPLE 101
A mouse-based, integrated software package for the Apple II range of computers, Jane is designed for novice users, but is it any good for churning out the work? EVAN McHUGH

ANADEX IN COLOUR 103
It's built like a tank, does colourful work and interfaces to the IBM-PC. Our reviewer says this printer represents very good value for money.
JOHN NICHOLLS

NEW MODELS

NEC APC III 8
NEC's IBM lookalike isn't an IBM workalike — like its predecessor it is built for performance rather than compatibility.
FRANK LEE

IBM'S PORTABLE PC 51
IBM has announced the PC Portable here already, although the description 'portable' may surprise those who haven't done weightlifting...
LES BELL

COLUMNS

COMMODORE	*136*
IBM	*140*
APPLE	*144*
CP/M	*149*
OPERATING SYSTEMS	*151*
ATARI	*157*
KAYPRO	*159*
OSBORNE	*164*

DEPARTMENTS

YOUR COMPUTER NEWS	*12*
TEXTFILE	*83*
DIARY	*161*
MARKET DIRECTORY	*166*
CLASSIFIEDS	*168*
READER SERVICES	*178*

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EDITORIAL

Beware The Minefield

I received an alarming phone call from a reader the other day which set me to thinking. In fact, I'd first met this fellow at a seminar where we discussed the relative merits of C compilers for both 8- and 16-bit processors, and other languages which were suitable for 8- and 16-bit development.

At the time, I'd recommended PL/I, as I usually do, as I've had great success with it, but he decided – quite reasonably – that C was a better long-term bet, and decided to buy a widely-promoted compiler which supports a variety of operating systems.

He bought it from an interstate distributor, by mail order, and then the fun started. The compiler was as leaky as a sieve; integers were stored as single-byte values in some cases, various functions did not work, and in general, the product was nowhere near as reliable as the el-cheapo product he had hitherto been using.

I would have to say that, based on his reports, the product did not perform to its own published specifications, and was certainly not fit for its intended purpose of compiling programs written in the 'Kernighan and Ritchie'-defined C programming language.

Unfortunately, the distributor refused a refund absolutely, denied all responsibility and suggested our reader take the matter up with the manufacturer in the US – a totally impractical suggestion.

For a while we discussed various remedies under the Sale of Goods Act in each state, and the Federal Trade Practices Act, without coming to any conclusion. But the point is this. Our reader was willing to cut his losses, write it off to experience and buy another product, but other readers may not be so lucky, and could blow several hundred dollars with no hope of recovering it. So how can we warn people about such products?

However, in this case, I was well aware that the product was a minefield – yet there's no way I can warn readers away for fear – a very real fear – of getting my tail sued. What's really required is specialised consumer legislation to cover this kind of situation, coupled with a rethink of the defamation legislation. In the meantime, I can't advise you not to buy products to which we haven't given the stamp of approval – there are simply too many that we haven't reviewed – but I do urge you to tread with care, search for reviews, contact other users and ask for independent referees on major purchases. It doesn't happen often, but when it does. . .

Les Bell

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NEC's INCOMPATIBLE

ON OCTOBER 10, NEC Information Systems Australia announced the release of the APC III. Launched, perhaps, would be a better term; launched on a sea of champagne bubbles with breakfast at Pancakes on the Rocks. Ah, the trials of a computer journalist.

APC III? What happened to the APC II? Well, there wasn't one. There was, of course, the original APC. The numbering of computer systems continues to be a great mystery. I wonder what became of the Apple I? or the IBM 350?

Although it runs MSDOS, the original APC could never have been described as Yet Another IBM-PC Clone. There was therefore considerable speculation as to whether NEC would weaken, and join the 'me too' brigade by ensuring that the APC III was a true compatible. After all, with masses of IBM software out there it must be quite a marketing temptation.

By no stretch of the imagination is the APC III a clone. Further, NEC firmly believes that this will greatly enhance sales; after all, that's what happened with the original APC.

With such a short lead time before this issue is due out, a full review will have to wait for the December issue of *YC*. Meanwhile, I'll try to describe the loan unit which is currently occupying prime real estate at Mount Crisis.

UNIX for the Single User?

I was asked by NEC whether I wanted the MS-DOS version, or the UNIX version for the load unit. It seems the UNIX version needs an additional memory management board. Naturally, my prejudices got the better of me, and I stuck to the tried and true. But why UNIX on a machine which is aimed at the single-user market?

NEC's argument for UNIX is based on its ability to expand the range of available software, and to provide sophisticated facilities where necessary. In particular, the company cites multi-tasking, file locking, inter-process communication, a hierarchical file structure, and flexible command shells. The NEC version of UNIX (PC-UX) includes 170 commands, graphics capabilities, a C compiler and two screen editors – the Berkeley Unix Editor, and the Rand Editor. PC-UX and MS-DOS may co-exist on the same disk.

Under MS-DOS, one has access to the GSX Graphics Extension, keyboard remapping, a RAM-DISK utility, screen dump utility, and five possible modes for each of the twelve function keys.

The Innards

At the heart of the APC III is an 8 MHz 8086-2 microprocessor, a true 16-bit machine with roughly twice the clout of the IBM-PC's 8088. The standard machine is supplied with 128K of dynamic RAM and 32K of 'ROM BIOS'. An additional 8K is reserved for text RAM. There is one serial port, a parallel port, two hard-disk ports, a battery-backed calendar clock, a detachable keyboard and a 35 cm monochrome or high-resolution color screen. Four internal expansion slots (presumably non-IBM) allow for additional options.

The entry-level machine sports a single 13 cm floppy disk drive capable of holding 640K, although the same drive can be used to read IBM-formatted disks. This particular drive is quiet in operation, and has a neat way of ejecting the disk. The additional disk space is achieved by doubling the number of tracks on each side of the disk.

The disk drive system is the most noticeable departure from the original APC design, with its one or two 20 cm drives, and the ability to read standard 1S1D 3740 disks. By moving to 13 cm disk drives, NEC has made the main machine considerably lighter, but at a slight sacrifice of total disk space. Few applications will be troubled by this reduction, however there is a simple solution – go to an additional 10-megabyte hard disk.

As with the IBM-PC, the main memory can be upgraded to 640K. The screen mapping conventions for colour and text are not IBM-compatible.

The review machine is enhanced by two additional options, namely a further 256K of RAM and a second floppy-disk drive. Both drives are internally mounted. The tilt-and-swivel monitor is a striking high-resolution RGB display giving 640 by 400 pixels and eight simultaneous colours. This is twice the resolution of the standard IBM colour card, and twice the number of displayable colours. A number of demonstration packages illustrate the powerful graphics capabilities of the machine. Indeed, the inherent resolution of the colour display creates quite an impact if you are used to the 'standard' 640 by 200. The characters are so clear, it is difficult to identify individual pixels. When using the supplied WordStar package, one is again impressed by its 'easy-on-the-eyes' effect, and excellent selection of colour keys.

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The Input Device

The detachable keyboard is also definitely NEC, and not IBM – a good thing. The keys are 'cylindrically sculpted' and give a good reinforcement while typing. I must say I still prefer the feel of the original Columbia keyboard (apart from the layout), since each keyswitch offered a stepped physical resistance. The NEC keyboard has a single resistance.

The keyboard is adjustable (naturally) and features twelve programmable function keys. I haven't done a count yet, but there seem to be many more keys on this keyboard than on the IBM.

Apart from the machine's ability to run (suitably modified) popular 16-bit software, about the only level of IBM-PC compatibility is in its disk format. I was able to swap disks between my Fox 2010M (a 'true clone') and the APC III with no difficulties.

Since the DRI PL/I-86 compiler I use on the Fox is a 'generic' MS-DOS application, it will be possible to run my standard prime number benchmark program to compare its pure number crunching capabilities with the IBM-PC. The results will appear in the next issue.

Options

Options announced so far include those already mentioned, plus a GPIB (IEEE 488) interface board, an 'amusement' board featuring a joystick port and programmable sound generator, a dual serial interface board (bringing the total serial ports to three), and a 'universal' (do-it-yourself) board.

As with the original APC, NEC has identified three categories of software: software developed and supported by NEC, software approved and tested by NEC, and software which 'should' run (because it is 'generic' MS-DOS based).

More than anything else, NEC intends to capitalise on its established, well-trained dealer network. The company argues that it's all too easy to inflict a new machine on the marketplace, but quite another to make sales in the absence of a sound support infrastructure. Accordingly, much of the concern voiced at the product launch centred around dealer support and education.

Although my review article will include more details on prices and software availability, here are the announced hardware (only) prices for typical configurations, each with 256KB of RAM:

APC-SYS1M (1 x 640K FDD/monochrome) – $3425 (including tax)

APC-SYS2C (2 x 640K FDD/Colour System) – $4695 (including tax)

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• Compiles Full V7 C — including enums and structure operations • 50%—100% faster code than any competing Compiler • Complete I/O library • Source for libraries included — no royalties • Easy to use — one command compiles, assembles and links • Powerful debugging tool included • Command line I/O redirection • FAST floating point • Locally developed and supported • Supports ROM-based software • Includes MACRO assembler, linker and librarian.

This is a solid production-quality compiler now being used by government departments, major Australian companies and many small companies and individuals. It is available for the Z80 and 8086/8088 processors, running under CP/M-80, CP/M-86 and MS-DOS (or PC-DOS). Whether you are a commercial software developer or a hobbyist wanting to learn the most popular small-system language today, HI-TECH C can provide the answer to your needs.

Benchmark:

Program: Primes (Eratosthene's sieve)

Compiler	Execution Time	Compilation Time	Program Size
HI-TECH C	40	100	4153
Whitesmiths	60	420	15745
C/80	63	140	3584
Aztec	78	144	9168

AVAILABLE FOR:

Z80, 8086/8088, CP/M-80, MS-DOS, CP/M-86

Pricing: (includes 12 months support) Z80 — $250; 8086 — $300; Post and Handling $5 on all orders.
Disk formats: 8" SSSD most 5¼" formats (add $5 for 5¼" formats)

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NEWS

New Printers, Stand

EACH month sees the release of new printers on the market. This month's offerings include a couple with catchy names – the Kanto Denshi FT8000 and the Seikosha BP5420.

The FT8000 is a colour printer, featuring an 18-pin matrix head coupled with fine stepping increments, providing near letter quality printing at 100cps. There is also a memo-mode of 180cps.

The matrix print head is located at the rear of the paper and, as the matrix pins fire, the paper is depressed onto a colour platen turret located at the front of the paper. Seven colours are used in printing and the FT8000 has full graphics capability. Price is around $1380 plus sales tax, and replacement colour platens cost little more than a normal black ribbon cartridge. Datatel is the distributor: 19 Raglan Street, South Melbourne; (03) 690 4000 or NSW – (02) 439 4211.

The Seikosha BP5420 is a high volume, bi-directional business printer, retailing at $2850 including sales tax. In draft mode it prints at 420 characters per second, and there is also a 104cps correspondence mode. An 18K memory buffer helps in maintaining efficient levels of throughput. More information from: John Durbin, Mitsui Computer, (02) 451 7711.

Also recently released is a printer stand from Mac Designs. Available in two sizes, the printer stand is made from bronze perspex, and is designed to house the paper supply within its casing, with the printer sitting neatly on top. This eliminates hassles with paper access and moving a printer around the office. The 80-column printer stand costs $69, and the 136-column $97.50. Available from: Mac Designs, PO Box 59, Diamond Creek, 3089. ❑

Prolok Rumours Unfounded

AT A seminar in Melbourne earlier this year, a prominent overseas speaker claimed that Proloked disks would be quietly withdrawn from the market. He reported that the physical changes to the diskette, which are the key to Prolok's protection mechanism, cause damage to the disk drive heads. He added that IBM US had refused to honour the warranty on diskette drives in which Prolok disks had been in regular use.

News like this travels fast, especially as it tickles the sensibilities of those who disapprove of this sort of software protection. However, it appears that there is absolutely no truth in the story. Prolok has denied it, and has been happy to refer people to Australian IBM representatives for confirmation. So if you hear the story repeated... ❑

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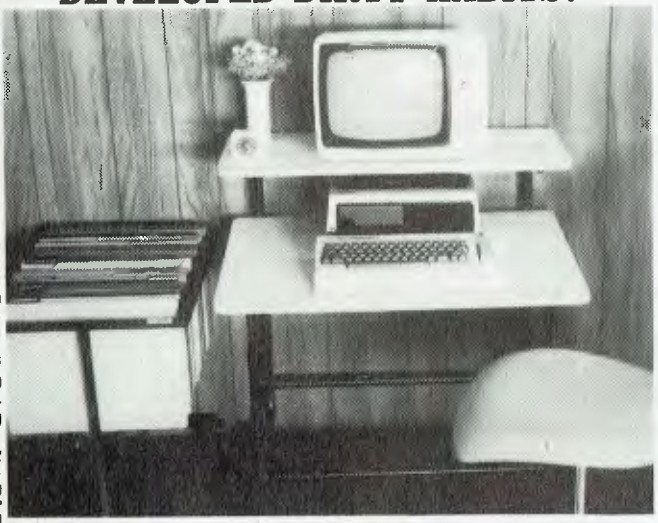

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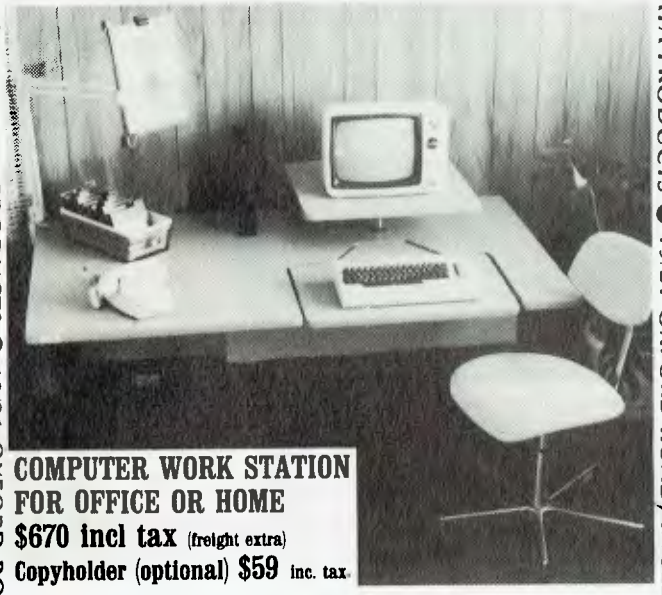

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Avon Calling – Online

AMERICAN cosmetic giant, Avon, is giving up its pen and paper system of ordering, and equipping its sales force with portable data entry terminals from Swedish manufacturer, Micronic. 'Avon ladies' will carry the compact terminals in their bags, and will key orders directly into the terminal as they are received, and then send them via their home telephone to Avon's central computer for processing. The terminals have been adapted specifically to suit Avon's requirements in both hardware and software.

The initial order of 1000 terminals was received after six months of stringent testing. If Avon's initial trials with the system work well, it is expected that *all* 440,000 of the company's US reps, and a similar number worldwide, will be outfitted with the terminals. ❑

Commodores for Hire

WEST Australians are the first to be able to rent a computer under a new programme by Visionhire. The company is renting Commodore 64s and Vic-20s for periods from overnight to six months. The scheme will allow people to experience new technology without making a large financial commitment.

Visionhire will provide a full service backup and the option to buy at the end of the rental period. If the scheme is a success, computer rental operations will be launched nationally by the company. Further information from: David Hall, 144 Pacific Highway, North Sydney, 2060; (02) 92 0902. ❑

Time on Magnum's Side

A LAST-minute rescue bid by Time Office Computers has saved the Magnum portable computer from oblivion. With $1 million backing from the NSW Government's Advanced Technology Assistance Scheme, TOC has entered into a scheme of arrangement with Dulmont, makers of the Magnum, and will take over the operation of the company immediately. Dulmont will become a wholly owned subsidiary of TOC.

For some time, the future of Dulmont has looked very shaky, and it appeared likely that foreign interests might take over this Australian company. Prompt action by the NSW Minister for Industry and Decentralisation, Mr Bedford, has enabled TOC to step in and take control.

Marketing manager for TOC, Mr Steve Luckett, said the Magnum, with its fast 16-bit processor, battery operation and support for the latest version of MS-DOS, would fill a gap in the company's product line. The portable is considered to have significant market promise in the US, where it was well-received earlier this year at the National Computer Conference. ❑

Local C Compiler

HI-TECH Software, a Sydney based developer of software tools, has released versions of its Z80 C language compiler for microcomputers using the 8086 microprocessors.

Designed to run under CP/M, CP/M-86 and MS-DOS, Hi-Tech C is said to be fully compatible with Unix V.7 C and incorporates advanced code-generation techniques to produce code which is claimed to be 20 to 50 per cent faster and smaller than that produced by other micro C compilers.

The compiler is aimed at both commercial and industrial software developers and hobbyists, with prices ranging from $125 to $500, depending on the host processor and the level of support required.

Included in the package is a macro assembler, linker, debugger, library manager and comprehensive documentation. Source code is included for the runtime libraries and there is extensive support built into the package for the production of ROM based software.

Hi-Tech Software can be contacted at P.O. Box 118 Eastwood, 2122; Phone: (02 85 4552. ❑

NEWS

Grant for Clearinghouse

AT THE official opening of the Australian Microcomputer Clearinghouse (AMIC) at the Royal Melbourne Institute of Technology, the Victorian Minister for Industry, Commerce and Technology, Ian Cathie, announced a State Government grant of $60,000 for the project. Mr Cathie expressed the hope that the grant would go some way towards developing AMIC as "a major and respected independent advising service".

Since it started operating in April, AMIC has had almost 5000 visitors. The Clearinghouse has 60 microcomputers on permanent display, available to companies and individuals for testing, either on their own or with demonstrator assistance. A consultancy service is provided and workshops are conducted on a wide range of computer topics.

At the launch of the centre, it was also announced that the Institute, through its subsidiary company, Technisearch Limited, had an agreement in principle to become the Australian agent for International Software Database Corporation (ISDC), which markets the .MENU international micro and minicomputer software database, containing 52,000 listings. In conjunction with RMIT, AMIC hopes to expand the range of facilities and services it offers by providing clients throughout Australia access to software information and products available through .MENU's extensive worldwide network.

Further information can be obtained from: Peter Wilkinson, (03) 348 1775. ❑

Home Banking Plan

BANKING will take on a new dimension from early next year with the introduction of home banking in Australia by the Commonwealth Bank.

The service will be modelled around a Videotex style service developed by the Nottingham Building Society and the Bank of Scotland. Users of the service will need a TV, telephone and keyboard. Personal computers (converted as necessary) will be able to access the system to let you pay a wide range of accounts, such as Telecom, council and water rates, electricity and gas. Up-to-date statements and account balances can be obtained, funds can be transferred between accounts, cheque books and statements can be ordered and financial and investment information can be referenced.

Future developments will include home shopping, travel information and bookings. The service will not be limited to homes as businesses, farmers and professional people will find it a particularly useful system.

The cost of the system has not yet been announced but, according to Managing Director of the Commonwealth Bank, Mr Vern Christie, customers will be pleasantly surprised at the relatively small cost at which the new facility will be available. ❑

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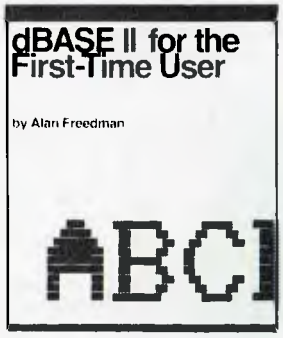
BOOKWARE™

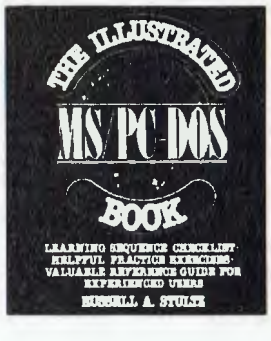
Apple Logo Activities *by Steve DeWitt.* Over 150 activities, 5 big projects, and an in-depth discussion of Logo, encourage learning and discovery with this easy to use language. Reston
0-8359-0088-6 $25.50

Apple ProDOS Data Files: A Basic Tutorial *by David Miller.* By drawing examples from home, business, education, hobbies, and investments, readers learn how to manipulate files, create personal, original, programs. This easy-to-follow tutorial takes the mystery out of creating files and includes important techniques and information for the advanced programmer as well as the beginner. Reston
0-8359-0134-3 $23.95 / Dec



Commodore 64 Subroutine Cookbook *by David Bush.* Enables users to use shortcuts to get these features without top heavy math functions or statistical programs. PHI
0-1315-1325-7 $12.95 / Nov.

dBASE II for the First-Time User: A Visual Guide *by Alan Freedman.* A thorough, clearly written introduction of dBASE II's capabilities, how it works and uses the different commands. Reston
0-8359-1244-2 $31.50



The Illustrated MS PC-DOS Book *by Russell Stultz.* Alphabetically-arranged modules contain detailed descriptions of DOS commands for managing files, maintaining diskettes, and creating and executing programs. Command descriptions are highlighted with same sample applications and screen illustrations that have made other books in the *Illustrated* series so successful. Invaluable as a computer-side reference or as a primer for novices. GPD
0-13-451063-1 $27.50 / Nov

Inside the Macintosh *by Tom Hogan.* Details the fundamentals behind the micro-processor, the operating system with thorough explanation of its services. Includes 30 different routines, the inside workings of diskettes (with programming examples on how to decode the information they contain), an introduction to ROM, and a complete glossary of computer terminology. Brady
0-89303-553-X $25.50

TI 99/4A: User's Guide *by Larry Joel Goldstein & Edward Wiest.* Serves as both an introduction and reference for TI 99/4A users. Presents all the programming and applications for the TI 99/4A and includes a thorough treatment of DOS and BASIC. Brady
0-89303-890-3 $17.50

Teach Yourself BASIC with the Commodore 64: A Beginner's Guide to Writing Programs *by Deborah Miller.* The tutorial style, dozens of illustrations, examples, and exercises make learning BASIC easy. Brady
0-89303-876-8 $18.95

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NEWS

Electric Desk for IBM Family

A NEW integrated application package has been released by Software Corporation of Australia. Electric Desk combines word processing, spreadsheet analysis, database management and communications in an environment which includes a micro-programming language, context-sensitive help screens and the proverbial windows.

The program is designed for the IBM PC and PC/XT using 256K RAM and one disk drive, and the yet-to-be-released PCjr, using ROM cartridges and a floppy disk.

SCA has also released an intelligent modem, Data Express, which will work with Electric Desk's communications module, and with the communications modules of Symphony and Framework. The modem is an Australian-designed product with Telecom approval. For information, contact: SCA, VIC – (03) 347 7011; NSW – (02) 328 7074. ❑

Why Buy a Typewriter?

ELECTRONIC typewriters seem to resemble computers more each day, with various brands offering memories, screens and disk drives. Sanywriter, from Sanyo Office Machines, combines a typewriter with a 16-bit computer for under $3000 – the same price you'd pay for some stand-alone typewriters.

Aimed primarily at businesses and individuals who need an economic word processing system, Sanywriter includes the Sanyo MBC 550 colour computer, a high-resolution amber monitor, dual-function electronic daisywheel typewriter/printer, interface cable, BASIC, Wordstar, Calcstar and the MS-DOS operating system.

The typewriter can be integrated with the system or work as a stand-alone machine. It has righthand justification, automatic underline and centring, relocation and a ten-character index correction buffer. It will print at 15 characters per second, and has a 20-character, two-line liquid crystal display with a 144-character correction memory.

For more information contact: Mark Johnston, Sanyo Office Machines, Level 5, 5-9 Harbourview Crescent, Milsons Point, 2061; (02) 929 4644. ❑

Capturing the Youth Market

A NEW peripheral from Koala Technologies Corporation (makers of the Koala Pad touch tablet), is aimed at capturing the market of three-year-olds and up. The Muppet Learning Keys, Kids' Computer Keyboard, simulates the familiar contents of a child's school desk – ruler, water-colour set, slate, compass, rubber and arithmetic exercise book – to help a child learn basic skills.

Each section of the desk can be activated by a touch of the finger. For example, a parent can help a child learn letters by using the program and pointing out that 'A' stands for the word alligators; touching the letter 'A', the alligator appears on the screen. By pushing a number key, say four, four alligators will appear on the screen. And by depressing different colour keys, the alligator will change colours.

If a child needs assistance, pressing Miss Piggy (who appears on a comic-book page, tied to railroad tracks crying "Help") will provide it; while Gonzo, who appears being shot out of a cannon saying "Oops!", will let the child know if they have made a mistake.

The keyboard itself is a lightweight unit which depicts school desk materials on a mylar surface over a circuit board. It connects to a computer display screen through the paddle port on the Apple or the joystick port on the Commodore 64. It costs $99.95, and is distributed by Imagineering: 579 Harris Street, Ultimo, 2007; (02) 212 1411. ❑

New Sega

JOHN SANDS has introduced a new model of its Sega SC3000 computer, the SC3000H, which it intends to sell alongside the earlier model.

Retailing for $349, the SC3000H comes with 48K RAM, 32K ROM and a hard sculptured keyboard, replacing the touch-sensitive keyboard of the SC3000.

Included in the price is a hands-on computer course (two two-and-a-half-hour sessions) and a tape of six interactive learning programs. Both computers are aimed at the first-time computer owner, and much of the software has an educational base.

More information is available from: Michael McClelland, (03) 645 3333. ❑

Visi Truce

SOFTWARE Arts, creator of VisiCalc, and VisiCorp, the worldwide distributor, have reached an out-of-court settlement on matters relating to the trademark ownership, development, marketing and sale of the VisiCalc Spreadsheet program.

VisiCorp had claimed that Software Arts failed to provide on-going development support for VisiCalc. In a counter-claim, Software Arts accused VisiCorp of not properly exploiting the marketing potential of VisiCalc.

In the settlement, the companies agreed to end all litigation and to terminate their previous marketing agreement. VisiCorp will cease marketing and distributing the VisiCalc program and pay Software Arts $500,000 in disputed payments for past sales. Software Arts becomes the sole owner of the trademark 'VisiCalc' and sole marketer of the VisiCalc products. In addition, VisiCorp will rename Visi On Calc, its independently developed electronic spreadsheet program, to Visi On Plan. ❑

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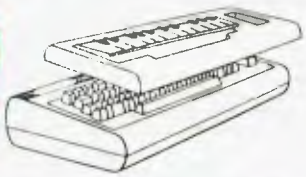

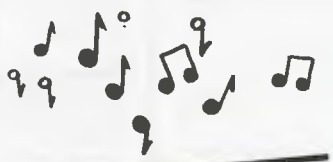

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Lets kids have fun drawing and colouring and at the same time learn programming concepts. It's easy to use. "The first program you should buy for a child" N.Y. Times. **Ages 4 to Adult**
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Commodore 64 ..... D 119.00
Apple ..... D 119.00

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Atari ..... D or T 27.99

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Combination of education and strategy with arcade action to keep the children spellbound while learning basic spelling skills. 10 skill levels. **Ages 6 to 18**
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Apple ..... D 37.99

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New powerpad graphics tablet and Leonardo's Library software transforms your computer into a drawing pad, a multi-coloured canvas, a piano keyboard, a jigsaw puzzle, a gameboard and more. Simply by moving a stylus or finger across the touch tablet you and your children can create beautiful high resolution graphics.

Commodore 64 Atari	159.00
Apple	175.00

***Leonardo's Library** is an exciting collection of software for the Powerpad, spanning interest and learning levels to suit every member of the family.*

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Golf for one or more players. Design your own course then using woods, irons and putters, play the game.

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Sets you free to develop games and programmes and brings your own creativity to the screen.

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Key: D-Disk, C-Cartridge, T-Tape (Cassette)

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NEWS

Texas Instruments' Family Grows

TEXAS Instruments has released its Portable Professional Computer, fully compatible with the TI Professional Computer and available with a built-in 23 cm colour or monochrome display.

The standard model has 128K of RAM and a single 13cm disk drive. Memory is expandable to 768K and there is a ten-megabyte Winchester disk option. TI's Speech Command system and support for the Etherseries local area network, announced at the same time, are both available with the Portable.

A basic system will sell for $3525, while a colour system with ten-megabyte Winchester will cost $7675, excluding sales tax.

The Etherseries includes products for local and wide area networks, allowing TIs, IBM PCs and PC compatibles to be linked. Configurations supported range from a single LAN with three or more TI PCs, through to a national or international Wide Area Network with multiple TI Business Systems or LANs in different locations. Etherlink, Etherseries user software and Ethershare are required to set up a local area network. Ancillary packages available are Ethermail, Etherprint and Ethervoice.

The national sales manager of TI, Mr Ian Hawkins, said that TI had chosen the Ethernet standard because of the wide industry commitment to it, particularly by the other VLSI (very large scale integration) chip manufacturers. Ethernet is now accepted by more than 60 manufacturers around the world, and Mr Hawkins believes TI's support for the standard will help reduce costs and increase the convenience for the end user.

Information can be obtained from Texas Instruments Data Systems Group: NSW – P.O. Box 106, North Ryde, 2112; VIC – 418 St. Kilda Road, South Melbourne, 3004. ❑

dBased Wrecks

IN 1791, HMS Pandora, England-bound with a load of mutineers from the Bounty, sank off the north Queensland coast. The Pandora Project, funded mainly by private industry and community support, will excavate relics from the Pandora, and dBase II will be used to keep records on what should be one of Australia's most intensive archaeological explorations.

Ron Coleman, curator of maritime archeology at the Queensland Museum, says more than 2000 wrecks have been located in Queensland waters, and all information on past and new finds will be stored on dBase II. The software will be useful in helping to interpret data compiled by the Pandora Project, and at the same time will keep track of the divers' personal records to ensure that safety precautions are maintained in hazardous conditions. ❑

Byte into these...

Graphics for the IBM PC
Dan Illowsky and Michael Abrash

This comprehensive book/program disk pack is intended for the nonspecialist in graphics, or computers in general. It is designed for home users who want to learn graphics and business users who desire to produce charts, graphs, and slides with ease.
Some of the many features include a description of IBM graphics and directions for putting those graphics to use, how to design a video game and much more.
Available as a complete package or the book may be purchased separately.

Book 0 672 22303 1 rrp $21.00

Book with Program disk
0 672 26220 7 rrp $42.50

Assembly Cookbook for the Apple II/IIe
Don Lancaster

This cookbook is for those who want to build their machine language programming skills to a more challenging level and to learn to write profitable Apple II or IIe machine language programs.

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Unix System V Primer
Mitchell Waite, Donald Martin and Stephen Prata

This book teaches you the new industry standard UNIX SYSTEM V operating system.
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Try-Before-You-Buy Accounting

ONE OF the problems with many software packages is it is very hard to decide whether it will suit *your* needs before buying the package and giving it a workout in real life conditions.
If it's not a success, you either try to build a system around the package's limitations or find a new package – an expensive process either way.

Personal Computer Services has announced an offer for prospective buyers of microcomputer accounting software, allowing them to try two modules of the Padmede accounting software for less than ten per cent of the retail price.

The modules are the Debtors Ledger and the General Ledger, and the systems supplied in the scheme are full live systems with restricted transaction volumes. Comprehensive instructions are supplied to enable users to thoroughly test the system in their own time. If they then wish to buy the full system, the price of the 'Try-Before-You-Buy' system is deducted from the full purchase price.

The Padmede software runs on all microcomputers with CP/M or MS-DOS. For more information call: Mr. John Perry, (02) 923 2899. ❑

PC and XT Price Falls

IBM has announced another drop in price for the Personal Computer and the XT. These follow a 15 per cent drop in June. The new prices will lower the price of a PC by 5.4 per cent to $4126 and the XT by 4.5 per cent to $8301.

According to Brian Finn, IBM Australia's Managing Director, the new prices " result from the lower duties and taxes attributable to our decision to produce these products in Wangaratta." ❑

80286 for Universe Supercomputer

THE 80286 processor is now available for the Universe Supercomputer, allowing users to directly address over 16 Megabytes of RAM and enhancing performance in multitasking and multiuser applications.

AED, designer and manufacturer of the Universe, intends to support the 80286 with an implementation of Unix, possibly Xenix 286. More information from: Wayne Wilson, (02) 636 7677. ❑

Upgrade to Mainframe

HERE'S A system for those of you who use an IBM mainframe terminal and wish you could also have an IBM PC, or vice versa. The IBM 3270-PC can run up to four simultaneous mainframe sessions, a PC session and two notepads, all using windows to display on a high-resolution colour graphics screen. Wow!

Lloyd Borrett, author of our IBM column, has used one of these wonders and reports it is worth the effort learning all the new keys needed to run the 3270-PC. However, he encountered one problem testing asynchronous communications: it appears IBM is using the same interrupt for one of the 3270 functions as is used by the calendar clock; something to keep in mind if you purchase one.

If you already own an IBM PC, Attachmate has announced an add-on board and associated software to convert your mediocre micro into a 3270-PC. The Attachmate has a coaxial interface card which is inserted in the PC and connects to a 3274 cluster controller, providing the same screen display and file transfer functions as the IBM 3270-PC. ❑

A word on the care and maintenance of your micro computer...

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New Operating Systems for the AT

IBM USA recently announced the choice of Microsoft's Xenix and the MS-DOS family of operating systems for its new PC/AT. At the same time, Microsoft released descriptions of these operating systems, which are due to hit the US market early in 1985. MS-DOS 3.0 is a single-user, single-tasking system with Version 3.1 to follow for networking, and a later Version 4.0 planned for multitasking roles.

The new software will be compatible with previous versions, and will support 96 tracks per inch format diskette drives which provide double the storage space of present systems. The networking version of MS-DOS has been extended to facilitate running programs and data files with new commands such as ASSIGN, JOIN and SUBST, and new modes of OPEN control the use of a single file by multiple users.

Microsoft's Xenix-286 Version 3.0 is a licensed derivative of the Unix operating system developed at Bell Laboratories. The system will support record and file locking, semaphores, shared memory management and the ability to recover from power loss.

Microsoft says it is committed to the compatibility of the Xenix-286 and MS-DOS systems, and there are facilities provided for the transfer of files between the two systems. The systems share common hierarchical file systems, device-independent input/output and similar system calls.

Of course, we here in Australia will have some time to wait before any of these promised products reach our shores. ❑

New Dimension for North Star

AN IBM-compatible multiuser system has been released by North Star. The North Star Dimension, built around an Intel 80186 processor, will support twelve users operating at work stations which incorporate their own Intel 8088-2 processors.

User workstations have 128K RAM standard (expandable to 512K) and one local RS232 port. The central server has a standard 256K memory, one 360K floppy disk drive, up to 60 Mbyte hard-disk storage, two serial and one parallel port and slots for any IBM-compatible boards.

In a five-user configuration, the Dimension costs about 40 per cent less than an equivalent IBM local-area network. More information can be obtained from the distributors: New Dimension Computers, PO Box 1167, Dandenong, 3175; (03) 792 4152. ❑

Commodore Bundles its SX-64

COMMODORE has announced that its SX-64 portable computer will no longer be sold as a separate item. Instead, the standard unit will be the SX-64 Executive Pack, which will include a range of software aimed at getting users started.

Designed to appeal to businesspeople, 'home managers' and community-involved people, the Executive Pack comprises the SX-64, Easyscript word processor, Easymail mailing system, The Manager database program, a diary planner and a series of utility programs. The whole package will sell for $1499. ❑

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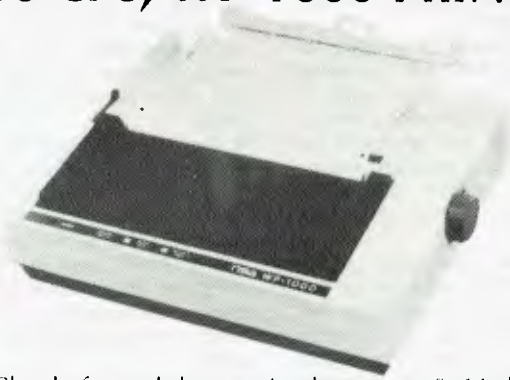

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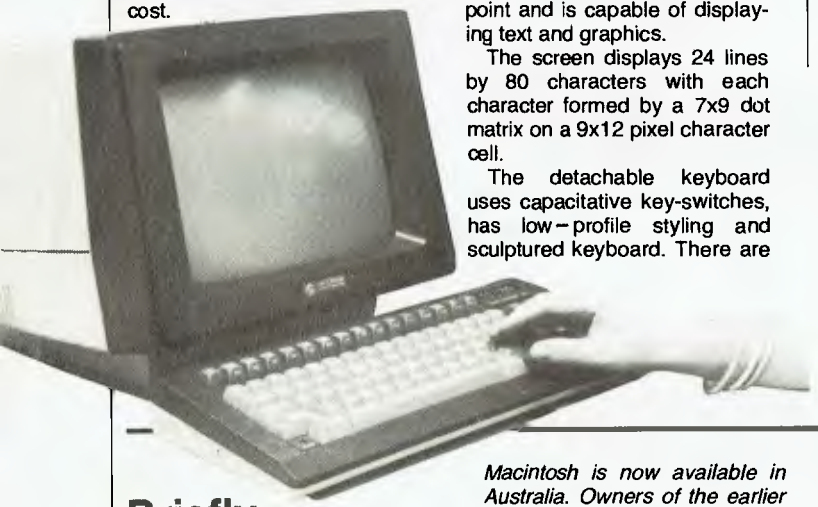
NEWS

Terminals from Paris

AFTER our terminal feature in the October issue of *Your Computer* we still have information about terminals coming in. One of these is the CCT-100 terminal, marketed by Paris Radio Electronics, which describes it as an intelligent terminal at low cost.



The CCT-100 boasts a low-glare 30 cm green phosphor screen, ergonomic keyboard and a range of transmission rates from 75 to 19,200 bits per second. It can emulate the Hazeltine 1500, Lear-Siegler ADM-3A and the ADDS viewpoint and is capable of displaying text and graphics.

The screen displays 24 lines by 80 characters with each character formed by a 7x9 dot matrix on a 9x12 pixel character cell.

The detachable keyboard uses capacitative key-switches, has low-profile styling and sculptured keyboard. There are 16 special function keys and LEDs that display local/on line mode, block transmission mode and when the keyboard has been 'locked' while the user is not in attendance. The Caps lock key also has an LED indicator.

Further information on the CCT-100 is available from Paris Electronics, PO Box 380, Darlinghurst 2010 or phone (02) 344 9111. ❑

New Age Communications?

THE Aquarius Tutor is a microcomputer-based Viatel/ASCII communicating device designed to simplify the linking of computers.

The terminal consists of a keyboard, processor and communicator, plus a wide selection of peripheral devices. Part of the terminal is a magnetic card reader, for reading credit type cards. Modem Technology, which has produced the Aquarius Tutor, has also developed a card, Linkcard, which is encoded with user identification and credit, and which may be inserted into the terminal to make automatic connection with a database.

In conjunction with the Aquarius Tutor, Modem Technology has also announced Tutorlink, an educational database facility which will provide low cost software, courseware and information banks for students and teachers. Access to most existing databases will be available through Tutorlink.

More information can be obtained Modem Technology: P.O. Box 376, Castle Hill, 2154; (02) 634 3544. ❑

Briefly . . .

■ *FOCUS, the powerful fourth generation language, has been released for the IBM PC. Previously only available on large mainframes, PC/FOCUS will be distributed by Computer Power; (03) 520 5333.*

■ *Silver Reed has announced an across-the-board reduction of 20 per cent on its range of printers; its most popular 80-column model will now sell for $787 including sales tax. For information, contact: Denis Bignold, Silver Reed; (02) 452 2022.*

■ *A new Computer Aided Design (CAD) package for the IBM PC and compatibles has been introduced by Vertisoft. Suitable for two-dimensional design applications, Cadplan lets you design plans on screen using a mouse, which is supplied with the software. The price is $3286, and more information can be obtained from Vertisoft: (062) 81 1086.*

■ *Commodore is splurging $2.4 million to promote its 'Family Pack', which consists of a Commodore 64, datacassette, joystick and four programs ranging from an introduction to BASIC to a home finances package. It all costs $499.*

■ *The 512K version of Apple's Macintosh is now available in Australia. Owners of the earlier 128K version can upgrade for $1558, while new buyers will pay about $4800 for a 512K Mac. Apple has also announced a carry-in service plan, 'AppleCare', which will cover all Apple systems locally available. Costs will vary from about $72 a year on an Apple IIe to $156 for a 512K Macintosh. The service will be provided by more than 100 Apple dealers around Australia.*

■ *The locally designed Sendata Acoustic Couplers are to be manufactured under license in France. It is hoped that the contract could involve the manufacture of 10,000 units by French company, HB Informatique. France is the seventh country in which these devices have been sold.*

■ *A complete stock control system has been produced for the Commodore 64 and SX64. Providing a basic stock management system which can be tailored to suit specific needs, the Stock Control System will record and process orders, produce invoices and keep track of back orders, all for $69.95. For more information, contact: Glenys Westwood, Parkinson Marketing Services, P.O. Box 1231, Crows Nest, 2065; (02) 439 2411.*

■ *A Melbourne company is offering a software procurement service for that elusive piece of software. If you can give them the name of the package, and its manufacturer's name, address and phone number, they will track it down and get it for you, usually within a month. For further information contact: Computer-Aided Graphics and Software Importers, 35 Forster Street, West Heidleberg, 3081; (03) 458 1946.*

■ *A fully integrated accounting system specifically designed for the Apple Lisa has been released by IMA Computer company. LAST (short for Lisa Accounting System Technology) has been designed to be flexible and comprehensive, and you can get more information from IMA: 292 Canterbury Road, Surrey Hills, 3127; (03) 836 8835.*

■ *For those interested in learning how to get the most from Knowledgeman, courses are being run during November in Melbourne. The fee is $350, and you can get more information from: Mr Peter Smith, Data Base Management Services, (03) 523 5947. A Knowledgeman User Group has also been formed in the Caulfield area. Information can be obtained from Jan Smith at the above number.*

■ *Software specifically designed for clubs is being used by Marconi Soccer Club, Granville RSL and other Sydney clubs. The Sord Club Software covers membership, payroll, poker machine accounting and reporting, stock control and creditors and general ledger, and can be used by clubs with up to 50,000 members. For further information contact: Ray Thornley, Mitsui Computer Systems, (02) 451 7711.*

■ *If you've always wanted to do a four-way balanced ANOVA with nested factors, or stem and leaf diagrams of studentised regression residuals, then Systat may be the package for you. Described as 'not user friendly – easy to use', Systat runs on mainframes, minis and micros. Contact Peter Smith, Data Base Management Services, (03) 523 5947 for more information.*

■ *US microcomputer manufacturer, Altos, has appointed Computer Enterprises as its first major Australian distributor . . . Atari has cut the price of much of its software, with some products reduced to a third of their former cost . . . Estimates put the number of personal computers in Australian homes at 200,000 at the end of 1983, with a further 136,000 commercial computers installed . . . IDC Research predicts that four companies will exceed $100 million in sales of computers of all types in 1984 – IBM, DEC, Wang and ICL.* ❑

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SYSTEM OBJECTIVES
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4. To produce a complete sales tax analysis.
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SYSTEM OBJECTIVES
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Are you tired of a micro market congested with PC clones and 8088/MS-DOS machines? Well, stand back and watch – the supermicros are coming, and they're coming fast. With up to 10 times the performance of the IBM PC, they are promising to shake the market's IBM-induced lethargy off for good. Articles by Les Bell, research by Maria Lengas and Andrew Nicholson.

LIFE IN THE *FAST* LANE!

THE COMPUTER world is currently being hit by a wave of high-performance supermicros that make the sixteen-bit machines many of us are using now look like pedal cycles in a sports car race.

The new machines, which run up to 10 times faster than the 8088-based IBM PC, mark yet another giant step in the 'more bang for the buck' march of microprocessor technology.

At *Your Computer*, we've just installed a micro which, in raw processor-speed benchmarks, matches DEC's supermini, the VAX 11/780.

And the same chip used in our latest Compupro, the Intel 80286, is at the heart of big blue's latest personal computer release, the IBM-PC AT (for Advanced Technology).

The 80286, which is actually four processors on a single chip, is the star of the latest round of supermicro releases, turning up in the Compupro, in Hartley Computer's new award-winning Unix machine, in the IBM, and in local manufacturer AED's latest announcement.

It, and the National Semiconductor 32016, are expected to take the lion's share of the supermicro market, which so far has been dominated by Motorola's 68000. The Motorola chip has been relatively widely used but, apart from the Apple Macintosh, it has appeared mainly in up-market machines.

The new high-performance chips can be expected to have a dramatic effect on the micro market.

On one hand they offer multi-user power previously available only with high-cost minicomputers and mainframes, while on the other they open the way for the high-powered 'user-friendly' software much of the non-computing world has been waiting for.

Single-User Super-Power

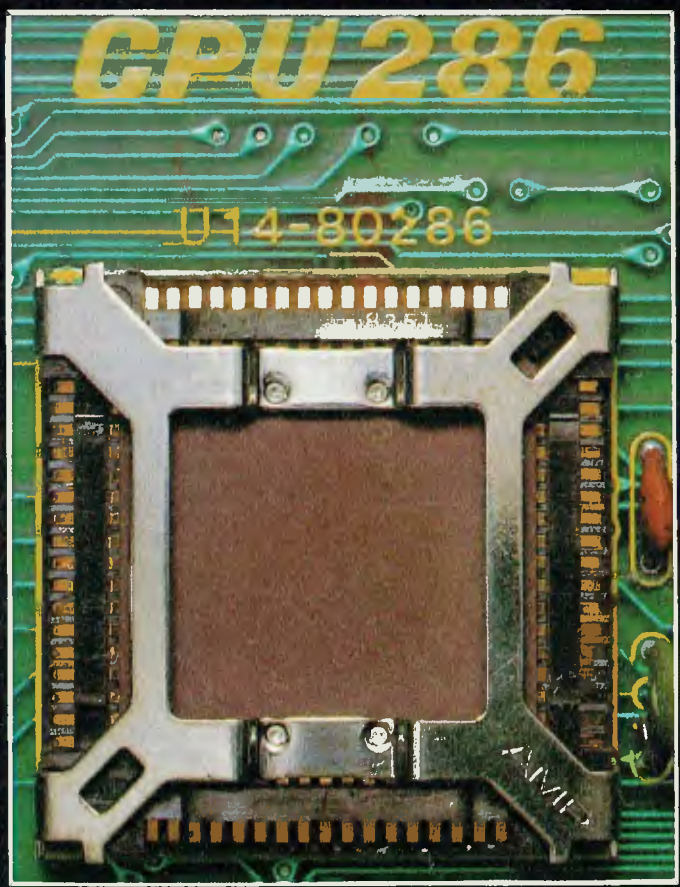
Apple's Lisa, though hardly recognised as a supermicro, is an excellent example of the potential in this area – built for user comfort, not for speed, around 95 per cent of its 'horsepower' is devoted to its user interface. It's a little like using most of your car engine to power the air-conditioning and stereo, because it has so much punch it can get you where you're going with what's left over . . .

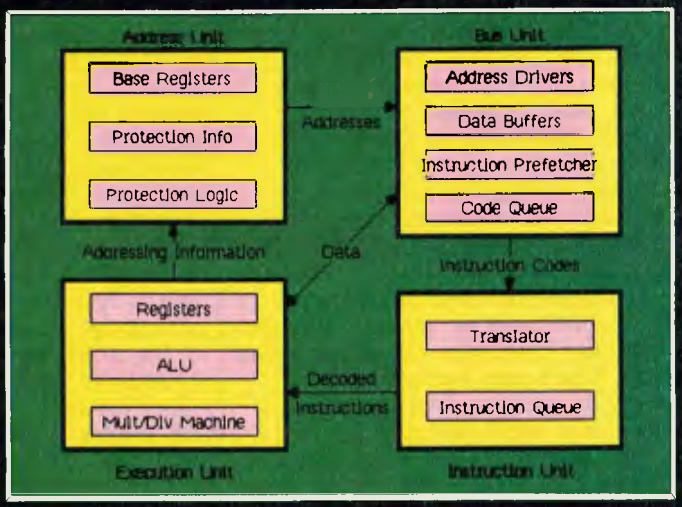
As the new superchips find their way into more single-user PCs, we'll start to see the machines the non-enthusiast mass-market wants: the 'push one button (or, make a simple English request) and get all your work done' device that non-users seem to expect of anything with the label 'computer'.

So far, most of the supermicro push has been in providing big-machine performance at little-machine prices, either for multi-user operation or for processor- and memory-intensive advanced scientific/engineering applications.

That's starting to change as companies like IBM release super-chip PCs, although even those are destined to see service as multi-tasking and multi-user machines, or as high-throughput network servers and the like. ▶

Micro graphics: One of the advantages of supermicros like the Cromemco X-series is the ability to handle digitised imaging.





Above: The 80286 is actually four processors in one chip.

Just about every word you read in this issue passed through the chip at left — at high speed! It's the 80286, Intel's latest superchip, in our new Compupro System 816F.

Here's our machine-by-machine rundown on the current state of the supermicro market:

Cromemco X Series

In early October Cromemco released its latest machines which take it well out of the shadow of the S-100 'hobbyist' image and into the full light of being a true supermicro manufacturer.

The X Series is based upon the Motorola 68000 series – current machines are being shipped with 68000 chips but an upgrade to the 68010 is a simple matter of replacing the chip. Two models are available: the CS-100, which has an 8-slot motherboard with a maximum of 4 Mbytes of memory and the CS-300, which has twenty slots allowing more expansion.

Memory can range from 512 Kbytes to 16 Mbytes, and the Cromemco is the first machine I've seen which can actually get 16 Mbytes of memory into the cardcage, since it only requires eight of their 2048MSU cards, at 2 Mbytes (of error-correcting memory) each, to take it to the limit. Bear in mind that only three years ago the maximum memory any IBM mainframe could have was 16 Mbytes!

Associated with the Cromemco XPU processor card is the XMM memory management board. This provides demand-paging memory management – with 4K pages – and the ability to 'scatter load' a program into multiple non-contiguous pages without first running garbage collection to reclaim the space into a contiguous area. This board also provides the ability to switch context between tasks in a single instruction time.

The disk controller for the X Series has its own Z-80 microprocessor to add intelligence. It boasts a four-track cache memory, and the on-board CPU is capable of automatically verifying data after it has been written to disk. Similarly, the eight-channel serial board has its own processor for enhanced performance.

A 50 Mbyte hard disk is standard with both systems, and the controller can handle two drives. Further expansion is possible through the SMD controller interface, which can handle up to 1200 Mbytes of disk storage.

The software supplied with the X Series machines consists of two co-resident (on disk) operating systems: CROMIX (Cromemco's proprietary UNIX clone) and UNIX System V (the one true), ported by UniSoft. Since Cromemco has the full source code for CROMIX, it will continue to support it for applications where UNIX is not suitable, such as real-time process control.

The UniPlus+ UNIX System V is supplied with a range of Berkeley enhancements including *cshell, termcap, uucp* and *vi*, the popular full-screen editor.

A number of options are available for the X Series, including a bit-slice co-processor which has down-loadable microcode, allowing optimisation of its instruction set for any application from Fast Fourier Transforms to array manipulation, and which has a throughput of 12 MIPS (Million Instructions Per Second).

Also available for these machines is the SDI II, a high resolution colour graphics display which is capable of resolution as high as a TV display. Other matching interfaces include a camera input and a variety of other cards.

Compupro System 8/16F

The Compupro System 8/16F is an S-100 (IEEE-696) machine based on the Intel 80286 processor. Compupro already enjoys an excellent reputation for its dual-processor multi-user systems, five of which are in use at Federal Publishing (publisher of *Your Computer*), where they perform tasks from accounting to producing this magazine, not to mention at Les Bell and Associates, where (of course) only the best will do for software development. Matt Whelan even has one at home, complete with 40 Mbyte Winchester – some home computer!

The 8/16F comes with 512 Kbytes of RAM as standard, though most users will want to extend this, and 1.5 Mbytes of solid-state disk emulator (MDrive/H). This provides cache buffering for the 40 Mbyte hard disk drive and significantly enhances its performance.

The operating system supplied with the system is Multi-user Concurrent DOS, which is Concurrent CP/M with MS-DOS support. The beauty of this system is that it gives immediate access to 'the vast library' (to coin a phrase) of CP/M-86 and MS-DOS software. The systems can be networked with other Compupro systems and IBM PCs using ARCNet hardware, and the operating system provides superb security features, coupled with excellent system maintenance and administration utilities.

The 8/16F is supplied with ports for up to 10 users as standard, with three printers. The system takes advantage of high performance peripherals to support the CPU – for example, the DISK 3 hard disk controller and the DISK 1A floppy controller both use Direct Memory Access to transfer data directly into memory. The DISK 3 also has its own on-board processor, and the DISK 1A is able to handle both 20 cm and 13 cm drives simultaneously.

Hartley's World First

Brisbane-based Hartley computer has pulled off a world first with the announcement of its 3923U, an 80286-based system with UNIX System V. Not only does the 3923 use an 80286 as the main processor, it also uses an 80186 for the disk and tape controller.

The 3923 is designed to support up to six users, with between 16 and 48 Mbytes of disk storage, and is designed as a 'tower' package with a (and I quote the publicity material here) 'winged keel' to provide stability!

Also built into the unit is a 720 Kbyte floppy disk drive and a streaming tape backup unit which can handle up to 45 Mbytes of data per tape cartridge. The backup module, which is normally at the top of the tower package, can be removed and placed on the desk beside the operator's terminal if required.

The machine will be available in the first quarter of next year.

Morrow Tricep

Morrow Designs, manufacturer of the popular Micro Decision range of personal computers, has shown a new UNIX-based micro at the recent NCC.

The Tricep is an S-100 bus based machine which makes use of innovative software rather than new hardware to provide improved performance. The machine is based on a 68000 processor (in fact Morrow is using Compupro's CPU 68K board) coupled with a Dual Systems DMA I/O board and Morrow hardware for the rest of the system.

The system is supplied with the UniPlus port of UNIX System V, and supports four users. Most interesting is the use of co-processors to expand performance and applications. Three co-processors are under development: an 80188, 128K/512K board which

will run MS-DOS and CP/M (possibly Concurrent CP/M) applications, a Z-80A board to run CP/M applications, and a 68008 board which will support UNIX applications. In each case, the slave processor operating system runs as a child process under UNIX.

Pricing for Australia is not yet determined, but should be aggressive. According to Morrow Designs, engineers from 'AT&T, Plexus and Convergent Technology were crawling all over the machine by mid-day of the first day of NCC'!

IBM's Advanced Technology

The new IBM Personal Computer AT uses the Intel 80286, and can be used as a stand-alone system or as a multi-user system. It offers up to 3 Mbytes of user memory and 41.2 Mbytes of on-line storage. It has a high-capacity diskette drive and expanded fixed-disk drive options.

The system is compatible with most existing IBM Personal Computer hardware and software, and can be used as a powerful single-user system or shared by up to three users. Because of its performance and storage capabilities, the new system is ideal for use with the new PC network that enables users to easily link IBM PC's to share programs, information and peripheral devices.

The AT comes in two models: Model one which includes 256 Kbytes of user memory and a new 1.2 Mbyte high-capacity diskette drive; and Model two which includes 512 Kbytes of user memory, the 1.2 Mbyte diskette drive, and a new 20 Mbyte fixed-disk drive.

Both models have an 84-key keyboard and eight expansion slots for additional features, devices and memory. Both can be expanded to more than 3 Mbytes of user memory and up to 41.2 Mbytes of disk storage.

I don't have this officially but I have heard – from someone who has taken the lid off an AT – that it also has the chip set (two 68000s and an 8087) from the XT/370 – see below. If this is true, it makes the AT an even more startling machine than was first thought.

Remember – you heard it here first. IBM's PC-DOS version 3.0 is now available with the new PC-AT and is compatible with all IBM PCs. The IBM PC Xenix operating system is also available for the IBM PC-AT and it enables two additional terminals to share the computer's processing power. In either a multi-user or single-user environment, IBM PC Xenix allows more than one task to be handled at a time.

Apple's Lisa — a supermicro which devotes nearly all its power ot its user interface rather than to speed.

The IBM Topview program is designed for individuals who want to operate several different programs concurrently, switch quickly from one task to another while using an IBM Personal Computer, or view data from several applications using "windows" on a single display screen.

Topview is compatible with many existing IBM personal computer programs, including the Assistant Series, Displaywrite 1 and 2, Personal Manager, Multiplan, VisiCalc, Personal Editor, Script/PC and several programming languages such as Basic, Cobol, Macro Assembler, Pascal and Fortran.

Topview's programmers' Toolkit includes information on accessing Topview's functions from application programs, supporting the use of 'mouse' pointing devices, and creating and using 'windows'. Topview can be used with either a keyboard or a customer-supplied 'mouse'.

It can be used with the new IBM PC-AT, IBM-PC and XT or IBM Portable PC all with the standard 256 Kbytes of user memory, two double-sided diskette drives or one double-sided drive and a fixed-disk, an 80-column colour or monochrome display, and IBM Disk Operating System versions 2.0, 2.1 or 3.0.

Topview and the Topview Programmer's Toolkit are scheduled to be available in the first quarter of 1985.

IBM PC XT/370

Perhaps even more interesting is the PC XT/370, which offers programmers, engineers, scientists and business professionals the ability to run, unchanged, most Virtual Machine/Conversational Monitor System (VM/CMS) application programs at their desks.

The XT/370 operates under a new control program – Virtual Machine/Personal Computer (VM/PC) – providing CMS functions with VM/System Product (VM/SP) compatibility.

The IBM Personal Computer XT/370 is actually three workstations in one. It can be used in a standard PC XT mode. In addition, it can be used as a System/370 VM/CMS workstation or as an IBM 3277 display terminal connected to a host computer. With usually no more than two keystrokes, users can switch between two preselected modes of operation.

Through the use of virtual storage in the VM/PC mode, the XT/370 may be operated as a single System/370 VM/CMS workstation with up to 4 Mbytes of virtual memory. Users can transfer programs and information to ▶

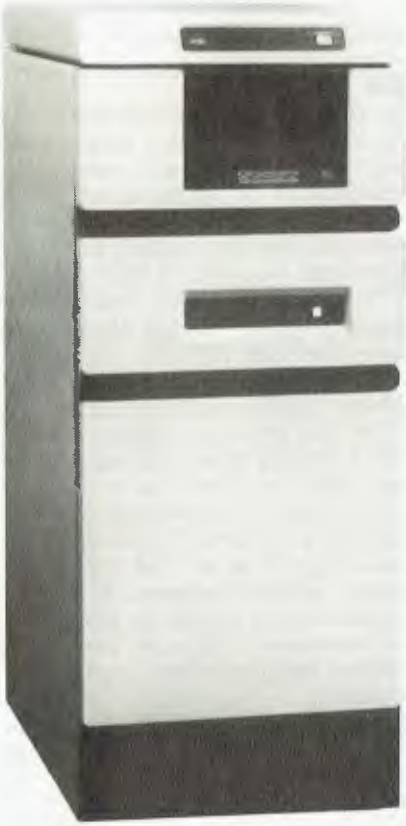
their PCs, where they can create and edit files, compile and execute programs and generate reports – and send information back to the host computer.

The PC XT/370 can run most application programs unchanged. It can serve as a distributed system for people who need the extensive software library of the 370 series at their desk and the consistent response time that a powerful single-user machine provides.

The XT/370 consists of an XT with 256 Kbytes of memory, display unit, 360 Kbyte floppy, either 10 or 20 Mbyte hard disk and new circuitry that provides 370 compatibility.

The XT/370 contains microprocessor chips developed jointly with Motorola and Intel, and three circuit cards that give the model its boost in processing power and function.

The first is a processor card with three microprocessors which gives the XT/370 the ability to work with a host System/370 and execute host compatible programs. Two of the microprocessors, one a standard Motorola 68000 and the other a custom IBM chip based on the 68000, execute the most commonly used System/370 fixed point data and control instructions. The third microprocessor, a custom IBM chip based on the Intel 8087, executes System/370 floating point instructions.



The Plexus P/60, a UNIX-based supermicro supports up to 40 users.

The second card provides an additional 512 Kbytes of memory. This provides the 4 Mbytes of VM/PC virtual memory, and expands the XT in standard mode to 640 Kbytes.

The third provides the XT/370 with a coaxial attachment which enables the processor to act as a 3277 Model 2 terminal when attached to a host computer via a 3274 display control unit.

The purchase price of a system with 10 Mbyte hard disk is $US8995 and with 20 Mbytes, $US11690.

The XT/370 will find its initial acceptance in organisations which already have System 370 and 303X computers. It can be used, for example, to relieve the main machine of program development overhead by providing the EDP department programmers with their own workstations. Its acceptance by smaller organisations will largely depend on the availability and pricing of applications and development software, and IBM has already made moves in this direction.

Already, a number of suppliers of products such as Fourth Generation Languages (4GLs) have announced 'micro' versions, which actually run on the XT/370.

WICAT's 68000 Giants

WICAT produces a range of machines, from the 150 through the 155, 160, 200 and 220. All are based on the Motorola 68000 processor with varying amounts of memory and mass storage.

The model 150 is a desk-top machine with integrated screen and keyboard, and can support from one to six users. Memory starts at 256 Kbytes of RAM and can be expanded up to 1.5 Mbytes, while disk storage is 10 or 15 Mbytes, expandable to 60 Mbytes.

The 155 is a tower package which supports up to 4.5 Mbytes of memory, with up to 12 users and 90 Mbytes of on-line, while the 160 extends the mass storage to 1800 Mbytes.

The 200 supports up to 32 terminals, 5 Mbytes of memory, 3800 Mbytes of on-line disk, and the top-of-the-line extends this to 12 Mbytes of RAM and 64 users.

WICAT is best known for its educational software, WISE, but it is also carving out a niche in the commercial arena. Three operating systems are supported: WICAT's own Multi-Control System (MCS), UNIX and PICK, a well-known database-oriented operating system also used by Microdata, Prime and others.

CT Miniframe

The Convergent Technology MiniFrame is a small tower package based on a 10 MHz 68010 processor and running Convergent's version of UNIX System V – CTIX. A minimum system is supplied with 512 Kbytes of RAM and a 10 Mbyte hard disk.

While the version of UNIX supplied is System V, it has been extended with some Berkeley enhancements, including c-shell and virtual memory. A 640 Kbyte floppy disk is standard, while other backup options include a 5 Mbyte removable disk and 55 Mbyte tape cartridge.

While terminals can be attached through the RS-232C ports, CT's terminals utilise an RS-422 multi-drop cable, and the increased baud rate gives screen-oriented programs like vi an impression of fantastic speed. The CT terminals also support an option called Window Manager, which allows the user to run four applications in windows with copy and paste integration.

CT Megaframe

Convergent Technology's MegaFrame is a multi-processor-based supermicro which is claimed to be able to support up to 128 users with a maximum throughput of 8 MIPS.

The system has at least one application processor and one file processor. The file processor always runs CT's own operating system, CTOS, but the application processors can run CTOS or UNIX, or even MS-DOS or CP/M as a sub-task. Other processors handle external cluster controllers and back-end database tasks.

Each cabinet can house from one to three 50 Mbyte SMD drives, and cabinets can be matched up to each other to extend the system bus across up to six cabinets.

Apple LISA

The Lisa is not normally thought of – at least, outside Apple – as a supermicro, but that is just what it is. With a minimum of 512 Kbytes of RAM, 5 and 10 Mbyte drives available from Apple and larger drives from third parties, and at least two versions of UNIX available off the shelf, the Lisa fits nicely into the supermicro bracket.

Its low processor speed (5 MHz) means it is not up there with the top performance machines, but it can nonetheless support three users with no further expansion, can run a CP/M emulator called Mimix (with optional Z-80B processor card if required) and has a wide range of UNIX software.

The two versions of UNIX are UniPlus+, from UniSoft, and Xenix, from the Santa Cruz Operation second source of Microsoft's UNIX port. While Xenix is currently at System III level with 4.1 and 4.2 bsd enhancements, the UniPlus+ system is a System V version which has already been ported onto over 100 different 68000-based machines.

The Lisa also has a very nice high-resolution graphics screen, plus its own user-friendly software. Add all that up, and you'll see it's a very powerful little package.

The 68000 Dominates

At present, it certainly seems that the dominant processor in the marketplace is the 68000, with the 80286 – which admittedly is *very* new – dragging along behind. What is surprising is the absence of any 32016-based machines, since that chip has been around longer than the 80286. Perhaps designers have decided to bypass that processor in favour of the 80286 which has the benefit of software compatibility with the earlier 8086/8088.

On the other hand, local manufacturer Labtam is known to be working on a 32016 machine, and if it is anything like as good as its earlier machines, it will be hot.

UNIX also dominates the operating system scene for supermicros, with only multi-user Concurrent CP/M and some proprietary operating systems to offer opposition. There can be little doubt that UNIX will dominate totally ere long.

It is also interesting to note that the time delay between introduction of a new processor chip and the introduction of machines using it is getting longer. This is because of a number of factors, including the difficulty of installing more complex operating systems, the wait for sufficient applications software to make a machine viable, the higher level of tooling and manufacturing setup required for production and the increased testing that must be done before release.

All of this seems to indicate a slowing down of new system introductions in the supercomputer market, though I can't quite believe it myself. ❑

Inside the Supermicros

NEW PROCESSORS from Intel, Motorola and National Semiconductor have provided the impetus for a whole new generation of microcomputers – machines significantly more powerful than the current generation of 8088-based PCs.

The last year or so has seen the introduction of a whole family of supermicros, from manufacturers such as Convergent Technologies, WICAT, Compupro, Cromemco, Altos, Apple, IBM and others. Such machines bear little resemblance to the first and second generation single-user microcomputers which have dominated the market until now. Instead, they are rather more like the minicomputers which they are in many cases replacing.

Supermicros are identified by a number of characteristics:

- Large memory space
- Advanced high-speed 16 or 32 bit processor
- Memory management and protection hardware
- Slave processors to perform tasks such as I/O and graphics
- Multi-user design with external terminals and multi-tasking operating system
- Large mass storage devices, often based on SMD interface
- Simplified user interface
- Minicomputer-style 'box' construction

The large memory space is of importance for two reasons: first, to support multiple users running multiple programs at one time under a larger operating system and, second, to handle larger arrays and data sets.

The use of a high-performance processor is also virtually mandatory. Here we are talking about processors like the 68010, 80286, 32016 (formerly known as the 16032) and WE32000, which have an instruction set and register set optimised for use with high level languages (although it is instructive to note that the various manufacturers have very different ideas on how this optimisation may be achieved).

Such processors usually have 32-bit internal data paths, hardware multiply and divide instructions, additional addressing modes for array and structure manipulation, and advanced memory management features such as virtual memory and address translation.

This is often achieved through the use of external chips, such as the Motorola 68451, or an address translation unit on the chip itself, like the 80286, or through specially designed discrete logic circuits, like the Cromemco XMM.

The use of a high-performance processor mandates that its time must not be wasted on low-level tasks like stuffing characters to a serial port, and for this reason, many supermicros use auxiliary processors to perform tasks like serial I/O, disk management and cache buffering LRU algorithms.

Lower Cost, Higher Power

While some supermicros, like Apple's Lisa, are dedicated to a single user and have only a single screen and keyboard, most are designed to support four or more users (under UNIX, the Lisa supports three users with no hardware expansion).

This allows many users to share software and data files, and often provides a much lower cost per terminal than using separate personal computers in a network. For example, the systems we use at 'Your Computer' have a cost per terminal of around $4000, including hard disks, printers and software, compared to around $8000 for PC-based solutions.

By sharing hard disks on a multi-user system, the cost of each user's storage is remarkably reduced. Another factor is that only one copy of most software needs to occupy disk space on the system, as opposed to multiple copies with PCs.

And for applications that require lots of mass storage – for example storage of digitised speech or video – systems that use the SMD (Storage Module Device) interface can handle several thousand megabytes of files.

Other machines, like the Apple Lisa, use their processor power to improve the user interface. The Lisa, for example, spends 95 per cent of its execution time in the user interface code, and not in the actual problem-solving part of the code. The result may be slower than an equivalent system with less user interface code, but more people can use it to solve more problems – an overall productivity improvement.

Finally, most supermicros are based upon a large cardcage with a bus into which cards are inserted. This allows ease of maintenance by replacement of boards, but more importantly allows easy expansion by the insertion of additional memory and I/O cards. Several buses are in use, ranging from S-100 (IEEE 696), through Multibus and Multibus II to VME bus.

Scientific and Technical Applications

The major application area for supermicros has traditionally been with scientific and technical users such as CSIRO and Government departments, universities and private research establishments. There are a couple of reasons for this.

First, the kind of problems these users have – data reduction and analysis, large database manipulation and presentation on high-resolution colour graphics displays – obviously require mini- or supermicro-computers to solve them (five years ago they would have required mainframes).

But, equally significantly, supermicros until recently have meant abandoning the safety of the well-supplied personal computer market and entering a jungle where users had to write their own software, deal with user-hostile operating systems, perform complex system administration and backup tasks and generally rely upon their own expertise and resources to solve problems. In short, supermicros were the preserve of the technical gurus.

On top of that, supermicros cost a lot more than PCs, and many potential users have been rather wary of assuming the downside risk involved in a mistaken purchase of the wrong equipment.

However, today, supermicros are approaching PCs in ease of use, supply of packaged software and simplicity of operation, and they offer their own advantages for many applications. For these reasons, the market is opening up and many of these machines are finding their way into new applications areas.

In the commercial world, for example, supermicros are an ideal solution where several users have to share files – telephone order entry against an inventory database would be a typical application. Here, a single database can be maintained and multiple users can share it, with the operating system providing record locking to prevent two clerks inadvertently selling the last item of stock at the same time.

Similarly, many office automation applications require users to share files such as mailing lists, prospect lists, on-line price lists, standard letters, and others.

They also need to communicate via electronic mail, share accounting information, have access to on-line correspondence files and so on. While local area networks can go some way to allowing such file sharing and communications, supermicro multi-user operating systems can do the same tasks more quickly (there's no network transmission rate bottleneck), with better database integrity (there are no separate copies of files with subtle differences) and with less mass storage (only a single copy of each file is maintained).

In addition, supermicros make backup easier through the use of backup utilities and cartridge tape drives, not to mention that all data is in the same place – near the CPU. This also lends itself to better physical security.

Another major application area for supermicros is CAD/CAM (Computer Aided Design / Computer Aided Manufacture). Today most car manufacturers, for example, perform initial sketches by hand and then make a clay model of the car. Once this has been done, its outline is digitised and fed into the computer, which is used to produce clean, accurate manufacturing drawings.

The graphics display is able to show any body section from any angle, and to adjust the design in any desired way, and the resulting drawings are produced on a flatbed or drum plotter. However, unlike the old days, where parts were manufactured by copying dimensions from the drawings, we can now almost dispense with the drawings altogether. The computer can directly produce the tapes required to drive NC (Numerically Controlled) machine tools directly to cut, stamp and bend the metal to the required shapes.

All of this requires considerable number-crunching capability. To rotate a solid shape requires the recalculation of thousands of points in real time, not to mention the execution of hidden line algorithms to decide which lines are visible and which are not. Conventional PCs are not yet up to this kind of task.

Another area where supermicros are popping up is as high performance database file servers on local area networks. The availability of high performance processors to perform preliminary processing, such as abstraction or preparation of summary databases, makes them ideal for this kind of task.

MICROPROCESSOR COMPARISON CHART

Processor	Performance (Eratosthenes Sieve, seconds)	Test Unit's Clock Speed (MHz)	Data Path External	Data Path Internal	Address Space (Mbytes)	No. of Internal Registers
VAX 11/780	1.42	N/A	32	32	2	N/A
80286	1.89	6	16	16	16	14 x 16bits
8086	2.8	8	16	16	1	14 x 16bits
8088	3.1	8	8	8	1	14 x 16bits
Z8000	3.2	5.5	16	16	16	16
68000	4.7	8	32	32	16	20 x 32bits
6809	11.0	2	8	16	64K	N/A
Z80	15.2	2	8	8	64K	22
8088 (IBM PC)	22.1	4.7	8	8	1	14 x 16bits
32016	N/A	N/A	16	32	16	18 x 32bit 6 x 24bit

Note: The performance figures shown are a guide only. All the test figures were obtained using the C language, but different C compilers can produce widely varying results on the same processor. Several of the test figures were obtained from *Byte*, January 1983 issue.

In October, Cromemco released its latest X series of supermicros. Two models are available, the CS-100 and the CS-300. A number of options are available for the X series (see text) which include the SDI II high resolution colour graphics display (illustrated at left).

Selection Factors

A number of factors should be taken into consideration when selecting a supermicro:

- Processor Performance
- Disk Performance
- Terminal Support
- Operating System Enhancements
- Applications Support
- Software Availability

Processor performance directly affects the overall throughput of the machine. The faster and more powerful the processor, the faster it will get the work done, and the more users or more complex the tasks it can support.

However, processor speed is not the be-all and end-all of supermicro performance. A fast processor can be rendered useless by a slow disk drive or poor operating system implementation. Disk performance should therefore be taken into consideration, particularly on UNIX systems, which make extensive use of disk I/O for paging or virtual memory management. Look for high performance DMA disk controllers, particularly those which offer track buffering or LRU (least recently used) cache buffering.

For office automation applications which pose only a moderate strain on the CPU, the question becomes – how many terminals will the machine support while still providing reasonable response times? And how well does it support them? Some systems only support the most primitive features of smart terminals, while others can make use of page memory, windowing capabilities and other features of recent terminals.

Some supermicros offer useful operating system enhancements. For example, UNIX does not support record and file locking as standard, but commercial applications demand it and all UNIX ports implement it somehow. Some implementations of UNIX – the Berkeley 4.1 and 4.2 bsd are good examples – provide virtual memory support, while others utilise demand paging or simple memory management schemes.

Other operating system enhancements include: file encryption for sensitive data; password protection for files, disks, network nodes or the system as a whole; user time accounting; electronic mail; calendar and meeting scheduler systems; communications utilities such as uucp; and other goodies which may or may not come with a particular UNIX or other OS implementation.

Some supermicros are strongly oriented to particular applications areas. For example, the Sun workstation is obviously designed for CAD/CAM tasks, while the Compupro 8/16F is best suited to office automation tasks based on existing CP/M and MS-DOS software. The problem

obviously dictates the best machine for the solution.

Finally, software availability is of supreme importance; if you can't get software to solve your problem, no matter how fast the computer it will never arrive at the answer. Some machines address this problem by providing the ability to run 'previous generation' CP/M and MS-DOS software under UNIX, as well as newer UNIX programs themselves. Others use CP/M-derived operating systems to provide access to WordStar, dBASE II and the other well-established favourites. ❑

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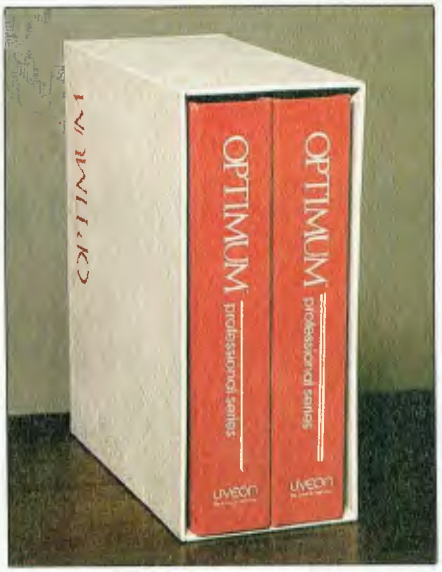

The Great Database Search continues . . . though not quickly enough for our liking (we're sick of the sight of database packaged piling up on the desks around here). Perhaps we should use one of these packages to list/categorise all the others we have in the queue – like Condor, Superfile, T/Maker, R:Base, Omnis, Sensible Solution, dBASE III, MDBS III, and half a dozen more we have been promised but have put on hold until we can find time for them. Oh, well, we started it. This month Rose Vines examines Optimum, while in our Programmer's Workbench Les Bell has a preliminary report on dBASE III.

OPTIMUM IS NOT a database system. It is advertised as a 'database management system development tool', and you'd better believe it. I originally approached it thinking I'd be dealing with something at least remotely resembling dBase II, and ended up frustrated and disappointed. It wasn't until I realised I was working with something in a different category altogether that I was able to make sense of the system as a whole.

My initial confusion was reinforced by the documentation which comes with Optimum; it consists of an 'Executive User's Guide' and a 'Programmer's Guide', implying the system is accessible to both novices and advanced users. This is not the case – while the 'Executive's Guide' is quite simple to follow, there is no direct progression from it to the advanced sections of the system, and so the real power of Optimum is available only to those with a fairly hefty programming background. In fact, the executive portion of the system was a late addition, designed to compete with other 'instant' database products such as FRIDAY!. When this marketing strategy failed, Uveon – the designers of Optimum – returned to the original concept of one complete system for software developers.

Optimum was originally developed as a series of utilities, providing solutions to specific applications problems in the hospitality industry. The designers then decided to combine these utilities into a systems development tool. Optimum's structure reflects this background: there are seven major components within the system – the DEFINE File Utility, Terminal Control Language, the Micro-English Inquiry/Reporting Language, SELECT-ED Sentence/Report Editor, the Form Processing System, the Item Editor and File Utilities. The first four components are discussed in the 'Executive User's Guide', providing an introduction to the automated and simple file and report generating facilities of Optimum. The other components offer advanced processing and development features, which allow the user to build up complex custom-designed applications systems. Despite Uveon's abandonment of the unsophisticated user, the 'Executive' section still provides a starting point for using the system as a whole, as it enables you to create an initial structure, which may then be expanded and modified according to your needs, using the advanced processing sub-systems.

First Steps

Getting Optimum up and running is a simple process using the installation program provided. If you have a multi-user set-up, Optimum has to be installed for each terminal, allowing you to define individual function key values and printer defaults for each console. To be able to enter the system, you need a valid user-ID and password. The system comes with two pre-defined user identities – DEMO and SYSMNT – which are not password protected. DEMO is used in the executive tutorial section, while SYSMNT is the system manager's ID and allows that person to set up new user IDs, modify passwords, restrict user access to specific database files, and specify a program to be run automatically as soon as a user logs on. This is an extremely useful facility, and obviously the first task is to set up a password for the SYSMNT ID itself.

Once you've entered the system, Optimum displays a directory of forms and reports valid for the current user ID, and a list of functions allowing you to DEFINE or RUN a file or report, or to enter the Terminal Control Language system. DEFINE is similar to dBase II's 'CREATE' or Knowledgeman's 'DEFINE', but with a few twists. After prompting for the name of the file to define (or modify), you are prompted through the naming and description of the database fields. Optimum doesn't call them fields – they're 'attributes' – and we have 'items' instead of records. (In fact, Optimum seems to use a different word for every cherished piece of jargon I possess!) The first attribute is called the item-ID, and is used as the primary key for data retrieval. Optimum uses the Keyed Direct Access Method, which requires the item-ID to have a unique value. It also means that records are *variable length*, something none too common in microcomputer database systems. One of the hassles with systems like dBase, with fixed length records, is the enormous waste of disk space: you have to allow for the maximum number of characters likely to be entered in a field, and then this amount of space is reserved in each record whether it is needed or not. In Optimum, the length of an attribute indicates its *maximum* possible size only – actual disk space is allocated according to the size of the information stored within the attribute.

When defining the item-ID and other attributes, Optimum allows you to determine input options and output formats, specify cross-referencing, and set a video attribute for the field when it is displayed. Input options provide checks on the type of data entered by the operator, and Optimum provides a useful assortment, including

Not quite OPTIMUM

pattern matching, range checking, interfile validation, default values for fields and internal date conversion. Pattern matching includes testing for numeric, alphabetic, alphanumeric and special character input, and displaying specific characters as part of a field. There's lots of flexibility, but writing the pattern descriptions can be quite complex. For example, to define a phone number field which displays in the format (047) 345-6789 requires the following pattern matching picture: P'('3N')x'3N'-'4N. Interfile validation lets you verify data entered in a field against data in a look-up file, ensuring that new data relates to information already filed. Internal date conversion, specified by an 'I' in the input options column, causes Optimum to store the date in a manner which allows it subsequently to be displayed in a variety of formats. There are seven output formats for the date, ranging from MM/DD/YY to full month name and year (as in 'January 6, 1984'). There is one notable omission – yes, you guessed it, the DD/MM/YY format. US parochialism strikes again!

Cross-referencing Facilities

One of Optimum's most attractive features is the ability to designate three fields per file as cross-reference fields. This allows the user to retrieve information by means of 'keywords'. If a file contains a list of company names and their products, with the product field cross-referenced, instead of having to remember the full title of a product all you have to enter is *any* word which is part of the product name. For example, you might have four different types of widgets on file; merely typing 'Widgets' will retrieve the following records:

```
ACME WIDGETS
Widgets – 7"        (case is ignored)
Red widgets
RX-7766/widgets (special    characters,
                 such as '/', are treated
                 as blanks)
```

Not only is this a pleasant shorthand alternative to dBase commands such as LIST FOR 'WIDGET' $!(PRODUCT), but more importantly it reflects the way most people remember information – by keeping in mind one or two key words. That's all you need with Optimum. It is also possible to retrieve information from any field, cross-referenced or not, by use of the SELECT command, which operates in a similar way to the dBase command above, so the restriction of three cross-reference fields per file doesn't hurt.

After defining a database file (referred to by Optimum as a 'form'), you are prompted through a series of questions relating to file size, record-locking for multi-user systems, and type of forms to be produced (data entry and/or print forms). Optimum then creates dictionary and data files, builds a cross-reference list, and builds and compiles a print form and a data form. You are then able to add information to the file. Any changes to the file structure are made with the CHANGE, ADD and DELETE sub-commands of DEFINE, following which it is necessary to re-compile the form. The Optimum manuals urge you to make all changes *before* entering data into a file, as some strange things can happen if you alter your file structure after entering data (especially if you delete a field). The 'form' produced by the DEFINE sub-system consists of a 'mainline', screen templates, prompts, displays and error messages, all of which may be modified using the advanced features of Optimum. 'Running' the form brings up the data entry and modification screen created by DEFINE, allowing the user to enter new records and modify, view or delete existing records.

I found data entry with Optimum a real chore. Trying to add a record to a file entails entering the item-ID, confirming that you wish to create a record, typing in the new information and then re-confirming that you wish to add this information. Not only does this involve a lot of keystrokes, but it also makes it hard to establish a rhythm when entering large amounts of information. If you happen to enter information which is too long for the field, Optimum wipes out everything you've entered and tells you to enter it again – no warning, no chance to modify what's there. Too bad if the field is 250 characters long. There is also *no full screen editing* of data, so if you've made a mistake in a previous field you can't go straight back and change it – instead you have to go through the whole record before being offered the chance to modify any entries.

Reporting with Micro-English

Once you have your information stored, you can retrieve it using Optimum's inquiry and reporting language – Micro-English. The Micro-English sub-system is accessed through the Terminal Control Language, which is basically the operating shell for the rest of the Optimum sub-systems. Micro-English itself is a very simple inquiry system to use, letting you list, sort and format information, and send the results to terminal, printer or sequential file. Control breaks, totalling, output field formatting and sorting with up to fifteen keys ▶

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are accommodated. Each enquiry begins with the word SELECT, and may be constructed as a single sentence or as a series of clauses entered at the SELECT prompt. The order of clauses within the sentence is generally unimportant. Thus:

SELECT CUSTFILE BY ACCT.NO WITH BALANCE>'0' SPACING 2 DISPLAY NAME[10] CITY BALANCE HOLD SUPPRESS COUNT

is equivalent to:

```
SELECT
->CUSTFILE BY ACCT.NO
->WITH BALANCE>'0'
->HOLD
->SUPPRESS COUNT
->DISPLAY NAME[10] CITY BALANCE
->SPACING 2
```

Using SELECT-ED, another of the sub-systems, it is possible to save such requests so that they may be run whenever needed. I don't like SELECT-ED – it's a cross between a form-painting system (such as dBase's ZIP) and Micro-English, with the advantages of neither.

This is the limit of the 'Executive' part of the system – up to this stage everything has been fairly simple, with the bulk of the work being performed by Optimum itself. From here on in things get tough. I can see why Uveon retreated from marketing the 'Optimum Executive Series' separately, because it just doesn't offer enough power or flexibility to be useful. Using DEFINE, Micro-English and SELECT-ED it's possible to create simple databases and reports, but some things you'd expect to find on the most basic systems are impossible with these facilities. One glaring example is that you *cannot* create mailing labels with state and postcode on the same line! Records can only be printed with all the fields across the page or in one single column down the page. Not much use at all.

In the Deep End

The real power of Optimum is provided by the Form Processing System and the Item Editor. Most of the restrictions of the 'Executive' Optimum can be overcome by these advanced sub-systems. The Form Processing System consists of a form editor (Form-Ed), a compiler, a printer and a form processor.

Form-Ed is used to create or modify a 'source form', which can then be compiled, printed and run. An Optimum form is similar to a program, in that it describes the processing steps of an application. It also contains non-procedural information, such as pictures of the screens to be used by the form and locations of input/output data on those screens. Form-Ed allows you to change any aspect of a form – screen layouts, error messages, mainline structure and subroutine processing. It took me quite a while to find my way around using Form-Ed, thanks to the inadequacy of the manuals and the daunting appearance of the form processing language, which looks something like a cross between BASIC and assembly language. There are 48 processing options (see Table 1), which give you a lot of power in designing database systems and manipulating data in a variety of ways. Form-Ed prompts you through the writing of subroutines incorporating these instructions, providing a directed programming environment; each processing option asks for the appropriate parameters required for its operation. For example, if you want to extract a sub-string from the data in the work variable (I'll tell you about Optimum variables shortly), you enter 'TE' when the system prompts for the type of processing to be performed, and then Form-Ed will prompt you: 'Enter starting character and length :'.

Figure 1 shows an example display subroutine, designed to let a user know that a record she/he is trying to access is already being used by someone else. This subroutine refers to a number of variables, including the work variable – $0,0. Optimum has 250 variables available in five buffers. The buffers are designated $0 to $4, and the variables are numbered 0 to 49 in each buffer. Some of the variables are allocated specific tasks, while the rest are available for general processing needs. The work variable is used by the form processing options as the source and destination of their data.

Table 1

FORM-ED PROCESSING OPTIONS

AQ	acquire	DM	decimal mask	MV	move
AS	add to stack	DL	delete	NN	next number
AR	arithmetic	DF	delete file	NP	no operation
CD	call display	DP	display	OF	open file
CH	chain	DA	display at	PM	pattern match
CE	clear error	DE	display error	PT	print
CF	close file	DS	display screen	PU	print using
CC	concatenate	DU	display using	PR	prompt
IF	conditional	EF	exit form	RC	range check
	E - error	EI	exit item	RN	read next
	L - locked	ED	external date	RL	release
	N - not error	FM	format	RP	reprompt
	F - else	GS	get from stack	SP	send to printer
	variable	GE	group extract	SE	set error
	literal	IC	input character	SF	set filename
CA	convert ASCII	IN	input	TE	text extract
XR	cross reference	IA	item access	TR	transfer
				UP	update

Figure 1

```
        Sub-routine to display 'Item Locked' message

23, 1, 0023, 70
   4 CC - Concatenate    :"Item in Use, Console ";$1,1
   5 CC - Concatenate    :$0,0;", Form ";$1,2
   6 CC - Concatenate    :$0,0;" -Waiting (any key to reprompt)"
   7 DP - Display        :
   8 MV - Move           :"10";$0,2
   9 AR - Arithmetic     :$0,2-1
  10 MV - Move           :$0,0;$0,2
  11 IF "0"              :NP - No Operation  :
  12 Else                :SK - Skip          :9
  13 AQ - Acquire        :""
  14 DP - Display        :
```

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KX 1212 KX 1213	**Green** (P39) or **Amber** (PUL) Monochrome: Video Bandwidth – 20 MHz Horizontal Res. – 800 Dots Horizontal Freq. – 18.432 KHz	**IBM** & **IBM** compatibles only	Green – $330 Including Sales Tax Amber – $340 Including Sales Tax
Vision-Ex	Input Form – RGB/Composite Video Bandwidth – 6 MHz Min. Slit Pitch – 0.63 mm Horizontal Res. – 380 Dots Vertical Res. – 262 Lines Horizontal Freq. – 15.75 KHz	**Apple, BBC, Commodore, Microbee** and all microcomputers with RGB/Composite output	$565 Including Sales Tax
Vision II	Input Form – RGB Separation Video Bandwidth – 15 MHz Min. Slit Pitch – 0.47 mm Horizontal Res. – 510 Dots Vertical Res. – 262 Lines	**IBM, Apple, BBC,** all **IBM** compatibles and microcomputers with RGB output	$645 Including Sales Tax
Vision III	Input Form – RGB Separation Video Bandwidth – 18 MHz Min. Slit Pitch – 0.38 mm Horizontal Res. – 630 Dots Vertical Res. – 262 Lines	**IBM, Apple, BBC,** all **IBM** compatibles and microcomputers with RGB output	$895 Including Sales Tax
Vision IV	Input Form – RGB Separation Video Bandwidth – 25 MHz Min. Slit Pitch – 0.31 mm Horizontal Res. – 790 Dots Vertical Res. – 400 Lines	**IBM** (using double high resolution graphics board) and any microcomputer that produces in excess of 750 dots horizontal res.	$1,245 Including Sales Tax

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less in business t at the same time?

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Buffer $1, in our example, contains information about the console and process which are currently using the data we tried to access. This routine will display a message 'Item in Use, Console n, Form xxxxxxxx –Waiting (any key to reprompt)', which will flash until any key is hit by the operator. The flashing is achieved by instructions eight to fourteen, which place '10' in a variable; subtract 1 from the variable; test if the variable is '0'; repeat the loop if it isn't or display blanks to clear the message if it is.

This subroutine was produced automatically by DEFINE during the file creation process. In fact, DEFINE can be used as the basis for almost any system, as it provides a processing skeleton which can then be altered by Form-Ed to produce custom-designed systems of enormous complexity. Multi-user, multi-file, menu-driven applications with extensive cross-referencing can be developed under Optimum, with a lot of the code slogging handled by DEFINE. Further flexibility is provided by the Item Editor, a line editor which lets you manipulate data at the dictionary level. With the IED you can, among other things, concatenate dictionary items and variables, strip spaces from items, alter the justification of a field and convert data to upper case. When used in conjunction with Micro-English, it enables you to produce reports in almost any form.

The final component of Optimum is the File Utility sub-system. With this utility you can create an empty Optimum file, clear an existing file, examine the effectiveness of file structures and generate prime numbers. The prime number generator is used in determining the modulo (that is, the number of fixed size blocks) needed for a file. The modulo should always be a prime number, so Optimum will supply you with the prime which is closest to your estimate of the modulo.

Documentation

Welcome to Jargon City! I spent days and days struggling with Optimum's reference manuals, becoming bitter and twisted in the process. At no time is a coherent overall picture of Optimum presented to the user; it is quite evident from the manuals that Optimum was created as a series of sub-systems, and the impression gained is that even the designers weren't too sure how to look at it as one complete system. This means you spend an inordinate amount of time trying to uncover the capabilities of the system, and when you've finally nutted them out, you spend a similarly lengthy period piecing them all together.

To be fair, not *all* the documentation is as bad as this. There are two reference manuals – the Executive Series User's Guide and the Professional Series Programmer's Guide. There's also an Applications Notebook, which leads the user through the setting up and modification of a sample order entry system. The User's Guide is the best-

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written part of the documentation, avoiding jargon and providing a simple introduction to the 'automated' parts of Optimum. The user is taken step by step through the definition, use and modification of a database, and the design of simple reports. A sample cheque-book system is also described. The text describes all the entries needed to perform these tasks, and shows what will be displayed on the screen at each stage. This is fine, except occasionally what they *say* will appear on screen and what *actually* appears are two different things. While most of these errors are trivial, at one stage it took me a good thirty minutes to work out what I needed to do to get my screen to look like theirs.

The Programmer's Guide and Applications Notebook are on a different plane altogether. Accepting that these sections are aimed at people with programming experience, I still feel they are inadequate, confusing and ill-designed. The message conveyed to me by these manuals was "We dare you to get the most out of our system". Some people may relish this challenge, but for many others it will be a waste of time. What's needed is a manual which bridges the gap between the executive and programmers' guides. With this, Optimum would become an attractive and accessible package to many more people.

Conclusions

How does Optimum compare with dBase II? It doesn't – they're different tools with different markets. Optimum is very much an applications development system aimed at programmers, or corporate users who can buy runtime applications systems developed under Optimum, while dBase obviously has mass-market appeal. With a price tag of $1,450 (including tax), Optimum is almost three times the cost of dBase II. A fair proportion of this cost pays for assistance from the local suppliers of Optimum, Software Suppliers, who provide extensive support for the system. They also run classes on Optimum, which would help anyone who gets lost between the two manuals.

Something Optimum does offer is a high degree of portability, as it runs on a variety of hardware, including both 8-bit and 16-bit computers with single, multi-user or networked operating systems. Applications developed on one type of computer are easily transported to other systems, increasing Optimum's usefulness to program developers. For professional systems developers, Optimum has a lot going for it, including flexible data manipulation, variable length records, the powerful cross-referencing facility and competitively priced runtime versions ($300 for Optimum, compared with $500-$1,000 for Dataflex). For others in search of their ideal database, Optimum's not likely to be the one; it requires too much of a commitment to get useful results and can't compare with systems, such as Dataflex, which combine power *with* ease of use. ❑

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Damage to disks doesn't come only from exotic sources ...

IT'S Sunday night, you're showing off your computer to the family, and while you're sitting there putting it through its paces, little Rodney, your destructive six-year-old nephew, has decided that a nice, gooey, saucy piece of lasagne would look good sitting on top of one of your disks – the one you've worked on all weekend for a major presentation the next day.

What to do? First and foremost, don't panic, advises Jack Stollery of Verbatim Corp, a California manufacturer of magnetic media. After you've recovered your aplomb, Stollery suggests rinsing the disk thoroughly and doing an emergency disk transfusion. Here's how to proceed:

1. Carefully rinse off as much of the lasagne as you can, using cold or cool water.
2. Carefully slit one end of the protective PVC jacket holding the disk. Put on a pair of white, lint-free cotton gloves (the kind sold in photographic stores for handling negatives and prints), remove the actual disk, and rinse it off several times. (The technical name for washing off the lasagne is 'removing the particulate matter'.) Throw away the jacket.
3. Slit the jacket of a good disk, and insert the questionable disk into the good jacket. Don't attempt to tape up the slit end.
4. Copy the now-jury-rigged disk onto a regular disk; with any luck you'll have recovered your data.
5. Invite Rodney not to visit you for the next 20 or so years, or only on condition that he wears a strait jacket.

Stollery also had these suggestions for enhanced disk life:

1. Buying a disk notcher, to make double-sided disks out of single-sided ones, is a false economy. The notching device actually tears the plastic-based disk envelope and increases the chances of contamination (and therefore of head crashes).
2. When a disk is to be mailed, insert it first into a Tyvek protective envelope. Individuals mailing disks often insert them between two pieces of corrugated cardboard (in a kind of a sandwich) without benefit of Tyvek. The only problem with this is that cardboard has lint, which can get onto the disk.

Stollery also made a suggestion which will be familiar to music enthusiasts who use magnetic recording tape: never, never buy unbranded diskettes. Like anything else, diskettes can also be made and sold less expensively; a saving of a few dollars could conceivably wind up costing hundreds, if oxide particles or other imperfections of inexpensive disks cause a head crash. ❑

A good example of how not to treat your disks!

HOW VULNE ARE YO

OVER THE years, a fair amount of mythology has grown up regarding the vulnerability of disks to energy sources, such as X-rays, magnetism, microwaves, and so on – not to mention more tangible threats such as spilled coffee, lasagna, and so on. In any case, as microcomputer users are well aware, a failure involving a $2 floppy disk can potentially be more catastrophic than a failure involving a multi-thousand dollar piece of hardware.

Computers – and therefore disks – have moved from their once exclusive preserve, the (ostensibly clean) white-collar office, into all sorts of commercial and industrial environments. The result is that it's hard to think of a place absolutely, positively guaranteed to keep disks safe. On first consideration, one might guess that some lead-and-concrete-lined vault in some obscure sub-basement of the Pentagon might be the best place; but even that's a bit questionable – given what are probably very powerful electrical devices (radio transmitters, radar, and the like) in that building, as well as the (potentially) unshielded energy sources one might pass on a trip to that vault.

However, if, like the rest of us, you must occasionally take your disks into the real world, you may have wondered just how vulnerable they are to environmental factors such as humidity, heat, industrial environments, and electrical fields (such as airport X-ray machines, airport radars, and so on). Over the years, a lot of myths have grown up surrounding the vulnerability of magnetic media to damage. One semi-classic horror story of yesteryear concerns mainframe computer tapes, transported on New York's subways near powerful electrical motors, and

ERABLE OUR DISKS?

For all computer users, no matter what size computer they're using, one of life's lurking nightmares undoubtedly is the fear that data recorded on a disk will somehow become unusable. Our US correspondent Howard Karten conducted a series of controlled tests to find out what sort of things really will scramble or erase your information, or render it otherwise 'kaput'.

arriving in unusable form.

To find out just how vulnerable disks are, we did some research. We were interested in seeing how much torture a disk could take before losing its data. We were particularly interested in subjecting these diskettes to various forms of electrical energy, to try to destroy data without physically altering the disk.

Method

We bought two boxes of IBM double-sided disks at the nearby IBM product centre. Each disk was formatted on a 128K monochrome IBM-PC, on the same double-sided drive (a half-height unit made by Shugart), with DOS 1.1. The standard DOS FORMAT command was used; when DOS asked "... format another?", we replied Y (yes) 19 times in a row.

Then, we used EasyWriter 1.1 to create 18 distinct files on one of these disks. Each file consisted of just one single letter or character repeated 17,512 times.

Finally, we used the IBM utility DISKCOPY to duplicate the disk. We inserted the disk created above in drive B, inserted a blank (formatted) disk in drive A, and typed the DISKCOPY command. When DISK-COPY finished the first copy, it asked if we wanted to copy another. We replied 'yes' 19 times more, each time copying the new disk from the same disk that I had created in step two above. Thus we now had 20 identical disks, all created on the same drive within an hour of each other. The idea was to get each disk moderately thoroughly filled with data, and thereby simulate, to some extent, real-world conditions. Each disk contained 309,000 (out of a possible maximum 320,000) bytes.

To make sure we did, in fact, have 20 identical disks, we checked a few files on a few disks randomly, using the DOS utility TYPE. The advantage of this approach is that a pattern is created on the screen that makes it easy to spot an error. The point, of course, was to be able to spot any errors easily.

We then took some of the disks down to an industrial testing lab specialising in materials testing, and it subjected the disks to the following procedures:

Corrosive Gases

The disks were placed in a plexiglass test chamber containing one per cent carbon dioxide for 72 hours. This test was repeated in an environment of 0.5 per cent sulphur dioxide.

X-Radiation

Using a Picker X-Ray Corp X-ray camera, one diskette was irradiated with 120 Kvm (kilovolt minutes) for one minute at a distance of 36 inches (about 90 mm) from the X-ray source. A second diskette was irradiated with 250 Kvm for one minute at 36 inches.

(By comparison, a conventional chest X-ray at 120 Kvm and 36 inches would last 0.005 seconds.)

Humidity

The disks were placed in a humidity chamber for 24 hours, and exposed to air with a relative humidity of 85 per cent +/- 5 per cent, at a temperature of 25 deg. C +/-2 deg. C.

Thermal Shock

Thermal shock occurs when disks are taken from a cold environment, such as outdoors in the winter, into a warm environment, such as an office building. Although it seemed unlikely that thermal shock would affect magnetic impulses on a disk, we did this test since it simulates a reasonably common situation.

Two diskettes were subjected to −80 deg. F (-62 deg. C) for one hour, and then to 180 deg. F (117 deg. C) for one hour in a Tenny thermal shock chamber. The test lasted two hours.

Welding Cable

A Miller welding machine supplying 115 amps DC (source) was turned on, and two disks subjected to the magnetic field produced. One disk was placed one foot (30 cm) away from the cable, a second, two feet (60 cm).

The remaining disks were tested as follows:

Magnets

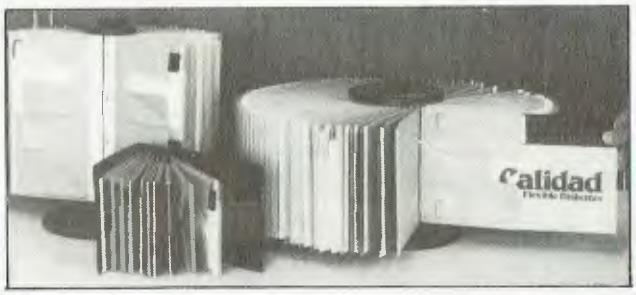
Information is stored on disks as magnetic impulses; virtually the first thing computer users learn is that magnetic media of all sorts are supposed to be kept away from sources of magnetism. But has anyone ever actually tested for the effects of magnetism? We did: a hardware-store variety magnet was moved back and forth parallel to the surface of a disk, approximately 2-3 inches (5-7 cm) away. Another magnet was moved back and forth on the Tyvek envelope, with the disk inside the envelope.

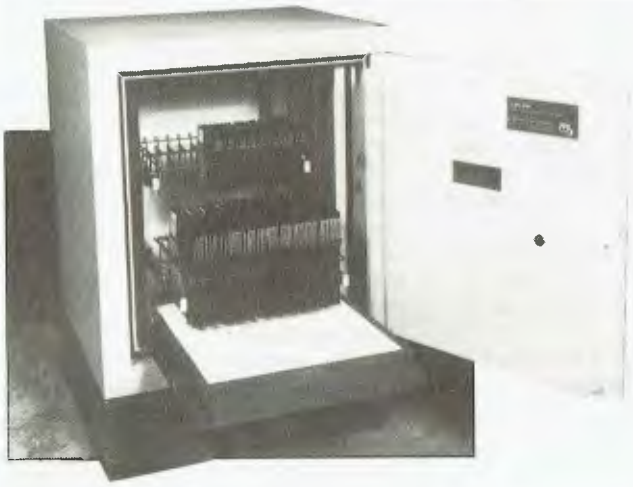
Telephone Receiver

According to a spokesman for California's Verbatim Corp, a leading manufacturer of magnetic media, telephone receivers have been known to destroy the integrity of data. With the disk in the protective Tyvek envelope, we conducted a ten-minute conversation, during which time the disk was rubbed repeatedly over the transmitter, receiver, and base of a standard Bell system touch-tone ▶

Safe Storage of Disks

This page shows various safe ways to store diskettes: On the far right is the DiskBank, while on the **right is a stand that** allows the diskettes to be stored vertically in **a circular 'file'.**





On the left is the Hadak MCC300 Datasafe, while above right is the DiskBank stacked **vertically for storage;** both are obtainable from Wilbroprint & Computer Supplies by ringing (02) 699-9933. **The photo on the right shows how easily one DiskBank component may be** transported in a brief-case.

Microwave

Microwaves are all around us – outside (from various communications services), in business/commercial environments, and in homes (microwave ovens).

To try to put disks to the most severe test we could think of, we went out to a local department store that sells several microwave ovens. When the salesman's back was turned, we put one of the disks into a Sharp Model 771R Carousel microwave oven for one minute, set at medium-high. A second disk was placed in a Litton Corp Generation II microwave oven for 90 seconds, with the controls set for a well-done hot dog.

Since microwave cooking works by heating up water molecules, we had thought that the disk would come through physically unscathed. (The point, after all, is not to fool with the physical or mechanical attributes of the disk, but with the data recorded on it.) Apparently, the Litton oven heats up inside, since the disk came out looking like a record left on a car dashboard in the August sun. The other disk came out physically unscathed; the person doing this testing survived the curious, very wondering looks of store personnel.

Fluorescent Lights

The Verbatim Corp spokesman also indicated that fluorescent lights could clobber data recorded on a floppy. (Fluorescent lights contain a transformer-like component, called a ballast, which apparently can have an adverse affect on radio receivers. Transformers generate magnetic fields; we thought perhaps a ballast might, too.) Two of the test diskettes (both in their Tyvek envelopes) were rubbed along a conventional fluorescent light in the writer's office, and a desk fluorescent in which the ballast and other electrical items were encased in a separate unit.

Airport Security Machine

Many people pass through the ubiquitous airport X-ray security machines; it would be easy to pass an attache case through and not remember that it contained diskettes.

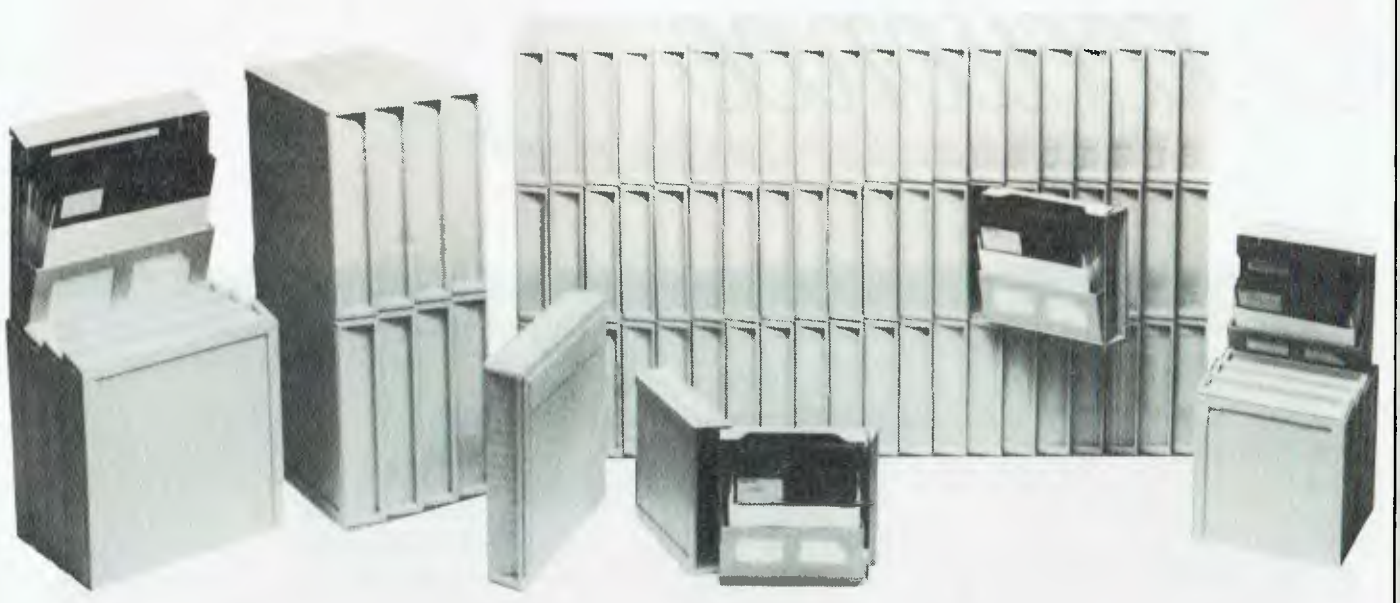
I walked up to the person manning the X-ray device at the Eastern Airlines Shuttle terminal at Boston's Logan airport, and confidently asked the security guards manning the device if they'd mind putting the diskette case (containing two diskettes) through their examining machine four or five times. Although they looked at me a little peculiarly, they relented when I nodded confidently and assertively.

(I explained that it was for some research I was conducting, that I frequently travelled with a box of these in my attache case, and so I wanted to see just how much abuse the diskettes could take.)

The chap running the machine assured me that they'd be erased, or at least adversely affected.

Automobiles

An automobile's ignition system produces high-frequency voltage to ignite the gas mixture. With the diskette in a Tyvek envelope to protect it from grease and other contaminants, I moved it over and around the ignition coil, ignition wires, and engine of a 1983 Toyota Tercel station wagon.



Television And Calculators
Colour televisions use high voltage to operate the picture tube, and a television has numerous transformers. For good measure, I took one of the disks (as always, in its Tyvek envelope), turned an RCA XL 100 19-inch (48 cm) colour television on to a daytime soap opera, and rubbed the disk over each of the set's six surfaces. Additionally, I keyed some figures into a several-years-old Sharp Compet CS-2108 desk calculator and rubbed the disk all over the device.

Results

It's obvious, from my tests, that floppies are a lot more robust than is commonly thought.

Two tests caused physical damage to the disks – the Litton microwave test, and the thermal shock test (which caused heat distortion of both disks.) That's not surprising, since the IBM Tyvek envelope recommends keeping the disk between 50 deg. F and 125 deg. F (10 deg. to 52 deg. C). Additionally, the ANS (American National Standard) specification for floppy disks, ANSI # X3.82-1980, a detailed, 19-page document spelling out almost every conceivable aspect of diskettes, states that they should be able to withstand operation and storage in that range, and at a relative humidity of eight per cent to 80 per cent. The only test which resulted in a data loss (without physically damaging the disk) was passing a magnet over the disks.

Additionally, a 1983 publication of the National Bureau of Standards found magnetic tapes were unaffected by the following: radar systems, airport metal detectors, X-rays, high voltages, nuclear radiation (gamma rays), automobile interiors, light and laser beams, and pressure (other than that causing physical distortion of the media). Static electricity by itself was not found to cause any data loss, and television receivers were regarded as having some (slight) potential for damaging tapes.

Apparently, however, major US tape and diskette manufacturers have conducted little or no original research in these areas – calls to some of the major US manufacturers indicated they were aware of virtually no research that had been done by themselves or others.

Waving the magnet around the disk from a distance of approximately 2-3 inches (5-7 cm) caused no damage. However, the disk was unreadable after we rubbed the magnet over (in contact with) the Tyvek envelope.

Nevertheless, it's always possible that a particular energy source, such as a microwave field, CAT scanner, or whatever, might use stronger fields than the ones we exposed the disks to. So, it's always a good idea to regard disks as fragile, and to give them the same TLC you'd give any valuable, fragile object, such as a rare book or historical object. It may not be necessary to go as far as the US Government goes in protecting the Constitution – but it couldn't hurt, either.

Professional writer Karten notes that odd looks by store sales personnel, airport security guards and others are one of the occupational/social risks journalists must routinely face.

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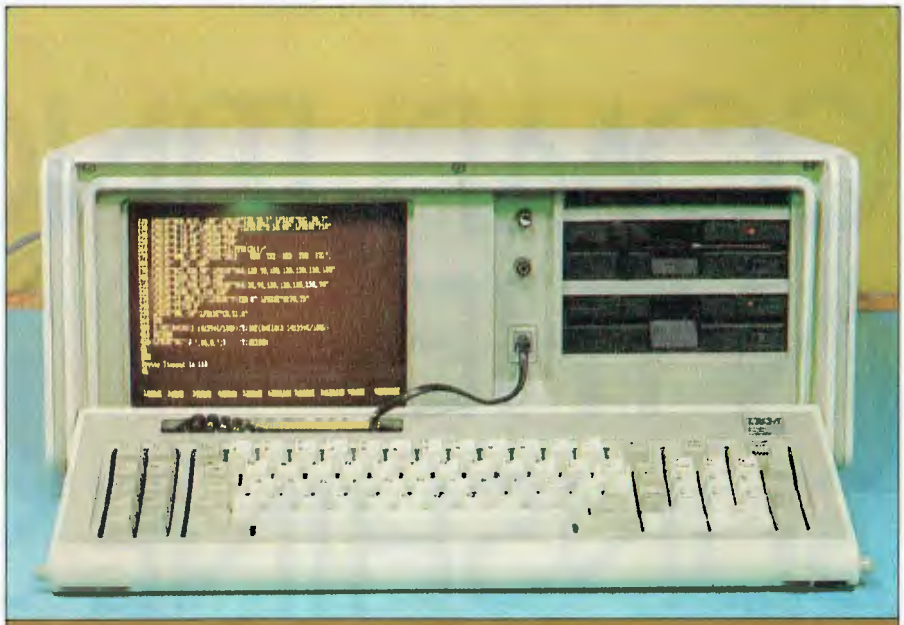
IBM PORTABLE PC



IBM's PC Portable made it to Australia almost without delay (thanks to its international power supply), launching locally last month. Les Bell borrowed an early import from software distributor Arcom Pacific for a brief inspection . . .

FOLLOWING ITS release in the US, IBM Australia has now also released the IBM Portable PC, a (and I quote) 'lighter, smaller model of the popular IBM Personal Computer'. Lighter it may be, but at 13.6 kilos you'll never need to tie it down, and as for smaller – airline seats must be getting smaller to match.

Incidentally, while many personal computers are advertised as small enough to fit under an airline seat, they are all *too heavy*. As a vaguely polite, but definitely firm, young lady pointed out to me recently at Adelaide airport, while a portable may fit under the seat, its weight exceeds the regulation limit.

This is for safety reasons; 'What would happen,' she asked me, 'if the plane hit some turbulence and that computer came adrift and hit somebody in the head'. I forbore from pointing out that the force required to extricate the computer from its tightly wedged position would already have ripped the wings off the aircraft and that a free-floating computer would hardly be a bother in those circumstances.

Anyway, the Portable PC, more properly classified as a transportable, comes as standard with 256 Kbytes of RAM, a single slim-line disk drive, colour/graphics adapter, amber display and a dual-voltage switched mode power supply. Most users will opt for an additional disk drive.

Also released at the same time as the Portable PC was DOS 2.1, which is claimed to support the slim-line drives. However, we had a preview of the Portable PC courtesy of Ron Chernich of Arcom Pacific, who bought one in the US prior to its Australian release, and we found it worked perfectly well with DOS 2.0. However, we suspect that fixes have been applied to correct some bugs, particularly in the format command, so that 2.1 may be useful to standard PC owners.

The Portable PC has seven slots internally, although two are used by the colour/graphics board and disk controller, and one will immediately be used by a parallel or serial printer interface, leaving four for more memory and options. However, because of the positioning of the display tube in front of the slots many long cards will not fit.

The Portable PC is priced at $4,234 recommended retail.

As a user who regularly flies all over the place with two PC's, I think this machine is still not the answer; my solution is to send a conventional IBM-PC, securely packaged, as freight and take the Hyperion as hand baggage. Perhaps the smallest and neatest portable to date has been the Otrona Attache, but it loses out on IBM compatibility. ❑

From November 8 to 11 Queensland will experience its second computer show, Expo '84. "So what?" those jaded show-goers in more southern states will snigger, but exhibitors everywhere would welcome the kind of attendance seen at Brisbane's Expo '83, and the promise of greater crowds this year prompted us to investigate exactly what's happening in the Queensland computer industry. Is the sunshine state a technological backwater or, as some would have it, the future high-tech state of Australia? Natalie Filatoff crossed the border to find out, but somehow remained sitting on the fence.

COMPUTING IN THE SUNSHINE STATE

By Natalie Filatoff

THE QUEENSLAND COMPUTER industry, like everything else in Queensland and like the computer industry everywhere else, is growing. Dealerships are springing up from Cairns to the Gold Coast like seedlings in a banana plantation. Major computer companies based further south are establishing offices and branches in Brisbane. Software writers who prefer sunshine and seclusion to the hustle of a major marketplace are labouring under beach umbrellas in trendy Queensland resorts. And homegrown Queensland computer companies are enjoying success throughout Australia.

But while the land of the pumpkin scone may have a Big Pineapple and a Big Cow, it still can't boast a Big Micro poised majestically on Mt Gravatt, or smiling benevolently from a pedestal on a bend in the Brisbane river. We spoke to a cross-section of Queensland's computer-related businesses about their operations, and about how being based in what many people still view as a banana republic affects them.

Go to Brisbane and start asking questions about the Queensland computer industry and a host of fingers point you in the direction of Arcom Pacific, the distributor in Australia for US software companies such as Ashton Tate (dBase II and III, and Framework), Digital Research (Concurrent PC-DOS, DR Draw and DR Graph), Micropro (Wordstar) and Sorcim (Supercalc). Arcom Pacific isn't situated on Brisbane's highest geographical peak, but it's certainly one of Australia's most successful software firms.

Run by partners Ron Chernich and Peter Iliffe (see accompanying profile), the company was originally called Archive; but because of market confusion resulting from the existence of two other 'Archive' companies, one in Sydney and one in Melbourne, the company reluctantly changed its name. Now Arcom Pacific is associated with some of the best imported software, good service and memorable marketing.

Both Chernich and Iliffe are Queenslanders, and since the company began as a backyard concern in 1981, it naturally grew up in Queensland too. Says Iliffe, "There are obviously times when it would be convenient or better for us to have our head office in Sydney, but then you can say there are times when it would be better to be in Melbourne. And if you were in Sydney there would be times when you wished you could be in Melbourne and vice versa. I don't know that it's much different being here. We don't see it as a problem. It would be if we didn't have offices in Sydney and Melbourne, but we opened a Sydney office in March and a Melbourne office in July."

He says that only once in his business dealings with US companies has someone questioned Arcom's

Queensland base. "Americans as a whole," he says, "are very ignorant about other countries – and that's not a criticism, it's just that very little overseas news is covered in their media. But the one company which did look into it very thoroughly and was concerned about us being in Queensland accepted the recommendation of its international marketing manager, who had had a lot to do with us in the past and had been to Australia many times, so we got the business."

It was Arcom's marketing manager Martin Lack who first mentioned Queensland as the future high-tech state of Australia. He backs up this theory with a view of Queensland as the ideal place to start your own small business, and therefore expects many innovative, go-ahead people to bring their ideas to Queensland for development.

He says, "Something like one-third of all small businesses in Australia start in Queensland, and when you look at that on a per head of population basis, you end up with something like four times as many businesses starting here as anywhere else in the country.

"There are structural reasons for this," he explains. "It's to do with the fact that Queensland is a distributed state. While a lot of people hate Joh and his politics, it still provides a stable environment in which you can make long-term plans. You know what's likely to happen in a year, or two."

Lack also believes that the attitude of Queenslanders to people starting their own business is less prohibitive than in other states. He says, "There's an attitude here which accepts that people will go and do their own thing. Once you start that, more and more people do it and the whole thing grows. There are also a lot of people around who are in a position to help small businesses, like the marketing advice company we run at night (called Solutions 2000). We've done work for probably half the software companies in Brisbane. We've kept small overheads, so we do a great service for relatively little money. And just as we offer marketing advice, other people are available who offer financial advice and so on. There are people around to help small businesses."

Topographically, Lack says businesses like his own, and even Arcom Pacific when it was run on a part-time basis, wouldn't have had as great a chance of survival in Sydney: "If you're in Sydney and you've got a stable job during the day, by the time you cut out the extra two or three hours a day you've got to travel, there isn't much time left at the end of a working week to do your own thing. Here, because it only takes me seven or eight minutes to get home, I've actually got two more hours of productive work time available to me, which I can route into my own company at night. This way you can slide off a secure job into your own ▶

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business with far less risk than you might have in Sydney."

John Perry of Active Learning Systems, the company which produced One World – an educational database program – laughed outright at the idea of Queensland as the high-tech state of Australia. "I couldn't possibly agree with that," he said. "But what I do think is that the Queensland government is going to lose high tech unless it becomes as innovative as New South Wales, which is providing money for marketing. Queensland has provided only some very limited, structured forms of finance, and has even withdrawn that in the case of Hartley Computers. In the long term, that was a very bad decision because now Hartley is owned by New Zealand interests. If they'd hung onto it and helped it, they would have been fostering what is now one of the strongest growth companies in Australia, but they let it go. It was a move showing a great lack of foresight."

Perry, who describes himself as an "innovator of companies", administers Active Learning Systems and a number of other business interests from Brisbane, while the actual research and development of ALS packages is carried out in New South Wales in Byron Bay. He says he has no particular reason for operating from Brisbane, except that he has lived there for the past few years. Active Learning Systems' products, which now include 'Australia – A Profile' (a social and geographic database) and 'Hometown' (a kit designed for use in the study of local areas, in which the computer is used to collate and analyse data gathered by students), are distributed by Imagineering. Again, Perry says this has nothing to do with his own geographical location: "We felt Imagineering could provide better support. They've got a lot of stores that they distribute to, which would allow schools and other buyers to get instructions and demonstrations locally. It's a better way of getting closer to the customer than using direct mail."

Despite his remarks on the current situation of high-tech industry in Queensland, Perry describes Brisbane as "a tremendous growth city," and says, "I'm sure the government has a positive attitude, and the minister, Mr Ahern, wants to do something substantial and meaningful."

A Popular Politician!

The computer industry as a whole seems well-disposed to Mike Ahern, ▶

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the Queensland Minister for Industry, Small Business and Technology. He maintains a friendly profile, and, like Perry, many people seem to be waiting for him to implement meaningful plans in the computer area.

His department, still called the DID (Department of Commercial and Industrial Development), though plans are under way to include 'Technology' in there somewhere, has also been fostering the idea of Queensland as a high-tech state. In the April '84 edition of *Industry*, the DID's magazine, one article ran: "Queensland could become the 'Silicon Valley' of Australia, with definite plans to create high-technology parks in Brisbane and on the Gold Coast. The State Government has already purchased 50.98 hectares of land between the Gold Coast Highway and Pine Ridge Road, at a cost of $1.75 million, and is currently negotiating for up to 50 hectares of land in Brisbane near universities. It is envisaged the two new industrial estates will eventually house medical researchers, computer software and hardware manufacturers and other high-technology businesses."

The same issue announced the membership of a newly formed Queensland Science and Technology Council. We spoke to Graham Baker, Assistant Director of Industry for the department, who explained, "Minister Ahern has been pushing to develop a technology policy for Queensland and has taken a two-fold approach. The Queensland Science and Technology Council is a small, high-powered ministry advisory body; its ten members are all non-bureaucrats, and their aim is long-term policy formulation. A separate group in the department will handle the technology program, which is really the implementation of the Council's policies.

"But," he continued, "the Science and Technology Council is concerned not only with technology, but with business and industry and the broader functions of the state; areas such as information technology and what the government should do about the funding of monitoring seismic activities. We're also trying to co-ordinate a broad policy for the education needs of the future, developing within the national technology strategy a compatible state strategy."

On the subject of government assistance available for high-technology projects, he said, "At present we have a policy arrangement for people with new ideas. I'm not talking high-tech now. I'll come to that. But if some new innovation or new product comes up that looks worthwhile, we've got an advisory service on marketing, and we can also provide financial assistance of up to $10,000 on a 50-50 basis – so if a project is going to cost $20,000 we can provide $10,000.

"This scheme has been in place for some time and applies to all industry. What we're doing now is applying it to high tech. The variation is that up till now, where governments give support they've tended to take some security to protect themselves. Security, traditionally, in the banking scene has been what I call tangible assets, like land, buildings, plant. But ▶

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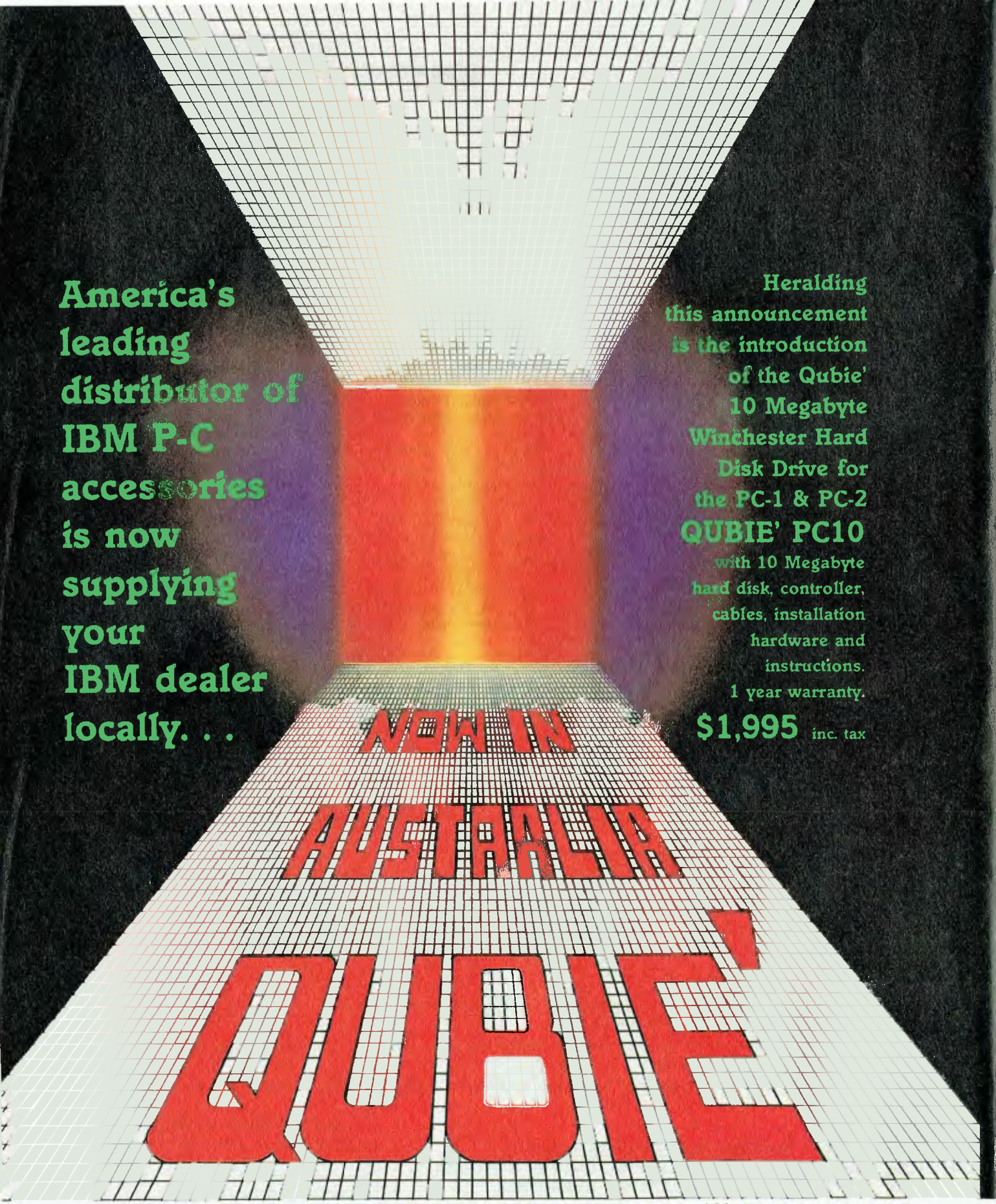

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with most high-tech ideas, the person's only asset is essentially intellectual. They're usually in leased premises, they're working on a desk from a second-hand furniture shop, they've hocked their house to raise funds for the business – but they have a lot of intellectual capital. This is a problem throughout Australia that the accountants and bankers haven't been able to put a value on, but we're starting to look at it and in certain cases we've been able to underwrite firms. The person then has to insure himself for a big amount, so that if someone bowls him over, or something like that, the government as a major underwriter is somewhat protected. We've got a lot more fine-tuning to do, but we're moving to treat intellectual capital as an asset."

When asked whether he himself could see Queensland as the high-tech state of Australia, Baker said, "There are two ways of looking at it. The amount of stuff on the ground of firms who are doing things here isn't anywhere near the number you'd get in Sydney, Melbourne, or even Adelaide – the reason being that if you look at Queensland's economic history, it's essentially been in resources. We have up-to-date technology, but it's all resource-based. If we are in the electronics development of microprocessors it's for mining, sophisticated control equipment.

"But looking at the consumer side of electronics – no, we don't have it. There are a fair few software developers around, and then there's Hartley and Eracom down the coast ..."

Baker then also mentioned Queensland's political and economic environment: "We've got our premier and I guess it's pretty well known around Australia that he tries to sell the story of free enterprise, getting things done. But Queensland does have a record of having fewer constraints from a business point of view. When you start looking at state taxes, Queensland has very low taxes. We haven't had to put on the taxes Sydney and Melbourne have had to.

"So a lot of people do like the political environment, or to put it simply, those that don't really like a Labor government or what they perceive a Labor government will be, particularly entrepreneurs, are being attracted. In that way one would argue that the environment is right. The base is small, but it's a more open environment, and only time will tell. A lot of people here, while they're operating successfully, say they have to export 60 or 70 per cent of their stuff to Melbourne or Sydney because that's where the market is. They have to spend a lot of time flying in planes and knocking on doors – that's on the hardware side. The software people are a lot better off. So relatively there are more software people than hardware here.

"It's a synergistic effect," he finished. "There's a certain critical mass of skills, knowledge and interchange of people, which suddenly takes off, and frankly I don't think we've got it yet. But it's building all the time, so one might argue that the potential opportunities are great."

"At present we have a policy arrangement for people with new ideas. I'm not talking high-tech now. But if some new innovation or new product comes up that looks worthwhile, we've got an advisory service on marketing, and we can also provide financial assistance of up to $10,000 on a 50-50 basis."

Excellent Potential

Robert Woodland, organiser of Expo '84, would argue that the potential market for computer-related high-tech products in Queensland is excellent. He says, "We have 1.1 million people in Brisbane, and Sydney has around three times as many, yet they had 23,000 visitors to their computer show last year and we had 17,000 to Expo '83. On a per capita basis that's starting to look all right, and many companies with head offices in Sydney or Melbourne should realise that."

A major problem associated with organising a computer show in Brisbane is what Woodland calls "head office mentality".

"The large companies which are based in Sydney and Melbourne," he says, "prefer to let their retailers do things for the show up here. Hewlett- ▶

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Packard has taken a stand, but IBM, for instance, is providing all the promotional material, but saying to the retailers, 'Well, get into it, fellas'."

Another problem with companies which are used to Sydney and Melbourne shows is that they tend to want to take up huge areas of floor space. Says Woodland, "I'm having battles with a couple of exhibitors, but it's just impossible to give them the kind of space they want. Queensland really needs a bigger venue."

Expo '84 is being held at the Crest Hotel (King George Square, Brisbane) and will occupy every spare inch of convention space available, plus a whole floor of accommodation suites from which the furnishings have been removed.

Woodland says that due to the success of last year's show, exhibitors were falling over themselves to book space for Expo '84. The majority of areas were booked eight months in advance. He says, "The first year was really a trial and error situation. I worked really hard to promote the show and it paid off. This year the advertising budget has increased considerably and I hope to attract between 20,000 and 25,000 visitors. I've really tried to aim the show towards the business community and to attract them to the show, particularly on the first two days – the Thursday and the Friday – but I haven't neglected the home user."

Woodland attributes the show's popularity to the fact that "There aren't many opportunities in Queensland at the moment for people to see these sorts of things." But, he says, "Next year that will change because there'll be a Business Equipment Expo in March, which will be another opportunity for people to see these products."

More Hardware Competition

One keen Expo exhibitor is the Myer Business and Computer Centre, whose manager Herman Wysma is determined to make Myer the market leader in Queensland computer sales. Wysma says, "The computer industry here in Brisbane has revolved mainly around Computerland, until the beginning of this year. Now companies such as ACI and more recently Parity have come to Brisbane, and we started running really well at the beginning of 1984 and have been able to get a bigger market share."

He says Myer is already the best performer of the six Myer Business

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and Computer Centres in Australia, a claim for which he gives two reasons: "We've been able to get very good and highly qualified staff, and we are located in Indooroopilly (a residential suburb) – which might look like a disadvantage, but I think it's been good in that we've been forced to go out and get the business."

Indooroopilly is a western suburb of Brisbane – which means it takes about eight minutes by car to get there from the city's central business district. The Myer Business and Computer Centre employs 14 people, of which five are involved in sales and nine in support areas. Wysma believes this emphasis on after-sales service will also help the company to a number one sales position.

He says, "You find that a lot of companies want to deal with a large organisation, especially since they know that large organisations will still be around in two years' time if something goes wrong with the equipment. If a large organisation like us can perform, in terms of service and the ability to supply good hardware and software, that company will become dominant in the marketplace. About a year-and-a-half ago the main computer dealers in the Brisbane area said 'Oh, Myer sells computers' and laughed about it; now we are the second largest IBM dealer in Queensland. We've become a dominant force."

About the Queensland market, Wysma says, "In retailing Queensland probably has more buying power, in relation to the population, than in any other state – and you'll probably find that in the rest of the store as well. In the microcomputer market Queensland is probably a little bit behind. All the importers and computer companies are either in Sydney or Melbourne. They've been there longer and they've concentrated their efforts on the local market. But apart from one major software importer, Arcom Pacific, there's nothing spectacular here in Brisbane as far as microcomputer imports are concerned."

Indigenous Software

Imports aside, some innovative software is being produced in the Sunshine State. One of the first people to achieve fame in this area was Ian Phillips, who wrote Zardax – the simplest word processor for the Apple available in Australia.

Phillips works from what, on the outside, looks a bit like a doctor's surgery, in the corner shopping centre of a Brisbane suburb called Mt Gravatt – and says he might as well be working in Bourke for all the difference it would make to his kind of business. He has "the equivalent of five full-time employees" and has sold 8000 copies of Zardax since it was released in July 1980. Five thousand of those copies found buyers in Australia, which qualifies the program as what Phillips terms "a runaway success".

Phillips' method of marketing did not require close proximity to a major marketplace. He describes his technique as follows: "I just let retailers know that Zardax existed, and if they asked for sample copies ▶

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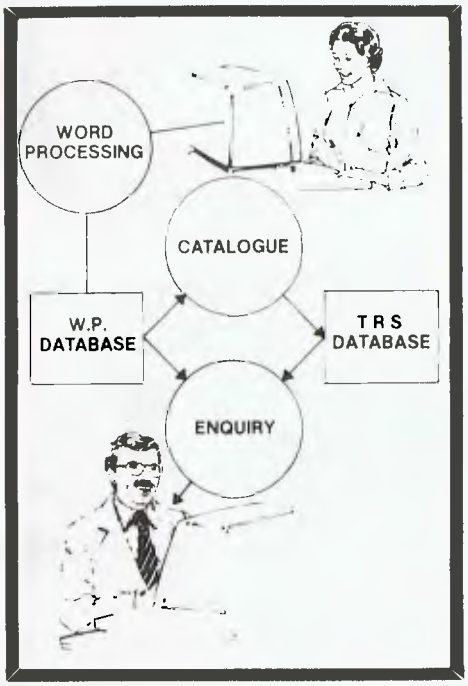

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All the components of Zardax – manual, binder, the program itself – are produced either by Phillips and his staff, or in Brisbane, so he doesn't have to rely on distant centres like Sydney for anything (many more elaborate organisations do). He recently released a ProDOS version of Zardax for the Apple IIc, Zardax III for the Apple III, and Zardax Writer for the IBM-PC. The last, he admits, might require a bit more of an aggressive marketing approach than the original Zardax, in order to compete with other word processing products for the IBM, but he says it won't get that push from him – he's happy to work to his previous formula. Phillips is also developing an inexpensive Apple-IBM networking system, which he envisages will be used mainly by schools and small businesses, where the ability to share resources such as printers and disk drives is important.

Phillips says much of his development work suffers for lack of resources, especially staff time – another reason, he says, why he wouldn't move to a larger city. "The rents in Sydney for the same amount of office space in a similar area would be three times as much. We'd rather keep our overheads down, and if we have any extra money spend it on programmers."

Apple Computers Australia is also keeping its newly opened Brisbane office overheads down, while boosting dealer numbers and hopefully increasing their productivity – not that Apple isn't doing extremely well in Queensland. As Brian Maddern, who *is* Apple's Brisbane office, says, "The Queensland market is very active, and Apple does particularly well in the education market and in government departments. I would say we sell more Apple computers in Queensland per head of population than anywhere in Australia. That's why the company wanted more active local representation."

There are 18 Apple dealerships in Queensland, ten of those in Brisbane. This number is likely to increase by five in the next few months. "What I'm also trying to do," says Maddern, "is lift the standard of dealerships by being active and by concentrating on providing good training for them. We've got a lot of good products and there's a lot of excellent software out there, but sometimes there's a gap between what's available and what a dealer is able to represent in the marketplace because of lack of training."

Madden believes the climate is Queensland's greatest asset. "It's a terrific place to live, and since (software developers) don't really need to be close to their market, and since gestation time for projects is usually fairly long, they might as well do it in a nice environment.

Maddern says Queensland demands a slightly different marketing strategy from some other Australian states. "I get the impression that Brisbane is more of a big provincial town than a great city, so I guess I adopt a different approach, in that I tend to encourage dealers to be community based and look after the general computing needs of that community. There's less of a presence, I suppose, of companies that are targetting particular groups. It's only recently that firms like Parity and the Computer Shop, which aim for a specific segment of the market, have moved into Brisbane. Here it's done more on a geographic basis, and that's particularly true of Apple dealers; they sort of try to be all things to all people."

In more far-flung areas of the state Maddern says computers still sell mainly to educational and business buyers. "There's a tremendous interest among farmers," he adds, "but the lack of specific software sort of holds that back. A lot of them are still able to use general purpose software, like spreadsheets, word processing and database programs quite effectively."

Great Natural Asset

Maddern believes the climate is Queensland's greatest asset, and he relishes the opportunity to go up and ▶

visit his northern dealers every couple of months. He says areas like Noosa are popular with software developers: "It's a terrific place to live, and since those people don't really need to be close to their market, and since the gestation time for projects is usually fairly long, they might as well do it in a nice environment."

Though Peter Donoughue, marketing manager for Jacaranda Wiley, agrees that, "There are aren't too many people who if the job and the pay are right would reject the idea of living in Queensland", he also says his company has trouble finding freelance staff in Brisbane, and believes that the creative stimulation and competition offered by a major marketplace is important, too, to the production of up-to-date materials which fulfil a market.

Jacaranda was an original Queensland publishing company which had been in existence for almost two decades when it was bought by the major US book publisher John Wiley and Sons. Jacaranda Wiley has specialised in educational books and supplies many of the texts used in Australian schools; so it was a natural progression to begin publishing educational software. The first Jacaranda Wiley packages were released in March this year after ten months' development, and the company now has eight programs designed in Australia to suit the Australian curriculum.

"Being in Queensland," says Donoughue, "was an accident of history really, because it was where the company was founded. It's less and less appropriate for us to be based here. It's certainly not our major market (about 20 per cent of the company's sales are made in Queensland). We're a totally national company with offices in other states, and our main markets are in New South Wales and Victoria."

In terms of administration, services, and especially freight, Donoughue says it's a benefit being in Queensland. Goods heading southward get what's termed a 'back-freight' rate, since many trucks carrying cargo from major ports in Sydney and Melbourne would often have to return without any paying cargo at all – so companies in Queensland can demand a cheaper fee.

"Where we find it a disadvantage," explains Donoughue, "is on the product development side. If people are just importing and selling goods from Queensland, I imagine they would go through a few more customs hassles because they have to land the stuff in Sydney (few cargo ships call in at Brisbane). But the major drawback is if you're developing products in Queensland, and especially if it's a people-oriented product like software. If you're relying on software authors and ideas, you've got to be where it's happening. You've got to be going to things and talking to people, especially in educational software. It also helps to be in a larger market. All your competitors are there, so industry meetings are held there which you should get involved with."

And there's the pool of potential employees. Says Donoughue, "We can't get good staff here, so we always have to relocate people and they have to be willing to come. I have only been in this job for two years and I was hired down there. The same applies to our managing editor and financial controller. We also have problems getting artists, ▶

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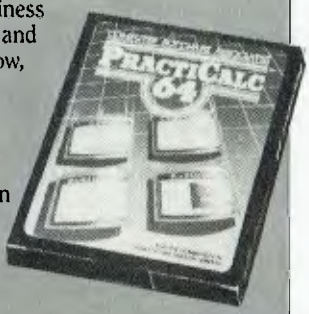

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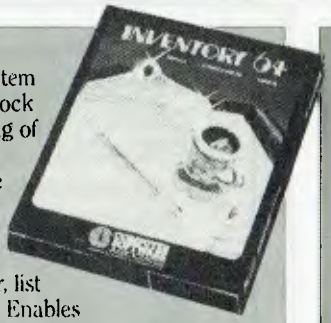

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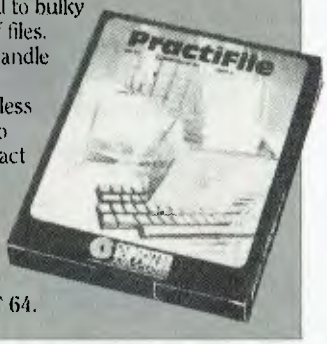

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designers, freelance editors and all that sort of staff which isn't needed on a full-time basis and which tends to congregate around Sydney and Melbourne because there isn't enough work up here."

The School Scene

Aside from the large number of Apple computers in Queensland schools, Donoughue says there are also a fair few Tandys – "they had a big push at one stage" – some BBCs and some Microbees. Brian Maddern estimated that almost every secondary and primary school in Queensland has at least one computer and said the trend, particularly in secondary schools, was towards building up computer resources and having a computing classroom set up in a network.

Several of Queensland's tertiary education institutions recently announced extra computing studies courses of various kinds. Griffith University will introduce a new course in computing and information in 1985. Designed for school leavers and older students, the Bachelor of Informatics degree course will place particular emphasis on studying computers in relation to the human organisations in which they are used and the problems which can occur in those organisations.

Brisbane CAE's School of Business at Kedron Park is starting a range of short courses in microcomputing under the umbrella title 'Management Applications for Microcomputers'. The day-time courses last from one to three days and are designed to expose people with business information requirements to ways in which microcomputers can assist daily business operations and decision-making.

At the Queensland Institute of Technology the School of Computing Studies was formed in 1983 by a merger of the computing sections in the schools of Applied Science and Business Studies. A Bachelor of Applied Science (Computing) course and a Bachelor of Business (Computing) course are already established, and in 1984 the school will offer a double degree in electronics and computing.

Graduates from the degree courses mentioned above are expected to boost Queensland's computer-qualified workforce, while the shorter programmes, which have received an excellent response, should contribute to a more computer-aware community.

Not Quite There Yet ...

But the magnitude of factors favourable to creating a thriving and innovative high-technology state will have to increase considerably before Queensland can gain that status – particularly in regard to its computer industry. At the moment it's not enough to plant highly qualified people and forward-thinking companies in high-technology parks, provide them with some extra fertiliser in the form of money and beam lots of sunshine and good vibes onto them. There are still so many scattered seedlings having great ideas and conflicting views to build a cohesive picture of Queensland as the place to be if you're interested in developing high-tech concepts.

It could happen, but at this stage other states are also in the running for the high-tech tag. Still, here at *Your Computer* we've been practising drinking cocktails out of hollowed-out pineapples just in case. ❑

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Although we're still sitting on the fence as to whether Queensland really is the 'high-tech state', there are certainly too many computer companies operating up there for Natalie to have had time to visit and talk to all of them in her few days in the Sunshine State. So here's a round-up of some of the other operators who let us know some information about themselves.

State of the Art!

The Kangaroo Software Corporation is a division of Tradelink Industries Group – of which Tradelink itself is Queensland's second-largest plumbing wholesaler – and aims to address the specialised needs of the building and construction industries. The company's first package, Tradepak, has been structured originally with the plumbing industry in mind, but can be installed for other tradesmen.

Glenn McDaniel, the company's manager, explained how the package evolved. "We took the way the average plumber worked, with his shoebox of papers and his quotes and estimates done on the back of cigarette packs or notebooks, and developed a computer program to go from there. We chose job costing as the centre around which the program would be built, and it also takes care of invoicing and stock."

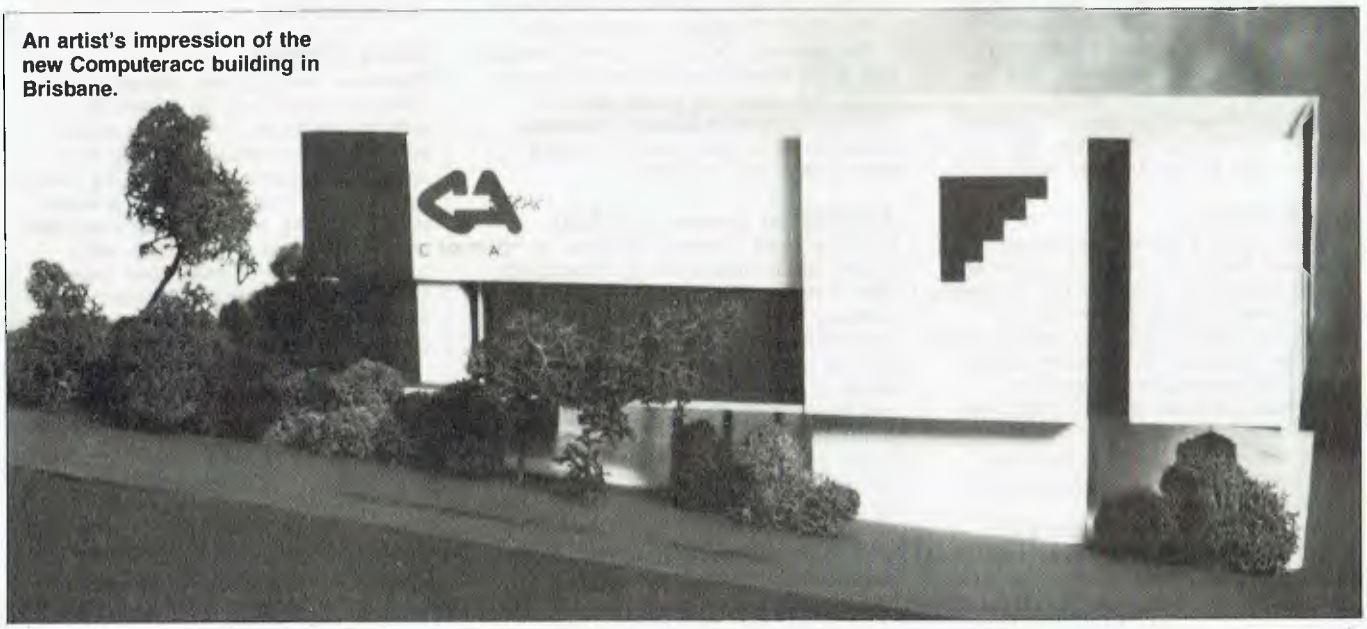
When installed for use by a plumber, Tradepak comes complete with a price list of Tradelink's plumbing supplies, and the user is regularly informed of updates to that list. Says McDaniel, "We see the time coming when a plumber or an electrician or a builder will be able to plug into our Tradelink computer, via a modem, and be able to get up-to-date prices on all the products he needs. He'll also be able to arrange for deliveries within 24 hours."

Tradepak costs $3000, which includes installation, operator training, dummy accounts and documentation. The package runs on the DEC Rainbow, chosen partly for its twelve-month on-site warranty, and the Kaypro, which is expected to be used by builders who work from a site office and might want to move the computer around.

At the moment Kangaroo Software is marketing Tradepak only in Queensland. Says McDaniel, "While we know the bugs are all out of the program, we're a bit cautious of being able to provide customer support and service in other states. We want to see how it goes for the first few months, so we know what other dealers are going to come up against, what sort of questions are going to be asked and what problems they are going to encounter. By the time we release it in other states, in about February next year, we'll have the answers already prepared."

Kangaroo Software is backed by the Complete Computer Centre, also a division of Tradelink Industries, which supplies

An artist's impression of the new Computeracc building in Brisbane.



Apple, Digital, Commodore, Kaypro and Epson products.

You can contact Kangaroo Software on (07) 350 1300, or by writing to PO Box 301, Chermside 4032. The Complete Computer Centre has two locations: 1929 Logan Road, Upper Mount Gravatt 4122 (phone (07) 343 4588); and Corner of Gympie and Rode Roads, Chermside 4032 (phone (07) 350 1255).

Software Australia

This company started in 1978 with the aim of designing and manufacturing a complete hardware and software system for nursing homes and private hospitals. Today, Software Australia has a number of successful computer installations in Queensland and New South Wales nursing homes, private hospitals, tertiary institutions and commercial organisations.

Warren Shaw, marketing manager for the company, said, "The Dual computers manufactured by Software Australia represent one of the most expandable microcomputer technologies in Australia. Even our low-cost single-user 16-bit computer may be upgraded to support 16 terminals."

There are four Dual models, ranging in price from $4000 to $70,000. They are supplied with a choice of CP/M 80, CP/M 86, CP/M 68K, and Digital Research's latest operating system, Concurrent CP/M.

Software Australia also holds the distributorship for Y-E Data floppy disk drives, and imports and distributes a range of dot matrix and daisywheel printers which it markets under the name 'Impressions'. Another series of products available from Software Australia is the S-100 board range, which includes 1 Mbyte (semi-disk) 256K memories, and a large range of processors such as the Z80 A and B, the Dual processors 8085/8088, 8086, 80186, 80286, MC68000, and the National Semi-Conductor 16032.

For more information, contact Software Australia at 2 Somerfield Street, Mt Gravatt 4122. Phone (07) 349 4877.

ComputerAcc

ComputerAcc is a Queensland-based firm, which was formed in 1969 by Robert and Barbara Dungavell. Originally the company was a bureau service, but in 1970 it became an original equipment manufacturer for Digital Equipment Corporation. Since then it has specialised in providing customised computer systems (hardware and software), based on DEC machinery, for vertical markets such as the legal profession, the hospitality industry, local government and education.

ComputerAcc now has around 50 employees and is undergoing expansion. The company is moving to new, specially designed premises where it intends to step up manufacturing operations; and it also recently announced a new range of computer systems, based on the popular Digital LS11 QBus range, to be marketed under the name MicroAcc.

The entry-level MicroAcc system will comprise a PDP 11/23+, 500K memory, six serial lines, a 30 Mbyte Winchester disk drive and an industry-standard-compatible tape drive. ComputerAcc is actively seeking suitable distributors in other states and New Zealand.

For further information contact ComputerAcc at 146 Leichhardt Street, Spring Hill 4000, or any of the company's interstate offices.

Computer Supplies for Cairns

To cater to the growing number of computer users in Cairns, Electronics Resources (9 Brutus Close, Edmonton 4869) has expanded its range of products to include computer supplies such as paper, printer ribbons, disks, storage systems for computer printout, ergonomically designed computer furniture, printwheels, computer cleaning products, and many other computer-associated requirements.

The shop also supplies computer monitors, modems, printers and other peripherals, and cables to suit all popular computers and printers are made to order.

Quasar

This company's aim is to provide total solutions for the problems which face many small businesses. To this end it imports software from the United States for distribution to Australian dealers and for sale to specific users. Having recently secured a source of QCS01XT PC-compatible microcomputers, Quasar Computer Systems will soon launch the machine to complement its software product base.

The standard QCS01XT comes complete with a 10 Mbyte hard disk and a single floppy disk drive. For more detailed information, contact Quasar Computer Systems, 54 Turner Avenue, Fairfield 4103; phone (07) 341 2931.

Alliteration Under the Sun

Sunshine State Scientific Systems is located at 16 Niddrie Drive, Toowoomba 4350. Helen Avey, a spokesperson for the company, said, "Our market may be described quite simply. It is anyone who has the need to store, manipulate and search a significant quantity of data which has the characteristics of diversity, unpredictability of format and changeability. In our various projects we are constantly confronting the problem that data simply refuses to conform to rigid rules of structure and form."

The staff at Sunshine State Scientific Systems believes Superfile, a database management system produced in the UK and distributed by SSSS in Australia, does meet the demands of this market. Avey says Superfile "permits truly free-form record structures, and though it has only one file, each record in it can be different, so one can have as many logical files open as one has records. The implications for system design are obviously staggering."

Superfile is available in eight- and 16-bit versions for a variety of machines and operating systems, both single- and multi-user. Sunshine State Scientific Systems will undertake to design tailor-made Superfile applications.

Compsoft Keeps in Touch

Since opening in 1982, Compsoft has concentrated on a relatively small number of computer brands – it supplies Sirius, Apricot and BBC machines. The company also develops software to suit the needs of particular clients, such as the Parish Data System, which keeps track of parish records.

A spokesperson for Compsoft said, "Many computer dealers in Brisbane feel themselves isolated from the mainstream of technological advances. Compsoft has overcome this by working very closely with Barson Computers (the Australian distributors of Sirius, Apricot and BBC), and by nearly constant use of the ISD lines to Britain and America. By keeping in touch with developments worldwide, we are able to import the latest software and then evaluate it. While some packages don't live up to their overseas promotion, others prove excellent for Australian needs."

For more information, phone John Martin or Gary Turner on (07) 839 0066, or visit them at 537 Boundary Street, Spring Hill 4000.

Micro Where?

Microware was originally formed as a computer consultancy to customise software packages for small business applications. However, according to a company spokesperson, "It quickly became apparent that many overseas packages were not being brought to the Australian market quickly or in a manner which suited the needs of many local buyers." So in 1983 the company directed its efforts toward national distribution of high-quality, specialised software packages.

The products represented by Microware in Australia now include the Omnis family of database packages for use on Apple, Apricot and IBM computers; Infax, a 10 Mbyte cartridge removable disk system which attaches to Apple and IBM machines; and Jane, an integrated package (see review elsewhere in this issue).

Enquiries should be addressed to Microware, PO Box 299, Brisbane North Quay 4000; or phone (07) 393 4586. ▶

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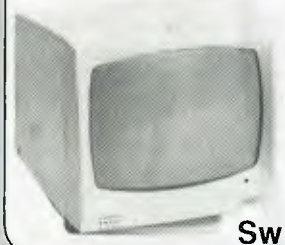

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Compsoft co-director Gary Turner demonstrating the Apricot computer. Compsoft also distributes Sirius and BBC machines.

Skills and Solutions

Queensland's leading NCR microcomputer dealer, Skills and Solutions, offers businesses and other organisations a complete facilities management service. The company can provide software such as the IAL Charter series and Attache products, as well as a range of printers, ergonomic furniture, and computer supplies.

Skills and Solutions has also written a number of dBase II programs for specific applications. These include a restaurant bar stock system ($990) which facilitates the operation of a licensed restaurant without the need for a costly and complex cash register to be on-line; a medical patient records system ($1275) for the single-doctor practice; and a chiropractor's patient records system ($4250), developed in conjunction with a leading Brisbane chiropractor.

Contact Skills and Solutions at 48 Park Road, Milton 4064, for further information; or phone (07) 368 1566.

Ada Who?

Ada Australia is a software supply organisation whose main business is programming languages and other program development aids for Australian software writers. The principal market for these products is in government departments and universities.

Ada has the Australian distributorship for products such as R.R. Software Inc's Janus/Ada compiler for 8080 and 8086 microcomputers; Volition Systems' Modula-2 compilers; and the Phact-dbrm Database Record Manager from Phact Associates, for programmers writing in C.

For more information, contact Rennie Frizzo at Ada Australia, 218 Lutwyche Road, Windsor 4030; phone (07) 57 9997.

Doctor! My Computer's Sick

Computer Clinic (49 Gawain Road, Bracken Ridge 4017; phone (07) 269 8573) started as a hobby when its founder, Carl Nielsen, a fully qualified electronics technician, began carrying out computer repairs in order to keep his technical skills well-honed, while maintaining a position in one of the large computer companies. After his own personal computer had broken down six times, Nielsen felt there must be a need for someone to carry out computer repairs in Brisbane, since many of the large computer suppliers were supplying service only in Sydney or Melbourne. That was late in 1981, and Computer Clinic was quickly established, with a continuous flow of equipment in need of repair.

These days a team of technicians/doctors treats the ailments of an enormous variety of computers, and can almost always find a cure for the aches and pains of various brands of disk drives, printers, terminals and other equipment.

Behind the scenes, Nielsen's wife Lauren has built up a thorough knowledge of the many different types of equipment which are serviced by the firm, and has developed a reputation as one of the best spare parts scroungers in Queensland – transplants can often give critically ill computers a new lease of life.

Purposeful Printer Purveyors

Syscom Terminals has established a firm foothold in the Queensland printer market. An offshoot of the Brisbane-based software house, Syscom, the company distributes printers from Anadex, NEC, NDK and Eaton.

Director of the company, Bob Mair, says, "In representing four of the world's leading manufacturers of quality printer products, Syscom is able to offer one of Queensland's widest ranges of character printers and accessories at the medium to high end of the market." Syscom Terminals is located at 39 Sherwood Road, Toowong 4066. Phone (07) 371 7366.

Print and Computer Supply Mart

Swiftforms Print and Computer Supplies, on the corner of Creek and Elizabeth Streets, Brisbane, bills itself as "your supermarket for computer and word processing supplies".

Munch, Chomp, Gobble

The Byte Shop first opened its doors in Newmarket Shopping Centre (93 Enoggera Road, Newmarket 4051) in 1983, and the rapid growth of the company resulted in the opening of a second branch at Taringa later that year.

The Byte Shop's products include Apple, Olivetti, Sharp and Sanyo computers, and Sylex office equipment. It also offers the complete range of Brother printers, and software for the Macintosh and IBM-PC.

Energy Control

Energy Control is a broad-based engineering company specialising in the supply and application of advanced technology in the fields of industrial instrumentation, energy systems, communications and microcomputers. The company is wholly Australian-owned and has offices at Goodna (PO Box 6502), near Brisbane, and Wellington, New Zealand.

Some of the products distributed by Energy Control in Australia are microcomputers, modems, microprocessors, memory and peripheral ICs from Rockwell International; microprocessors, memory and peripheral ICs from Synertek Incorporated; modular microcomputers from Dynatem; non-volatile bubble memory systems from Helix Laboratories Incorporated; advanced technology disk drives from the Tokyo Electric Company; economy dot matrix printers from Creative Technology Incorporated; monitors and RGB colour monitors from Yanjen Electronics; and multi-pen plotters from Hitachi.

For a more complete list of products, you may contact Energy Control on (07) 288 2455. ❑

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☐ Can be completely menu driven to eliminate having to deal with unfriendly operating system commands

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☐ 'Flex-Keys' allow single keystroke command entries

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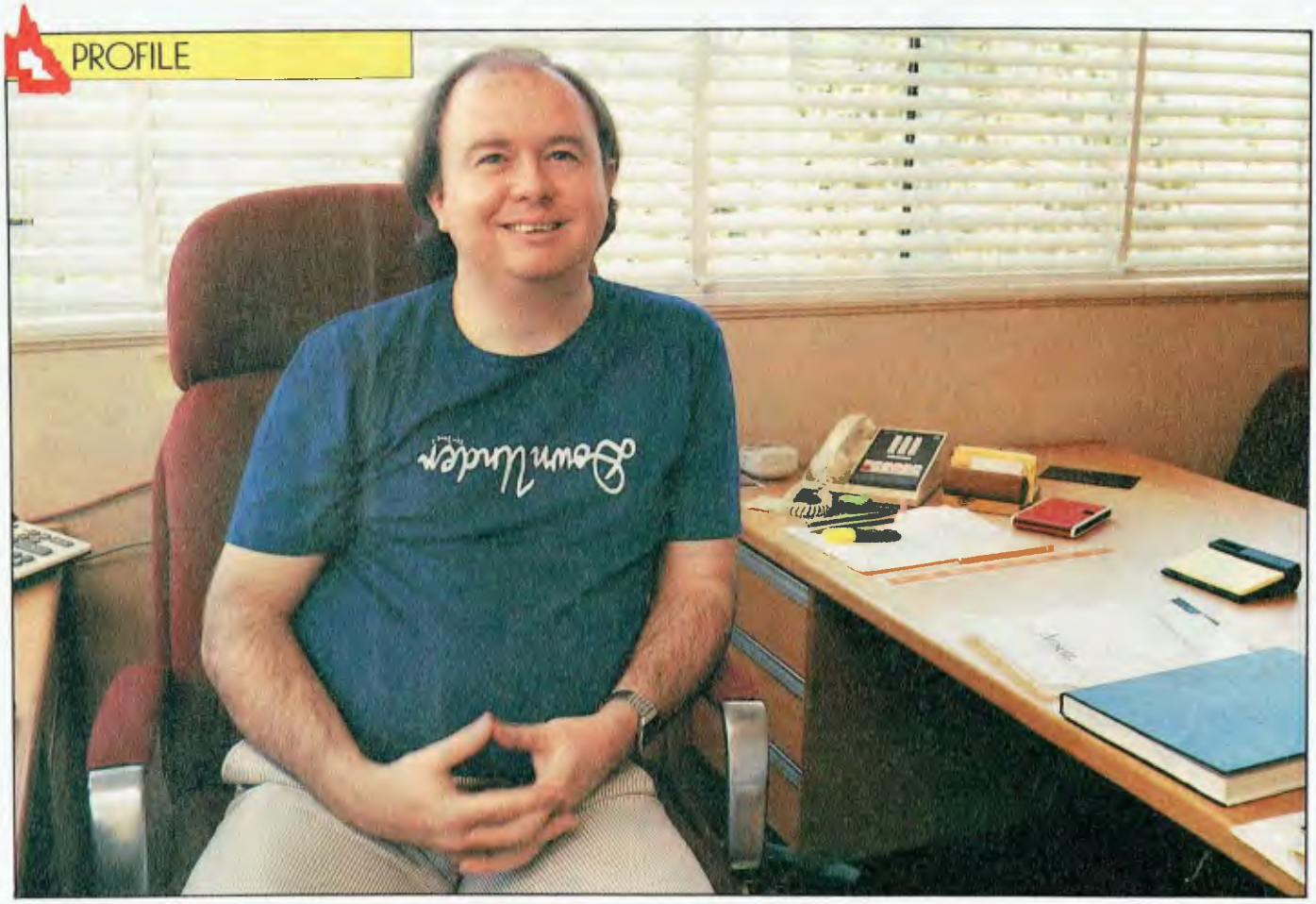
CITY PERSONAL COMPUTERS

PROFILE



By Natalie Filatoff

PETER, Peter Puppet, Peter Puppet Porsche. The progression of nicknames says a lot about Peter Iliffe and the success of Arcom Pacific, the Queensland-based software distribution company he runs in partnership with electrical engineer Ron Chernich. 'Pretentious' could never be added to the alliterative string. No pinstriped suit here – Peter doesn't preen. He's a bit of a prankster with a positive approach to life, a principled attitude to business and no time for paltry issues, details, pursuits. He is perspicacious, an entrepreneur by nature, with a penchant for the theatre – his own.

Of course, there's more to Peter Iliffe than a raid on the 'P' section of a dictionary can convey. He's casual: jeans and a T-shirt are normal office attire. He's approachable: we found half his staff in his office teasing him because he'd tidied his desk for the interview. He's enthusiastic, has a gleeful smile, and talks happily about his interests and himself, though when speaking about the computer industry and Arcom Pacific he is careful in his choice of words and conscious of being fair to anyone he mentions.

Iliffe emphasises his partnership with Chernich as one of the main reasons for the company's success. He says, "Ron has the technical knowledge and expertise. When I met him I knew almost nothing about microcomputers, whereas he'd been in micros from the very beginning and also had a mainframe background. But he's not an entrepreneur, so I believe we work well together; I couldn't have contemplated doing anything in this business without someone like him, and I don't think he would have done anything without someone like me."

Iliffe first became interested in computers in 1978, when Tandy's announcement of the TRS80 Model 1 coincided with the arrival of his tax cheque, and he decided to order one of the machines so it would arrive sometime near his birthday. It did, and he "sat there into the wee hours of the morning thinking 'Oh, this is great fun', and planning how he could use it in his business, which at that time was puppeteering.

In the Early Days

Within a few months he realised the Tandy wasn't going to satisfy his long-term needs, so while on a business trip to Adelaide, Melbourne and Sydney he visited every computer shop he could find, trying to ascertain what was available and what would suit his purposes. He describes the computer retail industry then as follows: "There weren't all that many computer shops around, and all they could show me, *maybe* show me, was a brochure. Then they'd tell me how much the computer was, ask for my money and expect me to wait three months for the goods while they imported them. Only two places sounded like they knew what they were talking about, could actually show me the equipment and give me an intelligent demonstration. One of those was Automation Statham in Sydney, which was a Sol importer, and the other was Ron Chernich, who used to sell Sols for Automation Statham out of his lounge room in Brisbane.

"One of the problems I'd found with the Tandys when they first came out was the guys in the stores knew less about them than we who'd bought one did, because they didn't even have one in the shop as a demonstration unit. It was most frustrating that you couldn't ask anyone anything about what you wanted to learn. So I bought a Sol from Ron because I figured he came

Pulling the Software Strings

We launched Your Computer *at about the same time as two Brisbane men started importing and selling software in a small way. We've both come a long way since then, but Arcom Pacific's expansion has perhaps been the more spectacular. Natalie Filatoff profiles Peter Iliffe, the man behind one of the few micro establishments we don't mind recommending to our friends.*

PETER PUPPET

from a mainframe background, he knew hardware and software, and no matter what I came up with he'd be able to answer the questions. I'm sure he regretted many times ever selling me that piece of equipment."

The two men went into partnership not long after, when Processor Technology, the Sol manufacturer, went bankrupt in the States. Chernich had the opportunity to buy five of the machines cheaply, but didn't have the capital. Iliffe offered to put up the money for half of the profits. He says, "It took us a while to sell those, but finally we wound up with $4500. We said, 'What'll we do with this? Will we take it and spend it, or will we keep going?'.

Business Funds Computer Habit!

"We said we'd keep going because then we'd be able to have the latest hardware and software to play with. The business was supposed to fund our habit. And of course we do have the latest hardware and software, and we do get to use it, but we have no time to play with it so it sort of defeated the purpose.

"That's what I really miss about the early days," he adds. "It was hard going. You spent your weekdays hard at it, but at least at nights and on weekends you used to feel you could just fiddle and have a play with the stuff. That rarely happens any more. When a new product comes in you've *got* to learn about it. You've got to be able to answer your customers' questions. You've got to come up to speed on it really quickly. It's good in a way, but I miss the fiddling. The only time I get now to have a bit of a play is when I go away on interstate trips – I always take some sort of portable with me and sit in hotel rooms at night and on weekends and have a bit of a play."

Iliffe has many stories and anecdotes to relate about 'the early days', a phrase which can strike you as a little odd, considering Arcom Pacific (then called Archive) was only formed in 1981. But the enormous changes which have occurred in the computer industry over the past few years seem to have left many young pioneers feeling like veterans.

A Backyard Industry

When Iliffe first went to America to organise the distributorship for a number of products in mid-1981 he was surprised to find that in many ways the industry there was not very different from that in Australia. "I mean, at that time we were operating out of an old bakery. It was what's termed a backyard operation, literally, because the bakery was in the backyard of the house. It was a big bakery, but they were definitely not what you would call the most salubrious surroundings. It was very practical and cheap and that's what we needed in those days, because we didn't have the huge dollar turnover so we needed to keep the overheads down.

"I went to the States," he continues, "expecting all the companies over there to be very glamorous and in nice buildings – and of course some of them were. But there were a lot of companies no different from what Archive was in those days. I went to Los Angeles one day and I had three places I wanted to go to, three ads out of magazines, three different addresses, but all vaguely in the same general area. I got to the first one and it was an apartment building, so I found it and it was in apartment four. Just as I was about to leave they said 'Where are you going next?' I told them and they said 'Oh, that's in apartment five.' So I went in there and I talked to them, and I wasn't going to try for a third one, but again they said, 'Where are you going now?' I told them I was going to Ashton Tate, and they said 'Oh, it's down in the garage.' At that time Ashton Tate was actually George Tate and two other guys, in a double garage of an apartment building, with model aeroplanes hanging from the ceiling."

Iliffe believes in making personal contacts in business, wherever possible. "From the very beginning," he says, " I spent a lot of time on the phone. I didn't write to people in America, I rang them up. I believe that helped us tremendously. I was told once I could strike up a conversation with a dog – and it was meant as a compliment."

Important Paper

Nevertheless, he's well aware of the power of the letterhead: "After we started out, I said to Ron, we need to make an impression on people; they need to remember us; we need to be visually impressive." So the first Archive letterhead was carefully designed to look tacky: the logo was sketched and held in place by sketched pins; there was a thumbprint in one corner and a smudge in the middle; and after the letter had been typed they used to put a wet coffee cup or coke bottle on it, to leave a water mark.

Says Iliffe, "It worked spectacularly well because nobody who saw it ever forgot it. Sometimes we just did a general letter, which we sent off asking for catalogues and things. One company I'd written to, I rang them up a couple of weeks later and said, ▶

One stands head and shoulders above the rest.

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Most of the remaining roses are looking very tired now.

The best one will also offer a more functional design for the users' ease. A footprint that takes up less desk space. And a choice of screens that tilt and swivel with push-button mono/colour control.

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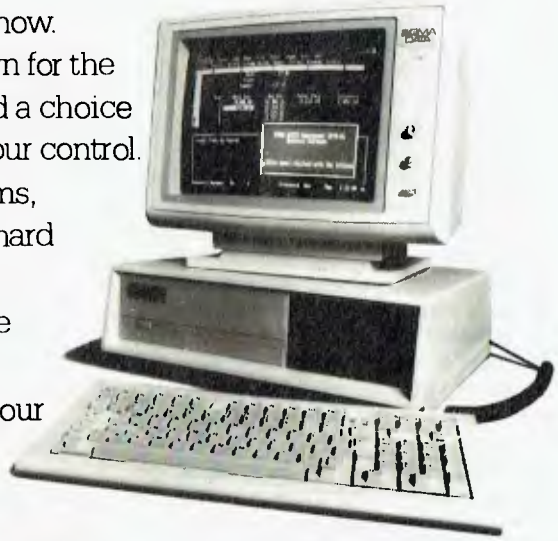
And that's the Elite from Sigma Data. To compare our rose with the rest of the garden, phone Sigma Data, Sydney on (02) 439 6211.



Elite

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Stewart Roache Watson SDC041

'I'm Peter Iliffe from Archive Computers in Australia'. He said 'Arrchive? ... Arrchive! We lerve yer letterrhaid.' I thought, 'Ah, it's successful.' People either loved or hated it, but most people loved it.

"We had business cards done similarly," he adds, "and the first ones we had printed, I had Ron's done as ROM Chernich. I never told him, he just got his cards and discovered it."

Iliffe had realised the impact things like letterheads and appearances could have at the age of sixteen, when he started importing and distributing slot cars from America. He remembers, "In the very early days of slot cars, when you couldn't buy much in the hobby shops, I had exclusive agency for two American manufacturers. They didn't know I was sixteen, of course. I went out and had some very classy letterheads printed and organised an office. Then I put on a suit and a hat and went to Sydney and Melbourne, calling on all the hobby shops. I did that for about two-and-a-half years. Apparently I'm destined to be in the pioneering days of industries."

It's funny to think that the slot car market generated more sales and represented more of a sure thing in its early days than did the computer software market. As Iliffe recalls, "To get dealer pricing from Micropro we had to buy three of the same product. We had to buy three Wordstars, and oh boy was that ever a monumental decision. 'Should we buy three? Will we ever sell three?' I remember the trauma as if it were yesterday. In fact, I remember Ron's attitude when I bought 20 dBase IIs. He thought I was mad. I could have bought just one or two, but I had to buy 20 to get a much better price. I'm a sucker for a good deal. And it took us a fair while to sell them, but it took a third as long to sell the next 20 and a third as long again to sell the next 20."

"The staff here is like a big family. We have family-like problems . . . but on the whole we get on very well. It makes a big difference. I don't think we have anyone on the staff who just 'turns up for work'."

Mutual Respect

Iliffe's business strategy certainly isn't reckless. In response to his own experiences with salesmen who didn't know anything about the products they were selling, Iliffe says, "From the beginning we sold hardware and software that we knew, that we could support, and I believe that's why we are where we are today. I don't say we've got a perfect record. Nobody has, but we've always tried. I always try to treat somebody who does business with me the way I'd like to be treated if I were doing business with someone else. That's not always possible, but if you try to do it you don't go too far wrong, I believe."

Adhering to such principles has earned Iliffe a great deal of respect and numerous good friends in the industry. He speaks of many people with affection. For example, Arcom Pacific also distributes Chuck Ellis's Nevada products (BASIC, Pilot, FORTRAN, Edit and Nevada COBOL) in Australia. Says Iliffe, "Chuck Ellis is a very nice man. I went to see him on that trip in '81, years ago, and we started selling Nevada COBOL, which sold in the States at the time for $200. He worked out of his apartment, and it was just a little business. He wasn't starving, but I don't think he was getting rich. Suddenly he dropped his price to $29.95. I rang him up to ask him what was going on. He said 'Well, a few months ago I saw an ad for JRT Pascal. The guy's selling it for $29.95, and I thought, you beauty – I'm gonna wait a few months until they go broke and then I'm gonna buy him out and I'll have a Nevada Pascal. So I waited about three months and I went down to his office. He wasn't around, but I asked the girl there 'Are you selling many?' She said, 'Oh, about a thousand in the last week.'. Well, I came back home, got onto the phone and called my friend John Starkweather, and I said, 'Guess what we're gonna do?'"

"In actual fact, his wish came true," continues Iliffe, "because not long ago JRT Pascal went bankrupt and he bought them out, and he now has a Nevada Pascal. He's a great guy. He lives near the harbour in San Francisco, and I rang him on the day before the final of the America's Cup to order some products. I gave him the shipping instructions and he said, 'Ba the way, if you win at the race tomorrow I'm gonna send tha books to ya ba air and the disks ba sea'."

Iliffe also has great affection for his staff. Of his "20-odd" employees, he says, "The staff here is like a big family," which sounds like a cliche until he adds, "We have family-type problems, we all get on each other's nerves and we get annoyed with each other at times, but on the whole we get on very well. It makes a big difference. I don't think we have anyone on the staff who just 'turns up for work'."

Itinerant Workers

Until recently, neither Chernich nor Iliffe has led a normal working life in ▶

PETER ILIFFE

regard to Arcom Pacific. Chernich only gave up his full-time job at ICL in January this year, and Iliffe still disappears for some months of the year to take his puppet shows around Australia.

Iliffe began puppeteering when he was in his teens. His father hosted children's shows first on radio and then on television, and his mother started the first theatrical agency in Brisbane in 1954, so he had always had contact with the performing arts. He says, "The artists who worked for Mum used to teach me things. There was a Hungarian magician, an Australian juggler and another guy who used to teach me all sorts of bits and pieces. When I was about 17 somebody needed a puppeteer, to be on Dad's show actually, but they contacted Mum looking for someone who could do it. Because they used to tape a week's shows on a Monday afternoon, and all the puppeteers had regular jobs, none of them could do it. One of them suggested to Mum that I could do it, and said he'd teach me. So he did and I started doing puppet segments on Dad's show."

Iliffe finished his high school education by winning a scholarship to go to university, where he began studying engineering. But he found the teaching methods and philosophies left him totally unenthused, so he left to go overseas. When he returned, his mother bought a small puppet show and together they travelled around Australia, performing in a caravan-style theatre.

"For the first five years we spent about nine months of the year away from Brisbane in two tours. We had one of the first motor homes in the country. We worked all around the country. They were wonderful times, but you eventually get very sick of living out of suitcases and motor homes, and staying in caravan parks in the wet weather and the mud and things. So, we decided we needed a change and came back to Brisbane."

Taking Risks

In 1976 they built the first theatre puppet show: "It was a very big undertaking. Seven of us worked for three months, day and night, seven days a week, to build it. We'd never done anything like it. We didn't know if it would be a success. We had somebody going out and calling on all the schools, getting them to come. We rented the Twelfth Night Theatre for three weeks. It was a big risk. It cost us a fortune. But before we'd even finished building the show, the guy who was going out selling to schools had us all booked up. We had three weeks booked solid and 18,000 kids coming. Three weeks before it was due to open, the puppets weren't finished – oh, look, it was trauma beyond belief. It's been a stunning success ever since the day it opened."

The group still performs this first show, called Bee's Hay, and a second production, Spring, each year. Iliffe talks about his puppetry with fervour, explaining music, theme, and technicalities. He loves the fact that he can bring pleasure to an audience, and the teamwork involved in staging a theatrical production.

In early 1983, the theatre which he had rented for the first theatre puppet show came up for sale. Says Iliffe, "It was as good to Mum and me as it is for some people winning a million dollars in the casket – not that I wouldn't like to do that, too. We didn't have any money, but we put in a tender for it and got it. Then we went out and raised every cent from a finance company.

"If we had our pick of any theatre we've ever played in in Australia to buy, this is the one we'd choose. It's just up the road, and it seats 400 people. It's a beautiful theatre for children and for adults. It's very intimate. You can see and hear well from every seat."

But by May this year a run of bad luck, with cancelled bookings and so on, had left the theatre severely in debt. "Things were looking glum," says Iliffe. "We'd never, up to that point, considered staging a show ourselves because it's such a risk. And out of the blue ... I don't believe in fate as such, but I believe I've been very lucky in my life ... we had the opportunity to buy a hit show and put it on in a time when we had nothing on in the theatre. We thought very hard about it, but we did it and it was a roaring success. It got us out of the hole we were in. We had two days to luxuriate in its success and we were offered another show. We had to go through all the agony of wondering whether we should risk the money we'd just got back."

The Iliffes took the risk again, and the second show was also a hit. "Now we've got a couple of others we're committed to," the puppeteer grins, "but we're trying to get together the equivalent of a betting fund, so that when we have a flop, which is guaranteed, it won't destroy us. It may take a while, and the smarter we are and the luckier we are the longer it will take, but there's no way we won't have a flop. It's like being a tightrope walker – it's really exciting, but it's very nerve-racking. "

Tickets on Himself

The theatre now employs several full-time staff, and in the basement Iliffe also runs his own ticket-printing operation. When he was looking at the feasibility of buying a printing machine, Iliffe canvassed numerous theatre companies, and the Brisbane ballet and opera companies, to see if they would give their printing custom to him. Most said they would, but not until their present supply had run out, which was generally in about six months' time.

Iliffe went home, ready to can the idea, at least for a while, and the next day someone from Melbourne phoned him asking "I hear you print theatre tickets?" And so the company Ticket Type came into being. Iliffe recently purchased a typesetting machine, and has had to upgrade his printer. He prints tickets for theatres all over Australia and lands such sizable contracts as that for the Torvill and Dean appearances at the Sydney Entertainment Centre earlier this year and Victoria's VFL grand final. He also prints his own theatre programmes and some of the manuals for software sold through Arcom Pacific.

How does he juggle such a diversity of interests? "I don't know," he says. "Sometimes I don't do it all well enough. I am by nature an entrepreneur. I don't have time for detail. I get bored very quickly just sitting doing the same thing day in, day out. But I learn things about one business from the other. Things I learn at the theatre I apply at Arcom and vice versa, and I think they both benefit from my different experiences."

The Porsche is a vital link, too – it shuttles him from theatre company to software company and back again. In early letters to software dealers, Iliffe and Chernich alerted them to the fact that they both wanted to own Porsches within a certain amount of time, and were even considering incorporating a sketched thermometer into the letterhead which would indicate how close they were to achieving their goal. Pert? Presumptuous? Pretty smart. ❑

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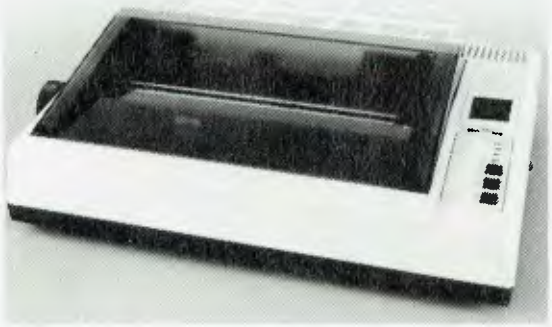

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Rip-Off?

I HAVE ONLY recently started buying your magazine, so it is possible that you may have answered my query at some stage in the past. My problem is that I have a TRS-80 model 1, which I use mainly for developing small microprocessor projects. My main interest in off-the-shelf software packages therefore tends toward development aids. Understandably, as the market for these types of programs in Australia is small, there are precious few available. Like others I have resorted to importing such programs.

Now, when the items enter this country (generally on floppy disks) I am being charged 35 per cent customs duty and sales tax of 20 per cent on 1.2 times the original price converted into Australian dollars plus duty.

Leaving aside the question of the morality of charging a tax on the duty, I can't help feeling I am being ripped off. When I see ads in your magazine from companies offering software from overseas sources at comparable prices to that charged in the source country, I can't help feeling that even allowing for distributor discounts and so on that they can't be paying the same customs charges as myself. I am sure other readers in a similar situation to myself would be interested in knowing just what the duty on imported software is. Am I being taken because of a mistake by the local customs office or, not?

NAME WITHHELD
Western Australia.

There's no mistake – you were charged the going rates. However, the good news is that the Federal Government has recently made drastic cuts to import duties on computer products. Duty on computer hardware has been reduced from a range of five to 24 per cent to a minimum of two per cent. Software duty, which was five to 35 per cent, has been abolished.

Interesting, Enlightening

MY FIRST purchase of *Your Computer* was the April 1984 issue. I have become increasingly interested in computer hardware and software, as I operate a DataPoint 1560 within the insurance industry.

Lately i have purchased other magazines about computers, but I find *Your Computer* the most interesting and enlightening periodical of them all. Because of this I look forward to purchasing your magazine and gaining useful knowledge from it each month.

MICHELLE O'BRIEN,
Hawthorne, Qld

WHILE IT was pleasing to see *Your Computer* featuring educational computing in both the August and September issues, I was dismayed to read serious inaccuracies and omissions in your account of educational computing in Victoria. I wish to present the following facts to your readers in order to correct any erroneous impressions they may have received regarding the Victorian Education Department's support for computers in education.

The article on page 33 of your August issue states the Department's main initiative in supporting computer education is a seven-person task force. The task force was in fact replaced at the end of 1983 by a State Computer Education Centre, which has a professional staff allocation of eleven, and twelve Regional Computer Education Centres which are each managed by a trained teacher. The scope of the State Centre is wider than that indicated for the task force. It covers on-going evaluation and recommendation of hardware and software, in-service education, the writing and distribution of software and software support materials, provision of publications and advice to schools, and special projects such as the design of an on-line electronic mail and information system.

The Regional Centres provide in-service courses to a wide range of teachers, with the emphasis being on hands-on experience in using the systems recommended in Victoria. The Centres also function as drop-in and display centres for all those interested in educational computing. We believe the twelve Regional Centres are a unique initiative in Australia, in making computer education more accessible to teachers. They should certainly have been mentioned in any state-by-state survey of services available in computer education.

In the same article, your list of Victorian Education Department's recommendations for computer systems for schools is incorrect. The first and only recommendations made so far were announced in March 1984. The three systems recommended are the Apple IIE, the Commodore 64 and the Pulsar 6000.

There is a significant omission from your account in your August article of the financial assistance available to Victorian schools for computer purchases. You do not mention that schools which purchase a recommended system have been eligible, since the beginning of 1984, for a rebate of $250. This scheme is a systematic way of ensuring that some finance is available to even the smallest schools to get into computing.

In your September issue you praise South Australia and Tasmania for their efforts in educational computing, but dismiss the other states as being confused and lacking clear directions. This charge certainly does not apply to Victoria. We have had a clearly delineated computer education policy since October 1983. It is currently being faithfully and effectively implemented across the state. I invite you to inform your readers on the implementation of our policy in a future article, and would be happy to provide you with accurate information for such an article.

GRAEME INCHLEY,
Senior Computer Education Officer,
Victorian Education Department.

I'm happy to be able to say we have been planning a comprehensive article on the *current* situation of computer education in various states for some time (and after over five weeks of writing letters and making numerous, often frustrating, calls to the various education departments, our correspondent has finally received the information necessary to actually begin writing). The article will appear in a one-off magazine devoted to computers in Australian education, which will be published in early January, 1985.

As for the article you mention ('State Policies Tied Up in Red Tape?'), which was published in our August issue, I understand your finding the section on Victoria and seeing red. However, the introduction to the piece states quite clearly that the information was taken from a government report published in late 1983. We made no pretence of publishing up-to-the-minute information in this instance, simply because, although we contacted education departments several times, we could get no clear statement from them as to the actual situation. So we were forced, for that issue, to rely on the latest printed information we could find: a report published in late 1983.

The main reason for printing this information, even though it stood a chance of being slightly out of date, was also mentioned in the introduction to the article: to illustrate the diversity of approaches being taken by different states to an issue that many consider would benefit from a more coherent national policy. While Victoria has undoubtedly advanced considerably in the implementation of computers in schools since the publishing of this Commonwealth Schools Commission Report, you would have to agree we are no closer to seeing uniformity in this area.

You refer also to the article 'The States that have got it together' in our September issue. I think you've chosen to misinterpret what was written. While we certainly did praise Tasmania and South Australia, this doesn't imply a dismissal of the other states, particularly given the context of that small piece, which was published within an article on a New South Wales computer education body. The praise for Tasmania and South Australia was in recognition of the fact that they had taken the initiative to develop and implement computer education policies several years ago, while, as you point out, Victoria has had a clearly delineated policy only since late 1983.

The state I really owe an apology to is Western Australia, where a Schools Computing Branch has been in operation since 1977 and has achieved a great deal, including the development of some excellent educational software. Western Australia certainly deserved to be included in the article on more advanced states, and we'll be rectifying this omission in the computers in education magazine mentioned above.

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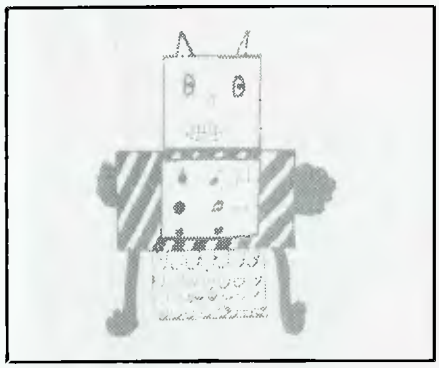

As we've pointed out in our recent features on computers in Australian education, most of what's happened in the area so far has been the result of the efforts of some dedicated individuals rather than concerted planning by the states' education departments. At a conference on this issue held at Macquarie University recently, teachers, experts and educationalists of all kinds met to discuss both what's started to happen and what they feel should happen in the near future.

THE DREAMS AND REALITY OF COMPUTER EDUCATION

By Natalie Filatoff

THE 700 OR SO delegates to Australia's second Computer Education Conference, held at Sydney's Macquarie University from September 3 to 5, were offered a great deal of data for assimilation and processing. Under the overall theme of 'Education and Computers: Dreams and Reality', the main issues of teacher training, curriculum development, the actual use of computers in the classroom, software, and the importance of understanding information technology were further divided into seminars and workshops to suit teachers of infant, primary, secondary and tertiary students, and teachers at different levels of computer literacy.

Feelings of excitement, frustration and foreboding were all evident, fanned by often-encountered words of mixed import like 'enthusiasm', 'evaluation' and 'backlash'. It seemed a difficult task for anyone to take home, compute and recode such a volume of practical and theoretical information into a form suitable for input into their configuration of school.

The problem is that Australian computer education seems to be developing in the isolation of individual schools, or at least under the directives of a myriad of different groups. Added to this, the states all have their own policies, some of which were implemented before the Federal Government had even addressed the issue. Now, with the allocation of funds from both federal and state sources, schools have been faced with the requirement to spend this year's allocation this year, or lose it; and then perhaps have future funding cut on the basis that they didn't use it the first time so they obviously couldn't need as much again.

For these and other reasons, like the fear of being left behind, there's been a helter-skelter to at least get computers into the schools. Back-up, in the form of teacher training, and ascertaining what kind of software is desirable for use in schools, has been terribly inadequate. And often the reason for introducing this new technology to students has been forgotten, misunderstood or obscured. The upshot of all this is the evolution of what one speaker described as a very "patchy" use of computers in Australian education.

The speakers at ACEC, all leaders in the field of computer education, therefore placed great emphasis on the need to review and revise the results of this hasty period.

Why Use Computers in Schools?

Why should we be concerned to ensure that children become computer literate? According to those running the seminars at ACEC, we should not be doing it because 'computers are everywhere and kids need to know about them'. Said Roger McShane, Co-ordinator of Educational Computing in Tasmania, "If I could think of any reason *not* to introduce computers in schools, that would be it. There's a computer controlling certain functions of my car and of my oven, and I don't need to know how they work.

"Then, there's the other view, that we don't teach aeroplane literacy or car literacy, so why teach computer literacy? The answer to this is that society as a whole knows the place of planes and cars in society. Unfortunately, at the moment, society doesn't understand the place of computers in society."

In the seminar he presented with Sue Dyson (Education Officer at Tasmania's Elizabeth Computer Centre), entitled 'The Educational Implications of the Information Society', McShane said, "The use of computers in schools is closely bound up with the concept of the information society. What we should be studying is the question of information and the process of information processing and retrieval. We need to ensure that we don't get a society with an information-rich group and an information-poor group. Kids need to be familiar with computers. They need to know how information is stored and how to access it. This doesn't mean children need to learn to program. They *don't* need to learn to program to get a job or understand information technology."

In light of these considerations, children in Tasmanian schools are, among other things, encouraged to use databases for research. Also, every school in Tasmania can link through Austpac for access to the AAP news service, and electronic penfriending systems have been set up with other countries.

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fabricated by advertisers trying to win the consumer, and eagerly grasped by people living in an age of high unemployment.

Said Jim Sully, Superintendent of Schools Computing in Western Australia, in a presentation entitled 'The Coming Backlash Against Computer Education', "A large number of parents are buying computers to give their kids a better education, because advertising says it will help the kids in future employment, for entertainment, and because Mum or Dad wants to get their hands on one. But the time is going to come when the hype goes out of computer advertising. Parents and then teachers will ask why they bought computers, and there's no solid evidence that having a computer in the home will give the kids a better chance of getting a job.

"That's why," he explained, "we might start feeling the backlash. People will perhaps begin to withdraw money and support. At the moment computers are on a high – Cuisinaire rods were once on a high."

Roger McShane added, "The backlash will come from administrators who don't want to spend money, and from journalists who will comfort the administrators in their opinion."

A Defensive Based on Evaluation

In order to prepare for this backlash, Sully urged delegates to help implement evaluation processes which would ensure that what is carried out in schools in the way of computer education is desirable, that it is both improving on previous ways of teaching and preparing students for life in an information society.

He said, "We have to be able to defend ourselves. To defend ourselves we have to evaluate what we're doing so we can say what we're doing is good – and that we have found the bad things about it and canned them."

To this he added, "Most evaluation is done on an emotive basis, not on a scientific basis. We tend to hold back on scientific evaluation because the answer might be bad. But resistance to competent evaluation cannot be defended by those who lay claim to professionalism."

Along these lines, the Western Australian Education Department has sought tough independent reviews of its own educational programs now marketed under the Wesoft name.

Other such reviews will be published in a journal called *Wesrev*. Also a project of the Education Department of Western Australia, *Wesrev* aims to collect suitable software from various countries around the world and Australia for evaluation. The resulting collection of reviews is available by subscription to all who are interested. (For details, contact Kevan Pentar, Education Department of Western Australia, 151 Royal St, West Perth 6000.)

Of Teachers, Software and Computers

Even given the most competent reviews, teachers still need to be able to recognise what software will suit their style of teaching, their class and their configuration of computer – and how to use it in the classroom. The highest proportion of time on the ACEC schedule was allocated to both seminars and workshops aimed at helping teachers become more confident and effective in these areas.

In his welcoming speech to the conference, the Vice-Chancellor of Macquarie University quoted Professor Alfred Bork as once having written, "Whether computer education is better than what went before depends on the quality of the software." Bork, who is involved in research and development at the Educational Technology Centre at the University of California in Irvine, and is recognised as an authority in computer education, was the first guest speaker at the conference. The thrust of his presentation centred around his concern that there was no evidence that computers were being used, anywhere in the world, to actually improve education. Of the available software he said, "There's very little educational software around that can be described as other than garbage."

Such comments were based on his belief that, "Computers will become the dominant delivery system for learning. We're going to move to a system where computers are dominant in terms of time spent by students learning on computers. The bad reasons for this are, firstly, that computers are cheaper delivery systems than teachers (considering the individual attention they can give), and secondly, the large profits to be made by companies involved in supplying equipment and materials. In societies like ours, these are likely to be the dominant factors. But they do not assure us that computers will be used to improve education."

Thus, a number of the projects carried out at the Educational Technology Centre involve development of programs which firstly give students individual attention not available from teachers and therefore allow them to study things they would not have been able to study before the advent of computers in learning; and which secondly do this in a way that is interesting, stimulating and effective.

As an example of methods Bork and his colleagues do not find interesting, stimulating or effective, the Professor said, "We regard multiple choice as the work of the devil, and not suitable for human beings."

Development of software at the Irvine centre is done in stages. Teachers do the actual authoring and design of the program. Said Bork, "The authors don't use computers. They don't have to worry about how their work gets coded, just as they wouldn't have to worry about how a printing press works for writing a book. Professional programmers are employed to carry out the coding. This method uses the time of good teachers effectively."

For evaluating software, Bork said public libraries had been found particularly useful. "People can come up to apparently unattended computers (a concealed observer or video camera is employed to monitor reactions) and start a program. You can see whether the program is free-standing – that is, whether people can get it running – and where programs fall down motivationally, where people get up and walk away." The resulting observations are then used to refine the program, and further tests are carried out.

Bork believes the key to producing good programs is "to produce coherent, sizable material." He said, "You have to look at full-scale development." The average two-hour program produced by the Educational Technology Centre uses 150,000 lines of Pascal and costs $20,000 to develop. Jim Sully verified these costs as being similar to what has been spent on some programs developed in Western Australia.

Teacher's Choice

So while institutes of learning and education departments are producing software which is designed by teachers to complement the school curriculum, there is still a vast amount of commercial software available which doesn't have the same credibility as far as educational backing is concerned. How can ▶

THE DREAMS AND REALITY OF COMPUTER EDUCATION

teachers differentiate between the good and the bad?

David Squires from the Computers in the Curriculum Project at Chelsea College of the University of London said, "Teachers should aim to form a functional, intuitive view of software," and listed five main points for consideration:

- **Power** – Is the software enabling you to do something different from what you'd normally be doing? Does it utilise the capabilities of the micro?
- **Relevance** – Is it useful in your classroom setting? To the curriculum? To your teaching style? To the age level you are addressing?
- **Reliability** – Is it robust? Will it run? If it runs in the store, will it run on the configuration of machine you've got in your school? Will it continue to run? If you type things that are inappropriate, will it cope with them? Does the documentation itemise possible problems?
- **Access** – Is it easy to use for first-time users? Is the documentation designed to enlighten you? Is the reading level right for the audience? Is the way in which the program operates simple? (However, beware of something that is dead easy to run initially, but is not able to address growing needs and expectations.)
- **Integrity** – Is it really a piece of educational material? Are the claims associated with the software valid?

Education as an Adventure

"Programs don't necessarily have to conform to the curriculum," according to Roger McShane. "Computers can be used to introduce new areas that we've never been able to discuss before. For example, I think Adventure games have a great deal to offer in the area of language development and in stimulating activity in the classroom.

"We've had groups using these, and the kids would try to beat each other through the game. They started to keep log books, started to write about what they'd done, started to talk to each other more effectively, started to act out scenes as they imagined they would happen in the game. Adventure games can become the centre of a whole range of classroom activities – but teachers need to know how to use them."

Just Answer the Question

What then of software in the 'Drill and Practice' style? There has already been a tremendous backlash against such programs, which are said by many to embody exactly the kind of automaton-like teaching which should be eradicated from all areas of education.

Bronwen Thompson, a primary teacher at Denistone East Public School in Sydney, gave an extremely practical talk on how teachers at her school had managed to introduce computers into the classroom, and how both learning from computers in the form of drill and practice exercises, and learning with computers by using them for word processing, had been found useful.

Most classrooms at Denistone East apparently have one computer, and the school also has a computer room with about ten machines. In the classroom, the computer is looked after by the children, either on a roster basis, or with specific tasks assigned to different pupils. Initially, two children at a time were allowed to use the machine. Said Thompson, "A lot of kids are not confident, so two kids can usually bolster each other. This worked well when we started, but later one child would usually start to dominate, so the other would end up waiting. We then moved onto a roster system of single use."

In this kind of single-use mode children are given exercises to do, most of them drill and practice, which will help them in their weak areas. The exercises are done during class time, while the other children continue with normal lessons. "I keep a name chart near the computer," said Thompson. "It might say, for example, 'Rachel, do fractions practice'. She does it, taps whoever is next on the shoulder, he goes up and it might say, 'Joe, do punctuation'."

The computer room is utilised for activities like creative writing using word processing. Said Thompson, "This allows us to encourage children to think up their own ideas, type them in and then go back and polish them up."

Thompson and other speakers also encouraged teacher delegates to seek the help of parents in things like supervising computer room activities. "Parent helpers," said Thompson, "don't need to know anything about computers. They are there to prevent panic situations." If something goes wrong they are there to take the student through a sequence of steps – clearly shown on a chart on the wall – to ascertain what might have been omitted or performed incorrectly. Parents familiar with computers can also be asked to help with technical problems, like deleting the music from a program that is distracting the rest of the class.

A One-to-36 Relationship

The 'one computer to a classroom' situation is seen as representing reality for most Australian schools for some time to come. And, according to one guest speaker involved in research into the dynamics of teacher/student/computer relations in Britain, that might be the most desirable ratio.

Rosemary Fraser, who works with the ITMA (Investigation on Teaching ▶

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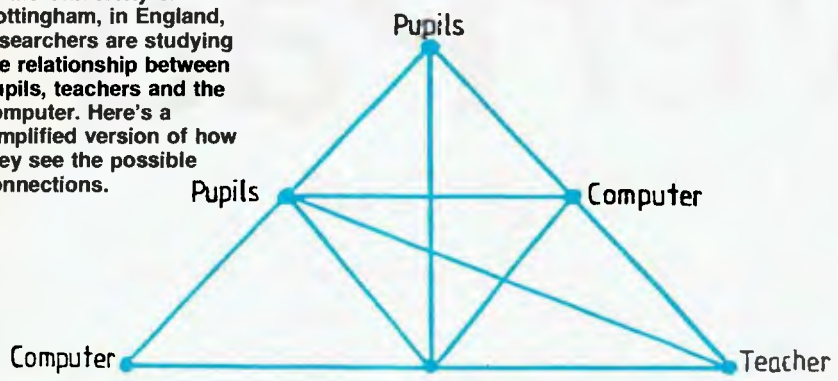
At the University of Nottingham, in England, researchers are studying the relationship between pupils, teachers and the computer. Here's a simplified version of how they see the possible connections.



with Microcomputers as an Aid) Collaboration at the Shell Centre for Mathematical Education, University of Nottingham, England, said, "Having five or six machines in the room doesn't necessarily work better than having one. Having a computer in the classroom as a teacher assistant gives the teacher quite a lot of freedom to change roles (say from classroom manager to fellow pupil), and it allows children to imitate roles (such as that of explainer, or task setter). We've been analysing what each partner does and how the actions and roles of one affect the other. We observed that responsibilities were shifted and shared.

"This shifting and sharing of roles is directly linked to a much more balanced pattern of pupil learning activities, with more problem solving, investigative work and a less total emphasis on technical drill. *Role imitation is better than rule imitation*, and we're not sure that this interaction wouldn't be diminished by having more computers in a room."

Computer-Generated Activities

On choosing software to support such learning situations, Fraser said, "It seems more important what is left out of a program than what is put in. You have to leave something for the children to do. It's very tempting, with graphics and so on, to let the computer do it all."

Two comments of Roger McShane's also bear thinking about in relation to this theory. First, "The work you do away from the computer is just as important, if not more important, than what you do at the computer. The computer can be a stimulus." This line of thinking can well be implemented on one classroom computer.

And, "There's a fine line to tread in the style of software we produce. The programs we do aren't nearly as flashy as some business and commercial software. I think we're going to be criticised for it, and that it's going to be part of the backlash." According to Fraser, programs don't need to be flashy to be effective. So it seems it's necessary to alert potential critics to such misconceptions.

Time vs Computer Confidence

The strongest need to emerge from all discussions about software and the use of computers in the classroom is to overcome the lack of teachers who are confident with computer technology and innovative enough to make use of all kinds of software – in ways that represent an improvement on previous teaching methods.

At the moment, teachers can either teach themselves about computers, attend in-service courses, depend on a computer resource teacher to help them in what to do, or attend such events as the Computer Education Conference. Some computer manufacturers are also offering to train teachers in the use of their machines. Most teacher training institutions are only now beginning to make some form of computer studies compulsory for student teachers.

The biggest obstruction to any of these options is time. It's time-consuming to teach yourself about computers; in-service courses require that you take time from your work, and it's not easy to organise relief teachers so that every teacher can receive in-service training; most schools don't have a computer resource teacher, but if they do teachers have to find time to ask for their advice. The matter of pre-service courses also involves time. The curriculum for trainee teachers is apparently already full with necessities, so some institutions are talking about implementing courses which give a total of 20 hours' introductory work with computers – that doesn't seem enough for the kind of confidence and competence required to use computers effectively. There could well be a backlash from within the teaching profession if these problems can't be tackled in a more satisfactory manner.

As one delegate said in a discussion following the presentation of papers on the issue of professional development, "Our school was looking to form a computer education policy. We surveyed the teachers, and two feelings came across very strongly: anger and fear. They were fearful about being required to pick up a whole new area of methodology – that's how they saw it – and to implement it in their courses. The anger came from the fact that they could see they wouldn't be given proper support to do that ..."

Bug Money

Clearly there are still a few big bugs in the computer education programme. But there's plenty of enthusiasm around, as the teachers and speakers at ACEC demonstrated. What the programme can't afford is a backlash which might reduce funding and curtail activities. In fact, it probably needs more money to buy more teacher time, and to pay for the evaluation of the current state of affairs so that only the most desirable aspects are continued.

That might sound greedy in view of the recent government allocations to computer education, but as Roger McShane pointed out, the stakes involve more than just having future generations who can use a keyboard, program or do word processing.

We Want to be Rich

Joyce Hakansson, a guest speaker from the United States, reiterated Roger's feelings when she said, "The industrial revolution amplified man's muscle, the computer amplifies man's brain. There will be personal power in having access to information in the new society, so everyone must have access to it. We choose to live in a democracy, and you can't have a democracy with big gaps between haves and have-nots." ❑

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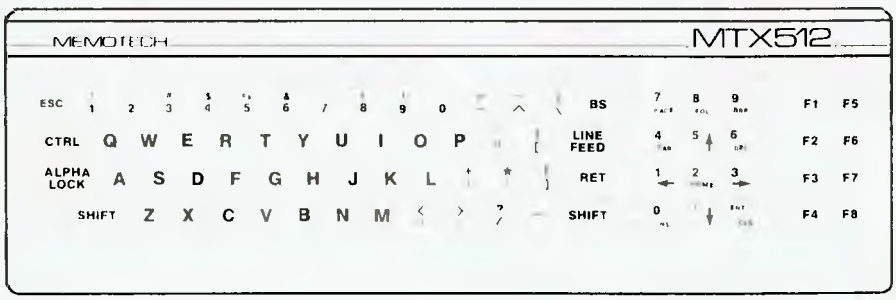
MEMOTECH 500 AND 512

The British company Memotech has been selling its MTX 500 and 512 (32K and 64K RAM, plus video RAM, respectively) computers in Australia for around nine months. Lance Wilson reviewed one and found it has some unusual features not offered by other machines of around the same market price.

THE SLEEK Panther-black of the Memotech machine's anodised aluminium case contrasts starkly with the grey and green plastics of its main competitors. This casing material gives the dual benefits of heat-sinking and interference shielding, and it seems somewhat bizarre that so few manufacturers have gone this quality route in construction. Despite its metal casing, the MTX is extremely light. (One hopes Memotech will see the logical development of this: stack some of the boards on top of each other with keypads re-arranged or externalised, to halve the length, and bring out a portable version.)

Aesthetics aside, I was impressed by how easy it was to use the keyboard. A standard QWERTY alphanumeric layout is supplemented by a pair of keypads: one dual-purpose for cursor control and numeric entry; and the other for functions – both built-in or user-programmable. The function keypad is implemented by branching in response to the ASCII codes provided. Cursor keys include HOME, EOL (deletes all characters following in the line), a CLS key, and a BRK key to interrupt programs. Due to the editing and list-screen format of the MTX, the vertical shift keys provided do not allow full screen editing. Also on this pad are a one-character DELETE key, and INSERT and PAGE/SCROLL toggles.

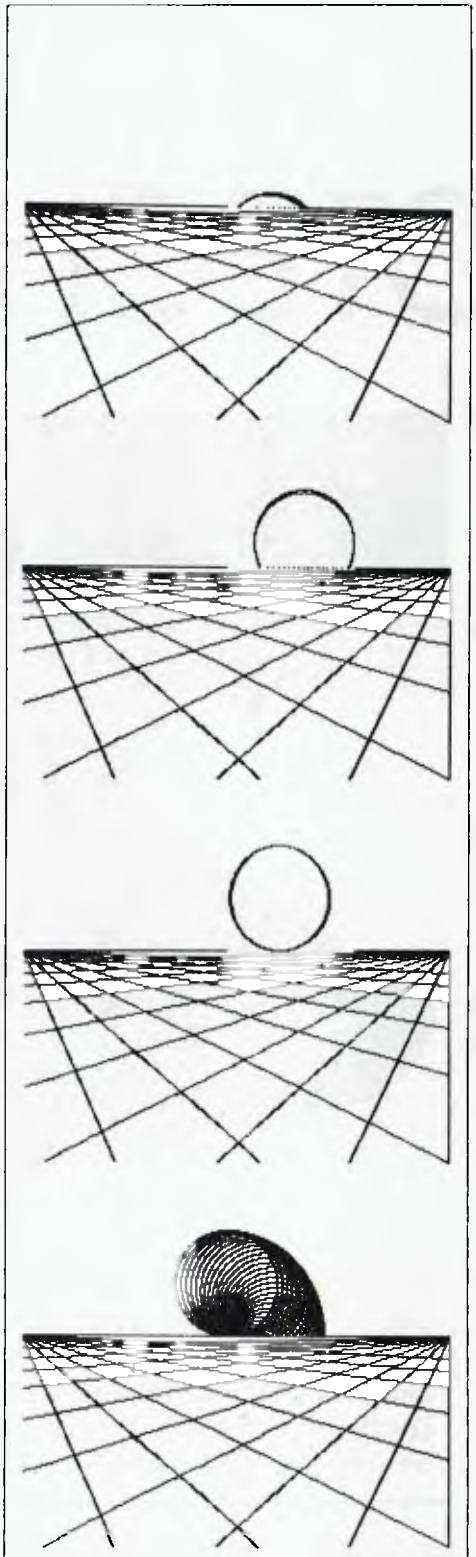
The case is in the shape of a tapered wedge, which you can open by unscrewing the end-plates to reveal the tightly designed complex of



circuit boards. A line of ports takes up the full rear length of the machine: there is provision for two joysticks, cassette in and out, a PAL-modulated TV socket, and a composite video outlet for monitors (RGB comes on the optional 80-column board). There is also a cartridge port, and a Centronics printer interface which is easily mated to the cheaper dot-matrix printers on the market – unfortunately, the cable from the local dealer costs a somewhat exorbitant $50. To avoid the distorting process of using the PAL modulator, the audio output has an additional hi-fi socket which allows you to connect to your stereo. Although these interfaces do not match those of the rather costly BBC computer (for example, the machine lacks an RS232 port as standard), for its price the MTX offers almost everything one might desire in link-up terms (either as standard or as an option). NODE/RING software and hardware will also be available, to provide a networking facility for teaching or professional applications.

Display and Memory

Text display on the MTX is the standard 40 characters by 24 lines (32 characters in graphics mode). An 80-column card, which mounts in the disk drive housing, is optional. The machine has a standard character set, as well as French, German, Spanish and Swedish character sets. Although these additional sets originate in the 24K of ROM, the one in current use is held in video RAM (which is separate from the 32K or 64K of user RAM) and accessed by ASCII codes from the keyboard. Since dot-matrix printers use their own character sets (stored in their ROM) for LPRINT instructions, these special characters may only be printed out by a screen dump when they are displayed in graphics mode. In addition, there are 25 user-definable characters available for the ASCII codes 129 to 154. You can even redefine the standard characters to produce, for example, Gothic, or Japanese Hiragana or Katakana characters. This is achieved using a GENPAT command from BASIC; since such redefined characters are held in RAM, they are lost with power OFF, so need to be stored in magnetic memory.



A sample printout of the Memotech's graphics capabilities.

It is in the areas of keyboard and display that the MTX comes closest to what one might term faults. Although the keyboard is of the very highest quality in feel and layout, some keys have a tendency to bounce; since software controls the time between keyboard checks there should be a software remedy, either in RAM or ROM. The problem often improves if you carry out a 'cold re-start'.

The other problem is, with a TV monitor, circles appear slightly elliptical. The machine's video chip is of the TI 9918 series, the same as specified by the MSX standard. Apparently, the European version, TMS 9929A, produces this aberration on PAL systems, which has so far appeared on Oric and Memotech computers in the UK.

One important aspect of the display is that the TI Video Display Generator is interfaced to its own 16K of video RAM, leaving virtually all the standard RAM accessible to the user. In BASIC, information (such as user programs) passes from the 'front end' to VRAM via the VDG, using commands like PRINT, PLOT, and so on. Information can be brought across from VRAM using the GR$ (x, y, n) and SPK$ commands, which can be used for screen dumps or transfer to arrays for storage output. Note, not many of the Memotech's competitors in the same price range offer the facility of separate VRAM, or such ease of programming. If all this RAM is still inadequate, boards are available to extend it to 512K, addressed in pages.

Graphics Use

As a personal application I have been able to utilise the MTX's extensive graphics capabilities in several areas of electronics problems. Multicolour graphics of load line analysis for a transistor amplifier, as well as the circuits themselves, were easily obtained from BASIC, using such standard commands as CIRCLE, PLOT and LINE. Similarly, using the 100-hour built-in digital clock, I was able, with a few instructions, to program the MTX to display an analogue clock face on which the

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There are two graphics modes – text and multicolour – which can be controlled via assembly language or the BASIC commands provided. These include the GENPAT command for made-to-order sprites or characters, and others to control their movement.

There are 31 planes on which the sprites can be placed, with a foreground and background plane behind these. It is also possible to control the framing by a VIEW command which controls the window onto these visuals. Display control is by a TMS 9918 chip.

With the virtual text and graphics screens which one can set up on the MTX, it is possible to switch between textual and display material under simple program control. Contributing to this ease of interaction is the built-in text handling language NODDY, which is also accessed from BASIC. This language operates via virtual text screens, treated as pages which can be called by simple NODDY commands. Possible applications would include programmed learning material, providing text in accordance with response.

There is also the option of changing the character font to various alphabets.

This abundance of goodies aside, for me the great strength of the Memotech machine is the facilities offered to the machine language programmer. Apart from the integral assembler/disassembler, which interfaces directly with BASIC, the command PANEL drops you into a mode where any memory locations may be hex-displayed or disassembled. Although it doesn't seem possible to dump this display to a printer, a bit of judicious programming does enable you to output hex values and assembly listings to the trusty CP80.

Sound

The MTX's sound capabilities are among the best around at the moment. The chip used is the 74689A (three tone channels and one noise), as used in the BBC machine, but MTX BASIC lacks the ENVELOPE command. Programming sound on the MTX is far easier than with such computers as the Commodore 64; which has the more powerful SID chip, but a weak interpreter.

Envelopes may be implemented on the MTX using normal BASIC commands. There are two SOUND commands, one with the three parameters of channel, frequency and volume, which is useful for slotting any bursts of tone into games programs, for example.

The other command has seven parameters, the additional ones being frequency and volume gradients, plus duration and chaining. With this very functional command and a bit of arithmetic, you can easily string an envelope together. Having recently purchased a piano-type keyboard, I am currently working on having the MTX work as a fully programmable synthesiser.

Since some of the parameter ranges mentioned in the manual seem to be in error, a bit of experimentation is worth trying when using these commands. Probably the aspect of the MTX that most qualifies it for criticism is the BASIC interpreter, being a somewhat primitive implementation which uses 'LET' in its assignment statements. The number of commands is also rather meagre (except in the area of graphics), when compared with common benchmarks such as Tandy's Extended Colour BASIC or the regular Microsoft implementation. One command sorely missed is line renumbering. However, a useful programming facility is that the user has the option of entering abbreviated versions of commands. Using Memotech's example:

if x = 5 t.g.500

comes up as IF X = 5 THEN GOTO 500

The Manual

The *BASIC Tutor, Reference and Operators Manual* has good technical descriptions and explains the use of graphics and sound commands well, but tends to be insubstantial as the claimed 'BASIC Tutor'. The first mistake was probably attempting a 'combine everything' book, rather than segmenting the various sections of the title between three different covers.

By splitting it into sections, the task of revising (or even scrapping and rewriting) various areas would have been made easier, to the user's ultimate benefit. This manual does need a rewrite, with more information required on those areas where the programmer can take advantage of the machine's obvious strengths.

For a start, there should be a section on utilising the ROM subroutines and material on directly accessing video RAM from BASIC. Since the machine's design emphasises ease of assembly language programming via BASIC, it seems a little shortsighted not to have provided extensive documentation for its use.

Options

Although the MTX 500/512 conforms in some ways to the MSX standard of Japan and Hong Kong, Memotech has very much committed its machines to CP/M expansion, as a means of providing access to a vast amount of software – much of it in the public domain.

Thus, its CPU is a Z80A operating at 4MHz, with options of Qume floppy disk drives or Winchester hard disk storage. You may also use silicon disks; that is, RAM boards emulating a disk configuration, but operating much more quickly and with a capacity of up to 32 megabytes. There is also a communications board, with two RS232 ports which can run at up to 19200 baud, and a disk drive bus.

To utilise certain levels of operation, particular extensions are required; for example, the communications board is required to run the disk drive; and the 80-column board, disk drive controller and Qume disk drives are needed to run Wordstar.

Summary

The basic MTX 500/512 is a very handy computer for the serious programmer, offering many inbuilt facilities, though lacking an RS232 port as standard. In machine language, Z80 programming should be first choice in this price range. If you need to run disk drives, things get a little more expensive; but for full CP/M outlay the MTX 500/512 does offer specifications and support which exceed those of the majority of its competitors.

There is a steadily increasing supply of software for the MTX 500/512, which consists mainly of games, but which also includes a good word processor and educational material. One particularly sophisticated package is 'Chess', which is available on cassette.

The MTX has a lot going for it. Which version you buy will depend on your requirements. The Z80 machine coder would be hard put to find an alternative that offers as much. The price, currently $599 for the MTX 500 and $799 for the MTX 512, is not much more than you'd pay in England, and places it in the market between the rather good-value Commodore 64 of the mediocre keyboard and BASIC, and the overpriced (particularly in Australia) BBC machine manufactured by Acorn and distributed here by Barson Computers. If you have more dollars than you know what to do with, the BBC is a good choice, but for the rest of us ... ❑

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Take an extra close look at the Canon disk drives. If Rolls-Royce built computers, they'd use Canon drives. See the massive head protection shield? Hear the way the heads lock away every time they deselect? The designers had an unusual attitude to reliability – fanatical.

Now carry out some speed tests. On a standard benchmark test using BASIC routines*, the timings are: PortaPak 12.9 seconds, IBM PC 16.4 seconds, NEC APC 19.7 seconds and Sirius 16.4 seconds. Using a standard dBASE II routine**, the timings are: PortaPak 8 minutes 11 seconds, IBM PC 11m 52s, Sirius 17m 9s and NEC APC 19m 16s.

The expensive imports really cringe at this because they make so much of being "16-bit" machines. PortaPak is an 8-bit machine and proud of it. Not only is an 8-bit machine inherently better suited to jobs like word processing, accounting, spreadsheets, etc, but the 6MHz clock rate ensures it can run rings around the others even in complicated mathematical tasks.

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- Compact portability. It needs only half the desk space of its nearest rival. It goes with you on business trips, at night, on the weekend. *In one hand, you hold the concentrated working power of an entire office.*
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- 640 x 304 high resolution, dot addressable graphics.
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- Universal terminal emulation lets your PortaPak mimic the screen handling of other computers and run the programs installed for them. Your PortaPak can act as a terminal for any computer you care to name.
- Ability to read and write to other 5.25-inch disk formats - e.g. Kaypro and Obsorne. Lets you exchange software directly with owners of different computers.
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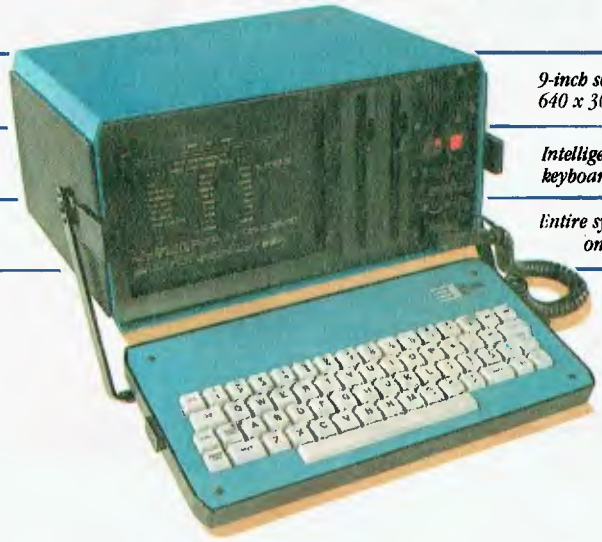

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*See Australian Personal Computer, Feb., 1984.
**See Australian Micro Computerworld, Nov., 1983.

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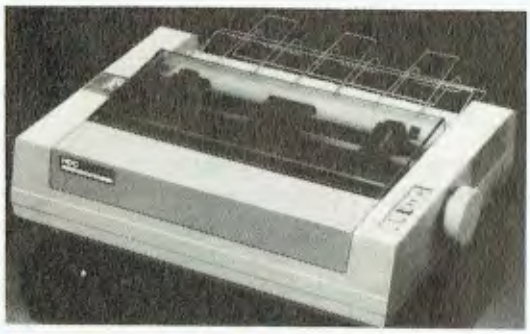

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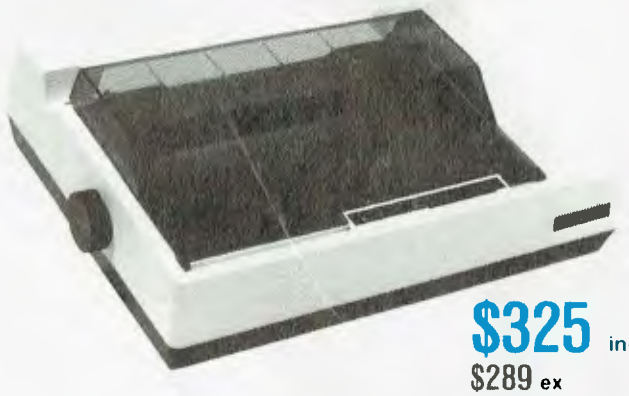

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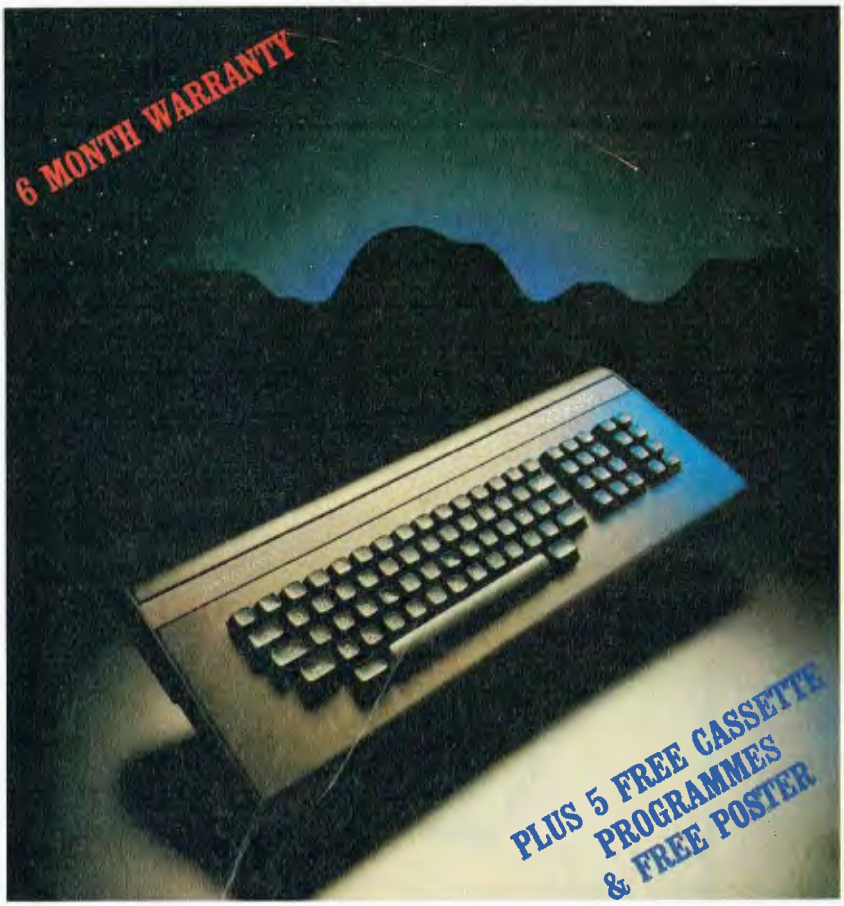

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ME JANE

We had an interesting time discussing this package in the office, given that our editor's first name is Jane. Evan McHugh used Jane, pulled her mouse apart and reached a conclusion on who would get the most benefit from her.

JANE can best be described as a mouse-based, integrated software package for the Apple II range of computers, and it incorporates a number of features normally associated with the more powerful Lisa and Macintosh. Like its bigger brothers, the Apple IIe running Jane has windows and icons, the ability to cut and paste and, a mouse.

The complete Jane package comes with a mouse and interface card, diskettes and manual. There are three diskettes: a system diskette, help diskette and data diskette. The whole lot is packaged tidily in a handy bookshelf box. The applications included in the package are: Janewrite, a word processor; Janecalc, a spreadsheet; and Janelist, a list manager.

From when I ripped off the box's plastic covering and connected the various goodies, to when I typed the instruction which turned the computer on, took ten minutes.

The first thing I did when I started using Jane was follow the manual-based tutorial. This takes around 90 minutes to complete and shows you all the basics of the most common features of the package; it's not very thorough, but is a quick and easy way to get to a reasonable level of competence.

Taking Jane's Word

The first section you enter in the tutorial is the word processing program. This is done by selecting the typewriter icon and then the predefined work file included on the data diskette. Here, you are taken through a number of mouse-based operations; for example, you can select scissors to delete text by cutting it out, or select scissors and a paste jar to cut and paste.

The word processing package could not be described as full-featured, but it does have the advantage of being relatively simple to learn and use. There are some formatting controls and a what-you-see-is-what-you-get approach to the printing process; that is, what appears on the screen is what will appear on the printer.

There are a number of options for the control of character size and type. For instance, you could have normal type, underlined, bold or bold underlined. Superscripting and sub-scripting are also available.

I normally use the Wordstar word processing package, and it could certainly take a tip or two from Janewrite. Janewrite's best features are the windows and more control over the cursor using the mouse. Icon-based activity is also a simpler concept to grasp than an obscure combination of up to three key-strikes.

There are also some things Janewrite could learn from Wordstar - mainly to do with functions that really shouldn't have been based on mouse activity. More on that later.

Number Crunching with Jane

Using Jane gave me my first experience of a spreadsheet. The tutorial takes you into an example spreadsheet, which is used to show how making a change to a value results in the totals for the spreadsheet all changing. It also explains how to perform simple calculations.

Janecalc is not complex. While I ▶

haven't had the need to use a spreadsheet myself, I have seen them in action and have given people who do use them assistance. Many spreadsheets offer a bewildering range of functions, but Janecalc could do little more than addition, subtraction, multiplication and division, and a little bit of averaging.

Jane's List

Next came the list manager. Here I found three basic forms: personal address, business address and user-defined forms. These are used to enter data, which can then be sorted on any desired field. When searching a file you can start at the back or the front of it and search forward or backward, one record at a time.

Janelist can also be used to set up mailing lists and to select specific records with which to create new files. All the functions are under mouse control, to which they are well-suited.

After doing the tutorial I delved into a bit of ad hoc hands-on usage. I found only one real bug in the manual, which was I couldn't find the instruction to change the page width in the word processor. I searched high and I searched low, but if it was there I wasn't going to get to it before going crazy. Finally, I discovered a small dash on the column width status line which you could pick up and move with the mouse to change the page width.

Nifty Manual

One feature I really appreciated in the manual was its size: it's just the right height to sit on the Apple, just above the keyboard, without obstructing the screen. In this position it is easily accessible for quick reference. Despite my one frustration with the column width, it is a very logical, helpful, reasonable manual.

My one, perhaps unreasonable, quibble is with the marketing guys who claim this package is easy to use. Compared to other packages it *is* easy to use. However, to my mind nothing, repeat nothing, that requires a 236-page manual can honestly claim to be easy to use.

Among Jane's laudable features are its 'global' operations. Number one among these was the windowing capability, which allows you to halt operation in one file or application and then open another file or application. You can continue doing this until you have four such windows open on the screen. You can shrink windows and move them around the screen and then switch between windows. You can close individual windows using the scissors, or close all of them using the Stop command.

Photographic Memory

Another useful feature was the camera. This let you 'take a photo' of some text or part of the spreadsheet and transfer it to another file or application. You can use the 'camera' to transfer text or numbers between the spreadsheet and the word processor.

And now, to the mouse. When the mouse works properly it is good, when it doesn't it's the pits. In some applications it is so simple to use, its best advantage being the speed with which you can move around the screen. But sometimes the little bugger just *wouldn't* work properly (snivel, whinge). Sometimes it would go left and right but not up and down, or, in slow mouse speed, it would go down more easily than up, even when I was *trying* to go up. The problem got worse when trying to move the mouse while holding down the button. Occasionally things got so bad it became necessary to lift the mouse off the table and turn the metal ball underneath by hand to get any result at all.

Eventually, Matt Whelan suggested that one of the things you should be careful of with a mouse is that if it has been used on a dirty surface the muck gets inside and makes it clog up. "Open it up and clean it out," he said. I think I learned a lesson from what I did next. It was either that you should never open a mouse or that you should never take Matt Whelan seriously.

There are many wonders to be seen within a mouse, but there can also be monsteres and ydragons. Therefore, venture thou not into yon mouse bowels lest ye tempere thou losest. Put simply, mice are one pig to put back together. Temper that, though, with the fact that when operating I discovered a flaw in my particular mouse, and it did work better when finally returned to its pristine state. There may be a case here for taking more care in the quality control of Jane's mouse.

When functioning correctly the mouse did work well and logically. Many operations, particularly those involving moving around in text, could be completed much more quickly than using arrow keys or some other means to move around.

Often, though, it seems that mouse mania actually has you doing it the hard way. For example, to delete something you have to stop typing, move the mouse to the scissors, click on the scissors, move the mouse down to the text, click and specify the text to be deleted, release and wait for it to disappear, move the mouse back up to the hand, click on the hand and move back to where you wished to continue typing. That's a lot of work to delete, say, one word.

Mice aren't Good Horses

The point to realise here is that the aim of a function is not only to be easily understood, but also quick to use. Unfortunately, the Jane package does not always combine these two aims.

Many critics of mouse-based packages and their icons and 'ease of use' point to their marketing-oriented gimmickery at the expense of productivity as a major fault. While Jane may not be that bad, it did strike me that I wouldn't want to use this as *my* workhorse package.

Which is not to say that Jane hasn't got a place in the market. Far from it. Jane could well become popular with novice computer users who want to begin exploiting the power of their new computer, but who lack the expertise to understand and get the most benefit out of more sophisticated packages.

The interface between Jane and the first-time user is simple for both person and machine. Experienced users will probably discover how far you can go with Jane quite quickly, but Jane has a lot to offer people who want to get going on a new system quickly and with a minimum of fuss.

By the way, the name Jane is based on the Jane, Dick and Spot of childhood reading lessons. The idea is that it is as easy to learn how to use an integrated software package as it is to learn how to read with Jane.

The Jane software carries a recommended retail price of $249, thus offering a good low-level entry point at a reasonable price. The mouse costs an extra $179, though there may be some packages around which include mouse and software for $350. Jane is available from Edusoft (phone (02) 451 6243) or Ashtron Software, a division of Ashton Scholastic (phone (043) 28 3555). ❑

ANADEX 9725 COLOUR PRINTER

The Anadex 9725B is a colour printer, which can be used as an alternative to the printers normally interfaced to the IBM-PC. John Nicholls approached it as a beginner and found it a solidly constructed, co-operative machine.

ANADEX is one of the better-known names in computer printers, and is one of the very few companies to offer colour printers. The model we received for testing is the 9725B, a 120 cps (characters per second) matrix printer equipped with a four-colour ribbon. We tested it with an IBM personal computer.

Because the printer we received was set up for the IBM-PC, a machine predominantly used by business people, we have approached it as new users without previous computer knowledge. We have also assumed that the printer was received in the form in which paying customers will receive it.

Aside from the printer, the packing box contained an interface cable (for general use – not the special cable required by the IBM); a manual; two spare ribbons, one colour and one black (a colour ribbon was already installed); and a diskette designed for an IBM-Anadex connection.

Built Like a Tank

The first thing we noticed is that compared with other personal computer printers the Anadex 9725B is large, even massive, in appearance, and heavy (18 kg). Contributing to the massive appearance is the way in which the cover shrouds most of the working parts. The impression is one of solidity.

Because the ribbon was already in place, we were able to skip that part of the installation instructions. This was a good thing, as the installation of the colour ribbon is somewhat more complicated than is usual, requiring the ribbon to be threaded through the gears and around four rollers.

The next step was to insert the paper, about which the manual says "Paper loading for the first few times can seem difficult, but after doing it a

SPECIFICATIONS AND REPORT CARD

Unit	Anadex 9725B colour printer
Made by	Anadex Inc California
Print Speed	120 cps (draft 240 cps, correspondence 60 cps)
Pitches	10, 12, 15 and 16.4 proportional
Characters/line	132 @ 10 cpi
Ribbon	Four-colour (yellow, magenta, cyan and black; or all black) Width – 13.2 inches (33.5 cm)
Noise	Less than 55 dBA at three feet
Dimensions	70.6 cm wide, 41.7 cm deep, 21.6 cm high
Weight	18.1 kg (40 lb)
Best points	Versatility, quality
Worst points	Nothing of significance
Extras included	Tractor feed, cable, ribbons, utility diskette
Options	RS232C interface, extra 2K buffer, APL characters, sound cover
Price	$2345 plus $375 tax
Review unit from	Datascape Int Pty Ltd, 44 Avenue Road, Mosman 2088; phone (02) 969 2699. Melbourne (03) 690 3622.

Ratings	Excellent	Very Good	Good	Poor
Documentation		•		
Ease of use		•		
Functionality	•			
Value for money		•		

few times you'll wonder why we even bothered including it in the manual." This is fair comment, once you get used to the idea that you start loading the paper through a slot in the bottom centre of the printer. The only difficulty we found was that although the manual has photos of each stage of the process, with arrows pointing to each part, the photos are not well reproduced; so it is somewhat difficult to tell what the arrows point to. The construction of the printer, with the shroud already referred to, also makes it difficult at first to see some of the parts.

The next step was to connect the printer to the computer. We already had a suitable IBM-to-Centronics cable, so this took only a few moments. After connecting the 240V power, we switched on and everything worked perfectly, first go.

A small panel includes power-on and on-line indicators, and the usual reset, test, TOF (top of form), form feed and line feed controls. This panel doesn't use separate buttons, but relies on you to press the appropriate part of the panel. This seems rather flimsy compared with the rest of the printer. It makes it difficult to tell whether you've pressed what you want properly, especially with the test function which takes several seconds before anything happens. Nevertheless, the test function is good because it produces a printout that tests all the ribbon colours and also shows the main default settings.

Concealed Switches

It is just as well some information is available on the default settings, because there are a lot of switches you can use. A small door alongside the front control panel opens to reveal two blocks of ten switches, and an opening in the back reveals one block of eight switches and one of ten switches. The first block controls forms format, such as form length, line width, line spacing and so on; the second controls font selection and language sets; and the third and fourth control selection of parallel or serial interface and the serial interface settings. All settings are more or less clearly indicated, except the manual confuses things by labelling one diagram 'open' or 'closed', rather than the 'on' or 'off' used everywhere else, and the appendix incorrectly states that the fourth switch is in the front panel. Most settings can be selected either by the switches or via the software, which is very handy. When the printer is in use, the switches are unobtrusive, so they should not be prone to tampering.

The printer has a piece of clear plastic covering the top. This isn't hinged or attached in any way (it simply rests in place in a cutout), but is an essential component, for without it the printer is shatteringly loud.

Good Performance

The printer performed well, except for a slight misalignment of the ribbon. This caused descenders to be cut short on the black part of the ribbon (black is the bottom colour), and descenders in other colours to show slight colouration from the next colour. I imagine this adjustment would be fairly simple, but apparently it is not one the customer can perform. The quality of print in all the modes we tested is good. Once or twice the paper emerging from the printer got caught up with the paper going in, causing a terrible mess, but this should be no problem if a little care is taken – it's just a matter of ensuring enough paper comes out of the printer to clear the feed before you start printing.

The printer manual is better than most. It sets out serial interface settings, and the use of graphics and print control codes – most of which are ESCAPE sequences. The manual also includes sample BASIC programs for graphics, troubleshooting information, full summaries of switch settings, comprehensive lists of ASCII codes and Anadex printer codes, and a useful glossary. Ours was nicely typeset, but didn't have a proper cover.

A Mystery Diskette

The diskette which came with the machine was a bit of a mystery at first, as it isn't mentioned in the manual and has no instructions on the label. A file called 'demo' looked promising, but contained nothing intelligible, and attempting to run it caused the system to hang so that it required the full three-key reset to get going again. While browsing through some of the text files on the diskette, we worked out that a set-up file would transfer DOS and the required files onto a new disk. However, the word processing program we are using supports the Anadex 9625; and as the diskette is supposed to work on both the 9625 and the 9725, we used this setting and had no problems.

To digress, a program called PC-Write is also supplied on a diskette with no documentation, but the diskette label bears the instruction "Enter DOS command TYPE READ.ME; and if you miss this you should see the file READ.ME on the directory. Anadex needs to do something like this to make the diskette more usable, but we were able to print one of the files, which explains what the diskette is designed to do: it is supposed to emulate the IBM Graphics Printer. When you use the emulator, the printer will behave as if it were an IBM graphic printer. When you turn off the emulator, you can use the Anadex features the IBM lacks, such as proportional spacing, margin justification and international character sets. Anadex claims "the only major application program which is known not to work with the emulator is 1-2-3 by Lotus Development Corporation."

Quite independently, we had asked for information on the Anadex Colour Printer. When it arrived we found it contained a single page of "Quick Reference Instructions for Anadex Utility Diskette". This explains what the emulation is and how to use the diskette. Unfortunately, we didn't discover this until we had sent the printer back.

The Anadex 9275B is distributed in this country by Datascape and costs $2345, plus $375.20 sales tax. Ribbons, either multicolour or black, are $23 plus $3.68, and cables are $70 plus $11.20. The printer is fast (120 cps for standard quality and 240 cps in draft mode); has type fonts for 10, 12, 15 and 16.4 characters per inch plus proportional spacing; provides draft, standard and 'correspondence quality' (the last at half-speed); and has full graphics capability. The ribbon we had installed had yellow, magenta (red), cyan (blue) and black. Mixing these colours provides four additional colours (the test sample prints yellow, red, blue, black, green and violet). Datascape says modifications to its printers can be made to suit other computers and terminals, such as Wang, Burroughs, Univac and NCR.

To sum up, we think the installation of this printer with the IBM-PC should cause novices few problems – especially if a little work is done on the documentation. The printer seems to be solidly built and offers a great deal for its price. It is well worth considering as an original or replacement printer for a personal computer. ❑

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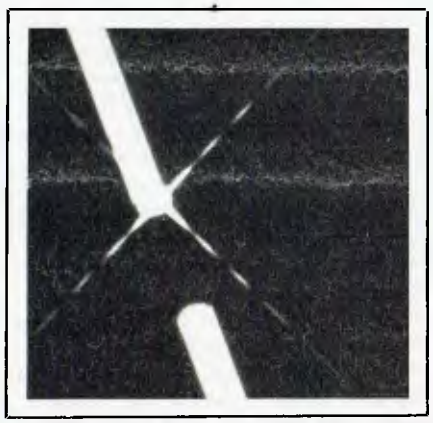


The concept of Local Area Networking has been often promised but rarely delivered – until recently. We're finally starting to see worthwhile, available product in this potentially explosive segment of the micro market. Les Bell looks at what's available, and how nets work.

FINDING A WORKING NET

I'VE COVERED networks in the past and, interestingly, when I sat down to do it again I discovered not a lot had changed. Networking seems to be one area that is often more hype than ripe, and many of the promised networks of 18 months ago are only now becoming available in practical terms.

What follows is a rundown on the various products on the market, starting with a section devoted to IBM PC networks, the one area which has seen a lot of activity in recent months. It's not a complete or by any means exhaustive survey, but it certainly covers the major names in the marketplace.

In this article, I'll cover the major products by category; the emphasis is on real products and the features they provide.

Network Features

The ability to transfer files between nodes is only the start of the potential of local area networks. Many networks can provide other services, such as electronic mail, the ability to chat between terminals, broadcast of news or message of the day, advanced security options, printer spooling, calendar/diary management with appointment scheduling and monitoring of network status and utilisation.

Many of these features are important in themselves, but as adjuncts to the main network applications they are well worthwhile. Given a choice between two similar networks, one with such software and one without, the choice is obvious.

Bus Transfer Speed

Bus transfer speed is crucial to the success of medium- to large-scale networks. For example, micro-to-mainframe communications systems suffer badly from the low transfer speeds of most mainframe communications lines, typically 1200 baud. At that rate, a 140 Kbyte database will take almost 20 minutes to transfer.

Obviously LANs must be able to transfer files at much greater rates than this, especially if the network is to be shared by many terminals. The situation becomes particularly critical in systems like Ethernet which have to retry several times to send packets through the network; eventually nodes are spending more time retrying transmissions than they are in productive transfers.

Networks require tremendous amounts of excess capacity for successful operation – those that are close to their limits will soon be over them.

Applications Software

At present, with no standard emerging, software houses are unable to take advantage of the features of most networks. For example, record locking is essential in order for users to share files. The classic example of this is the airline reservation system which allows two terminals to examine a data file at the same time and further allows both reservations clerks to sell the last seat on a plane at the same time.

Record locking means that while one user is examining a record with the likelihood of updating it, others are not able to gain access to it. However, the applications software must be able to test records to see if they are locked to take the appropriate action – delaying access or displaying a message.

Since applications written for the PC are mostly designed to run under DOS 2.0, a single-tasking operating system, they make no provision for record locking. Any applications which must run multi-user on the network with file sharing must be specially written – no small task.

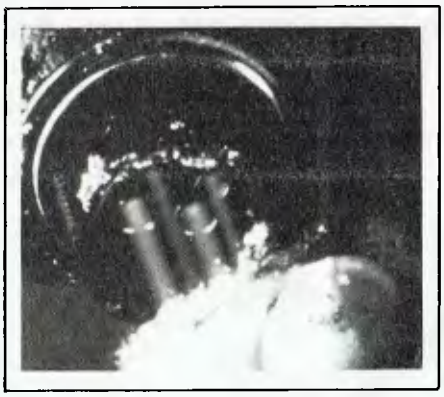
3Com Ethernet

3Com Corp's EtherSeries products use the Ethernet standard to provide DOS commands which operate across the network transparently to the user. The DOS COPY command, for example, can be used to transfer files between PCs.

The system is based upon the 3Com EtherLink card, which links the PC to the coax cable of the network – using coax allows data transfer rates as high as 10 Mbit/s. With the increasing use of the VLSI chips upon which the Ethernet interface is based, we can expect connect costs to continue to drop.

The EtherShare software allows users to share a hard disk on the network and provides three levels of file security – public, shared and private. A password is required to gain access to the shared disk as well as shared data, providing multiple levels of security.

The EtherPrint software acts as a print spooler on the network server, while EtherMail allows electronic mail between users through a menu-driven system.



Fox 10-Net

10-Net, from Fox Research, is a 1 Mbit/s CSMA/CA system based on twisted pair cable. No dedicated file server is required, as each PC runs both user and server software concurrently. The user software traps DOS calls and determines whether requests are for a local device or one on the network. If on the network, the software redirects the request to the server software of the server PC, which then passes it to that machine's DOS.

Meanwhile, the user machine waits for a reply to its message. If an incoming message is not a reply, it is passed to the server software for processing; if it is a reply, the returned data is placed in memory as though it had been returned by the local DOS.

10-Net uses the DOS 2.0 hierarchical directory concept to separate shared and private files, with the former in the root directory and private files in specific directories. A file attribute table specifies the locking modes for each file, and special modes allow sharing of database files with explicit locking or sharing of index files with delayed update. The file attribute table also contains information about security levels.

A matching database for 10-Net, called 10-Base, is also available, which offers a system based on IBM's SQL database language.

Sytek's Old and New

Sytek has been in the market for some time with a high- performance broadband network. This 120-channel net requires a dedicated Z80-based microcomputer for its interface.

Sytek is now working on a 2 Mbit/s version of this network which will require only a single interface card for the IBM PC, based on new LSI chips. Using this approach, corporate users would be able to place their PCs on one channel of the network and place mainframe-terminal communications on another.

Up to one thousand PCs can be linked on the network, with each eight PCs attached to a network translator unit which in turn connects the baseband signals to the broadband network.

That the Sytek network will be successful is now virtually beyond doubt with its adoption by IBM as the IBM PC Network.

PC-Net II

PC-Net II is the latest version of the network developed by Orchid Technology for the IBM PC. Based on base-band bus technology, it can link up to 160 PCs over distances of up to 2500 feet, using repeater circuits

PC-Net uses a variation of the CSMA/CD technique, called CSMA/CA (Collision Sense Multiple Access/Collision Avoidance), with a transmission rate of 800 Kbit/s over twisted pair cable for low cost. The network does not require any dedicated file servers or print servers; each node on the network can access up to 16 different disk volumes through standard DOS commands for ease of use. In fact, users can even run programs on remote PCs.

Software support for the network includes electronic mail, file transfer software, and record and file locking – although off-the-shelf applications will not use this.

Just Another NETwork

JANET (Just Another NETwork) was developed at the University of Waterloo in Ontario to meet that institution's educational networking needs. A centralised hard-disk file server is used to reduce implementation costs, and the network is based on the well-proven IEEE-488 (HP-IB) bus.

JANET supports a 10 Mbyte or larger hard disk, which is split into virtual disks – each 20 Kbytes to 320 Kbytes in size – for each user. Each virtual disk can be password protected, and can be defined in 'public read' or 'public write' mode. In addition, each disk can contain a 'news' file which will be displayed upon log-on.

Each user has up to four virtual drives, defined by an ACCESS command, and print spooler software allows software to run as though each station has a printer attached.

Up to 30 PCs are supported on the network.

Digital Research's DR/Net

Digital Research has replaced its older CP/Net product with the new DR/Net. This package provides the higher levels of network interface for the Concurrent CP/M and Concurrent DOS operating systems, running on the IBM PC and other hardware.

DR/Net can operate with ARCNet, Ethernet and other hardware networks, though to date ARCNet is the dominant implementation. In the Gifford Computer Systems' implementation for Compupro and IBM PC hardware, for example, up to 255 single- or multi-user computers can be supported on the network, and each user can access up to 16 different printers and 16 mass storage devices. Gifford's alpha test system, which has been running since March, has fourteen machines, including a PC XT, on the network, with 463 Mbytes total of mass storage.

Password protection can be applied at the file, disk, node and terminal level, and the system is supplied with electronic mail, calendar, communications, user time accounting and reminder software. Users can be restricted to specified user areas, terminals, programs or nodes on the network.

The major advantage of this network over others is that existing MP/M and Concurrent CP/M applications already include record and file locking which will operate across the network.

Novell NetWare

Novell's Netware OS is an operating system which supports virtually all the network hardware described above, but provides higher level performance than the vendors' own operating systems. This is achieved through a number of important techniques, such as directory caching and hashing, file caching, and a technique called elevator seeking. This sets up unavoidable disk reads in the order in which the files are placed on the disk, to minimise disk head movement.

Naturally, NetWare supports file and record locking, as well as read-only access to shared files. Utilities such as electronic mail are also supplied.

Baseband LANs

The best known of the baseband networks is, of course, Ethernet. Developed by Xerox Corporation, Ethernet is also sponsored by Intel Corporation, which is working on interface chips, and Digital Equipment Corporation, which has incorporated Ethernet into its DECnet architecture. It has also been adopted by a number of other companies for inclusion in their products, and is the basis for one of the IEEE 802 local area network standards.

Ethernet is a baseband bus network using the CSMA/CD access method. It uses a special coax cable, which is snaked around a building, to link the various workstations on the bus. The cable is marked every few feet, and at these points a network tap can be inserted in the cable.

Ethernet has a maximum bandwidth of 10 Mbit/s, which roughly translates to 500 pages per second. However, the more stations that are placed on a network, the more collisions start to take place, which represent wasted capacity on the cable, and so the system progressively degrades.

While Ethernet products are available from several vendors (we S-100 hackers can even buy Ethernet interfaces!), in this discussion I shall deal only with the standard offerings from Xerox.

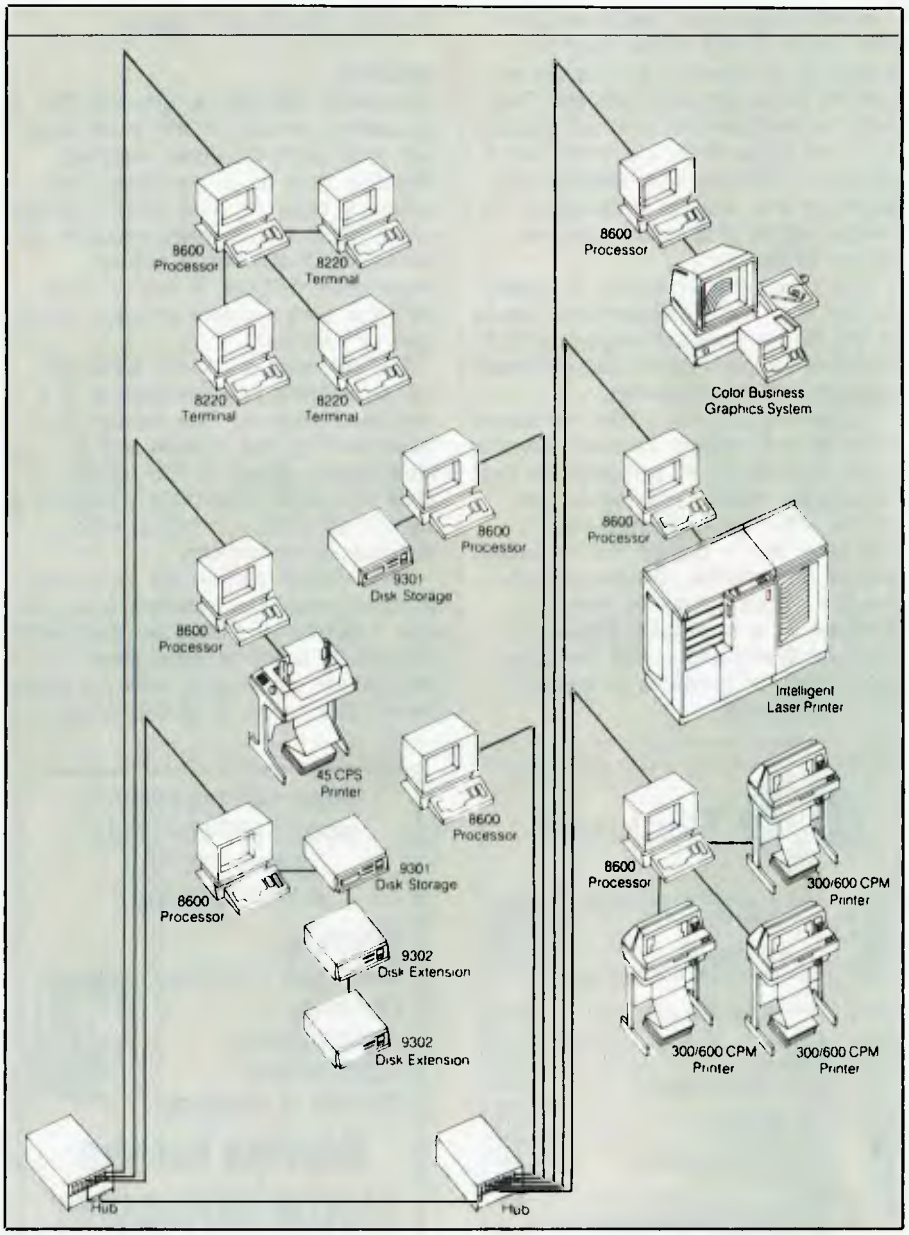
Xerox sees Ethernet as being primarily an office automation network, and link it strongly with its exceptionally powerful workstations based on the Smalltalk and Interlisp-D environments. This is primarily a marketing decision on its part, and allows other vendors to attack the market for pure networking applications of Ethernet.

The top-line Xerox workstation is the 8010, also known as the Star. Its large screen features a high-resolution display which emulates a desktop and other familiar objects such as file folders. To work on a document, the user simply points to the file with a graphics pointer termed a mouse, and clicks a button on top of the mouse. The folder opens to reveal the document, which because of the 8010's display appears to be typeset.

Merely pointing to a section of text, clicking the mouse and selecting from a menu will allow the text to be changed to italic, bold face, a different typestyle entirely or deleted. Graphics can be created by drawing with the mouse, then magnified, rotated and so on.

Perhaps one of the best applications for the Star is in technical publishing: production of manuals, documentation, reports, that kind of thing. A page can be designed on the Star *exactly* as it will appear on paper. By then sending the document to the Xerox laser printer, it will be printed exactly as it appeared on the screen.

The conversion of the document, with its text, multiple typefaces, embedded graphics and so on into a suitable format for transmission through the Ethernet to the laser printer is all handled completely automatically by the system; the document is simply moved into an out-tray and away it goes.



Mass storage on the Star comes in two sizes: 10 Megabytes and 29 Megabytes. This can be expanded using mass storage over the network. On the screen of the Star, network storage appears as file drawers; opening the drawer (using the mouse) is equivalent to examining the file directory of the disk area. Documents from network mass storage must be transferred to local mass storage before they can be worked on.

The network has one logical controller – from the point of view of the higher levels of the OSI model – which keeps track of the users on the network, their names and passwords, access privileges and also stores their mail. Incoming mail is flagged by an envelope appearing in the mail in-tray. Outgoing mail is handled by moving it to the out-tray.

At no stage is the user faced with the need to type commands or understand the technicalities underlying the system.

Xerox also has a simpler word processor which attaches to the Ethernet. The 860 is more like a conventional word processor – no

mouse, no graphics. It's also a lot cheaper! However, it has the ability to communicate over the Ethernet in exactly the same way as the Star, and can use the laser printer or, of course, a more conventional daisywheel printer.

A local floppy disk can store up to 300 pages of information, and for local data processing, the system will run the CP/M operating system. Two screens are available: one will display a full A4 page, while the other has a 25-line by 102-character display. The keyboard also has an optional cat (cf mouse) which is a touch-sensitive cursor control pad.

The Ethernet interface is an option on the 860. Also available from Xerox is the 820, a low-cost single-user CP/M-based computer which can optionally interface with the Ethernet.

In summary, Xerox's Ethernet-based products are strongly oriented towards office automation, in particular for the 'knowledge worker' who deals constantly with charts, graphs, reports and other text – people like technical writers, consultants, researchers and the like. Xerox seems to view Ethernet as a necessary adjunct to this orientation, and is not pursuing the market for networks to connect other equipment.

Ethernet has been adopted by several other vendors, including DEC, which has integrated it into its DECnet architecture, ICL, which uses it as the basis for its OSLAN product line, Ungermann-Bass, whose Net/One is based on Ethernet, Siemens, Data General, Olivetti and others.

ARCnet

Datapoint's ARCNet is probably the top-selling network in the world today, with over 5000 networks installed, including over 80 in Australia. The company stole an early march on the competition, and it would probably be fair to say that when it started working on ARCnet, it had no idea the local area network concept would take off like it did.

ARCnet uses a coaxial cable to link processors and peripherals in a baseband network. The network is a token-passing bus system with a transmission speed of 2.5 Mbit/s; while not up to Ethernet's 10 Mbit/s, it's still adequate for typical office automation applications.

The ARCnet started life as a way of transferring files between a shared disk controller and multiple processors. Datapoint's products were small stand-alone processors, each of which served the needs of an individual or department. Such low-cost machines do not justify the expense of disk controllers dedicated to each machine; such expensive hardware has to be shared.

While investigating the possibilities of a high-speed multi-drop cable interface, Datapoint engineers hit on the concept of the local area network and started development in mid-1976. In December 1977, the ARC (Attached Resource Computer) network was announced. At the same time, a Direct Channel Interface Option was introduced, which allows an IBM mainframe to use the network.

While Datapoint's traditional orientation is towards data processing – typically small to medium business applications – it did not take the company long to see the potential in electronic office applications, and in late 1979 it introduced Integrated Electronic Office, which provides word processing and electronic message services on ARCNet.

Subsequent releases have included new, larger processors, a new operating system called RMS, which is more closely oriented to network operation, a colour business graphics system and a laser colour printer.

The ARCNet uses an interesting topology. Logically, it is a bus, but

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any arbitrary physical topology is permitted as long as no loops are formed. Access control is through a token-passing scheme, which Datapoint engineers claim does not degrade due to bus contention. Up to 255 stations can exist on one network, which can span up to 4 miles, though the longest cable section between nodes can only be around 700 metres.

While 255 stations is a lot, some organisations will require more. ARCNet caters for this by providing gateways between networks. Although these links are slower than typical network speeds, they are completely transparent to the user. Other gateways allow network connection to IBM, Honeywell, Univac and Burroughs systems.

Datapoint has built up considerable expertise with networks in both data processing and office automation environments. The ARCNet is a mature product, but standing up well to the tests of time. For example, at least one industry consulting group forecast that it would take Datapoint until 1986 to sell 5000 networks. Well, in May 1983 (one year after that forecast) the Medical College of Georgia, in Atlanta, installed the 5000th ARCNet, and there are no signs of the system lying down and dying.

Corvus Omninet

Like ARCnet, Omninet grew out of a desire to share expensive hard disk storage between low-cost workstations. Corvus originally made its mark by releasing hard disk drives for Apple, TRS-80, S-100, Xerox and IBM computers.

The major thrust of development for Omninet was the need for a low-cost network to allow Apples in the education environment to share a common hard disk. Since then, the Constellation system has been refined to the stage where it is a practical alternative for many business applications.

A Corvus Winchester disk system can provide up to 80 Megabytes of mass storage, and may optionally be attached to a 'Mirror' backup system, which will back up the hard disk on to videotape. The hard disk is also attached to a master multiplexer, which allows up to eight computers within a radius of 50 feet to access the disk.

Each line from the master multiplexer may also be attached to a host multiplexer which can further distribute the network to another eight computers. Thus nine multiplexers can allow up to 64 computers to share common disk storage.

Each computer attached to the net requires a special plug-in card known as a transporter. This board has an on-board microprocessor, together with a high-speed direct-memory-access controller, and performs the network transfers without help from the workstation's software.

The shared disk is split up into areas designated system read/only, personal read/write, which can be accessed by a single computer only or shared read/write, which can be accessed by several designated computers. The disk can also be split into several volumes, each of which can be accessed by a different operating system, allowing, say, Apples to mix Apple DOS, UCSD Pascal and CP/M files on the same network.

The Corvus system also provides the ability to create pipeline files (*a la* Unix) which are used for spooling

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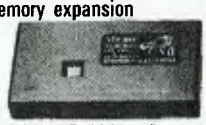

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and intercommunication between programs. In addition, the system provides file locking, to avoid the confusion that can result when one user reads a file just as another writes to it.

Corvus has also released a new computer, the Concept, based on a 16-bit processor with several new features, such as a screen which can be rotated through 90 degrees to provide vertical or horizontal display format. The Concept is specifically designed to take advantage of the Omninet.

Other new releases from Corvus include an SNA gateway, which allows Concepts and IBM PCs on an Omninet to communicate with an IBM mainframe, and a 200 Megabyte tape cartridge drive for back-up and low-cost mass storage. In addition, Corvus has licensed the Omninet design to other manufacturers, including Texas Instruments, Onyx, NCR and Dictaphone.

The OmniNet offers a low-cost network for clusters of Apples, Tandys and similar computers. While not a full-function local area network, it offers several useful features.

HiNet

Digital Microsystems has one of the longest and most honourable backgrounds in the microcomputer marketplace. While Datapoint was the company that requested Intel to design the first microprocessor, Digital Microsystems had its genesis at the birth of CP/M, the leading micro operating system.

Gary Kildall, who wrote CP/M, may have been a software genius, but on hardware he wasn't so hot. He called in a friend, John Torode, who wire-wrapped a floppy disk controller to work with Gary's Intel development system. When the system worked first time, the two had a celebratory beer, and it may have been then that John Torode decided to found Digital Microsystems.

Digital Microsystems was one of the first companies on the market with complete floppy disk-based microcomputers (they weren't personal computers back then). From the earliest days they earned a reputation for good quality gear, and surprisingly made an early break for the business market. Remember, back in those days anyone involved with small computers was definitely a crank.

HiNet is a much smaller system than Ethernet and ARCNet. Although the addressing scheme will allow up to 255 stations per network, the current practical limitation is 32. The network data rate is 500 Kbit/s, with a maximum separation between nodes of about 350 metres.

The system is baseband technology, using standard RS422 drivers and a dual twisted pair plus ground cable or standard ribbon cable over short distances. Access to the bus is controlled by a master station which polls each of the slaves to allow them to transmit.

Despite the presence of a master station, the system is not doomed to failure should it go down. It is possible to configure a system with a 'watchdog' master which will step in and take over control should the master fail.

The standard operating system for the HiNet workstations is CP/M – as you'd expect for a company with Digital Microsystems' heritage. Each workstation is based on a Z-80 processor with 64 Kilobytes of RAM – much the same configuration as many personal computers. The systems can thus run virtually all the available CP/M software.

Local Area Networks

Product	Manufacturer	Topology	Access Method	Cable	Speed
PC NET II	AST Research	BASE-BAND BUS	CSMA CA	Twisted Pair	800 KB sec
ARCNET	Datapoint	Logically - RING Physically - Dispersed STAR	Token Passing	Coax	2 5 MB sec
JANET	University of Waterloo	BASE-BAND BUS	IEEE 448 Interface Bus	IEEE Cabling	130 000 bytes sec
10-NET	Fox Research	BASE-BAND BUS	CSMA CA	Twisted Pair	1 0 MB sec
SYTEK	Sytek Inc.	Broadband	CSMA CD	Coax	2 megabits sec
INTERLAN		BASE-BAND BUS	CSMA CD	Coax	10 megabits sec
3COM ETHERNET	3COM	BASE BAND BUS	CSMA CA	Coax	10 MB sec
HINET	Digital Microsystems	BASE-BAND	SDLC protocol	Twisted Pair	500 Kbits sec
C-NET	Cromemco	BUS	CSMA CD	Twisted Cable	500 Kbits sec
GED Centinel	General Electric Developments	BASE-BAND STAR			800 Kbits sec
CORVUS OMNINET	Corvus	Star	None		

C-Net

Cromemco, another of the older companies in the microcomputer marketplace, has announced its new local area network, C-Net. In the tradition of Xerox and others, it has made details available and offered licences to other manufacturers, but at this stage I know of no other manufacturer adopting it.

C-Net is intended to be a low-cost system; as the Cromemco C-10 personal computer sells for around $2000 in the United States, including software, a network interface which costs around $1000 would meet considerable market resistance. Consequently, the C-Net interface was designed to use standard components (no custom chips, for example) so that any manufacturer could easily tool up for it.

The C-Net has a standard data rate of 500 kbit/s using a CSMA/CD access protocol over a twinax cable. The twinax cable was chosen specifically because it offered high noise immunity; I suspect this may be a major advantage for the system, as while major computer companies work towards the office of the future, the factory of the future offers potentially greater opportunities (think of the possibilities of robots on a LAN).

The C-Net architecture closely parallels the bottom four layers of the ISO OSI model, using its own Z-80 microprocessor to provide intelligence for the network interface. At this stage, Cromemco has not announced applications software for the network, such as electronic mail, though this is expected.

GED Centinet

The high cost of disk storage, compared with the low cost of processing power, has led Sydney company General Electronic Developments to develop its own networking system. The system is based on a star configuration, with a master processor which polls workstations on the network.

The master processor provides file and print services, and is the hub of the system. It is a Z-80A processor with 64 Kilobytes of memory, and it runs the TurboDOS operating system. Standard hard disk is a 34 Megabyte Winchester disk, although GED has installed at least one system with two 330 Megabyte Ampex drives.

Each workstation has its own Z-80 processor, 64 Kilobytes of memory and the TurboDOS operating system. It communicates with the file server over an 800 kbit/s line. Like the master, each workstation can have floppy or hard disks attached.

Through the use of TurboDOS, the system is compatible with the vast range of CP/M-based software available. Occasionally, a strongly CP/M-dependent application will not run, but the majority of business systems will run without difficulty. ❑

Cost node	Dedicated controller?	Multiple servers	Runs on	O S	Email	File transfers	Shared Files	File locking	Record locking	Mix machines	Application Areas	Installed base	Advantages/ weaknesses	Distributor
$1300 RR plus tax	No	No	IBM-PC XT & Strict Compatibles Taligrass & Mountain H D	PC-DOS	Yes	Yes	Yes	Yes	Yes	Strict Compatibles	Information & resource Sharing, Entry level		Can hook up 160 PC's	Sourceware, 473 Albert Avenue, Chatswood NSW 2067
$350 00	No	No	Datapoint, Tandy Wang	MS-DOS, CP M, C-TOS, VISTA PC	Yes – VISTA MAIL	Yes	Yes	Yes	Yes		Data Processing, Data Communications, W P, Electronic Message Services, Financial Modelling, Colour Graphics, Intelligent Printing	6000 World Wide 120 Australia	Growth – just attach to it, do not need to buy new computer Speed, powor, redundancy, resilient	Datapoint, 157 Walker Street, North Sydney NSW 2060
$750 RR Tax	Yes	No	IBM-PC	MS-DOS	No	No	No	No	No	No	Education Network	3 institutions	No backups, educational design, no illegal copying	HiSoft Pty Ltd, 8-12 Alma Road, St Kilda VIC 3182
$995 00	Not Required	Yes	IBM-PC, XT & Strict Compatibles	MS-DOS	Yes	Yes	Yes	Yes	Yes	Strict Compatibles	Office Automation etc.			SCA Software of Australia P L, 449 Swanston Street, Melbourne VIC 3000
Varies approx $500	Optional	No	Anything asynchronous synchronous	Anything	Yes	Yes	Yes	Yes	Yes	Yes	Office Automation etc widespread environment	13 Australia		Network Solutions Australia P L, 88 Christie Street, St Leonards NSW 2065
Varies approx $500	No	No	Asynchronous Communications DEC, DG all multi-bus machines	Anything	Yes	Yes	Yes	Yes	Yes	Yes	Office Automation etc..	5 Australia		Network Solutions Australia P L 88 Christie Street, St Leonards NSW 2065
	Yes	Yes	IBM-PC	PC-DOS MS-DOS	Yes	Yes	Yes	Yes	Yes	Strict Compatibles	Office Automation etc		Simple installation	Australian Personal Computer Milton Terrace, Cnr Milton & Walsh Sts, West Melbourne VIC 3003 OR Imagineering, 579 Harris Street, Ultimo NSW 2007
			Z80A 4MHz 8-bit machines	CP M, MP M, OASIS							Office Automation etc			Dare Office Systems P L, PO Box 207, Broadway NSW 2007
					Yes	Yes	Yes	Yes	Yes					
	Yes			Turbo-DOS										GED Pty Ltd 396 Victoria Road, Gladesville NSW 2111
			Tandy s Apple s etc											

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JWT ENTERPRISE 670P016

How NetsWork

Micros talking to each other over a network is just the start, says Les Bell, who points out that LANs will make office automation a reality rather than just a buzzword. Here's his backgrounder on just what LANs are.

THE EARLIEST computers ran entirely in batch mode; users provided input and programs as punched cards or tape, and there was no need for direct connection between the computer and its users. Later, in the early sixties, timesharing was invented, and users had their own teletypes and could communicate directly with the computer.

The problems of connecting multiple users and storage devices to a computer were generally solved by using devices called data concentrators, which connected 16 or so terminals to one line which went to a channel on the CPU. Later came the minicomputer, which was sometimes used as a 'front end' – or sophisticated concentrator – for the mainframe.

Now we're in the age of the microcomputer. Instead of users all being connected to one massive mainframe and sharing the same data storage devices, each user has his/her own computer. While this has solved many problems for the DP manager, it has created a few of its own. How can users exchange data and have access to each other's resources?

Office Automation

Several other changes in the workplace have also produced a demand for linking various kinds of office equipment together. Word processors need to talk to typesetters, smart printers that can produce graphs have to be driven by small computers, the air conditioning is now controlled by a fair-sized computer. Electronic mail makes instant distribution of memos and other information possible.

Because of this, any discussion of local area networks must also involve office automation (OA); the two are almost inseparably linked. Office automation will not get off the ground until LANs become more prevalent, while the biggest justification for installation of a LAN is the opportunity to install office automation equipment.

Still other possibilities present themselves: how about using the network to carry digitised speech, replacing intercom or internal telephone systems? And then there's conference video, and the piped music for the reception areas, all on the one cable – oh, it will cut costs!

In truth, there is a lot of fuzzy thinking about office automation. From a practical standpoint, for most of our readers office automation is a long way down the track because either a) a complete working OA system is prohibitively expensive or b) lower-cost solutions are just patches and don't work.

To date, the only companies who have been able to make inroads into the OA market are large, vertically integrated, traditional suppliers who have a full range of office products which they can adapt and make more intelligent. The people who made the micro revolution happen, on the other hand, are small, highly innovative companies who lack either the capital or the technology to present a full line of OA products to the marketplace.

As a result, office automation is still a sellers' market. Complete office automation systems are still rare; if you find a complete system that does what you want, be prepared to dig deep to pay for it.

This situation may be about to change, however. All the experts agree on one thing: that the office of the future is predicated on the availability of a local area network to tie everything together. In particular, we need two things: standards, so that all equipment that meets the standards will work together, and cheap network interfaces, so that small companies can build networking capability into their products and we can afford to buy them.

How It's Happening

All this is now happening. Standards are 'emerging – slowly to be sure, but the odds are improving. And several manufacturers are now offering low-cost chips which provide a single-chip interface between a microprocessor and the bus, automatically taking care of the complex communications protocols necessary.

A local area network has to meet several criteria to be effective. First, the fundamental design trade-off is one between performance and cost. Performance, in this case, is measured in terms of bandwidth; in other words, how much information the network can carry at one time. Related to this is the speed at which the network can transmit data between two users, usually measured in bits/second.

It is important that the network be able to cope with bursts of data at high speed. This is because, on today's networks, each workstation or other device on the network will have a user sitting at it, who will become frustrated at delays. Non-technical users can see no reason why the device isn't instantaneous in operation.

Bandwidth and speed can be obtained at a cost, so that a trade-off is necessary. The greater the bandwidth, the higher the price, so it will pay to examine a proposal to see if bandwidth is really needed.

The network must obviously be reliable and maintainable. Reliability is a complex issue with LANs; there is both hardware and software reliability to consider. Will a failure in one node bring the rest of the system down? And on maintainability: does the system have to be brought down while a new station is connected?

Purchasers of local area network hardware should give some thought to compatibility. Here we mean the ability of the network to interconnect several different types of devices. This is particularly important for large organisations who may wish to avoid the 'tyranny' of being locked into one supplier. Note, though, that the ability to plug a device into a network does not guarantee that it can 'talk' to other devices on the network; there are several levels of compatibility.

The local area network selected to meet immediate needs should also accommodate future growth and should be able to cope with relocation of departments within a building. As an organisation changes and grows, the network should not impose limits.

Attention should also be focused on how the network appears to the user: does he/she have to know special commands to use the network, or does it simply appear like a natural extension of a workstation or personal computer? Ideally, the network will be completely user-transparent.

Finally, the influence of standards should be considered. Those networks which become the basis of independent standards will attract equipment designers from companies other than the network originator. The availability of 'third party' or 'plug-compatible' ▶

hardware will add flexibility to such networks and the competition between vendors will help to reduce prices.

The Shape of Things

By shape, I mean here the physical layout of the network's connecting links: usually cables of some sort. Note that a network has both a physical shape (or topology) dictated by the building in which it is to be installed and the particular hardware selected, and a logical shape, dictated by the network's protocol, or how the various units talk to each other.

There are three basic physical topologies for local area networks: stars, rings and buses.

In the *star* arrangement a master unit, usually the one which manages the major disk storage (known as a *file server*), sits at the centre of the network, while workstations cluster around it like the points of a star. Each workstation is linked to the file server by a separate cable, which will allow high rates of data communication. On the other hand, it will mean quite a lot of cabling in an average office, particularly around the file server.

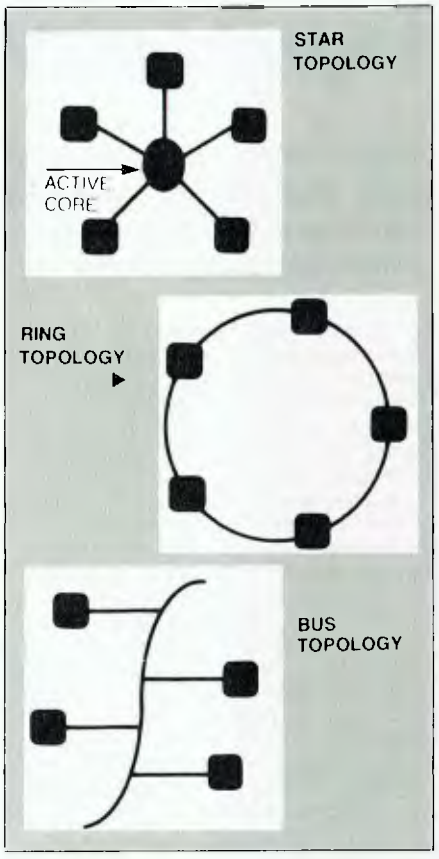
Furthermore, the entire network is reliant on the file server. If it should fail, the workstations will either be useless or usable only as stand-alone personal computers. Failure of workstations, however, will have no effect on the operation of the rest of the network.

Because each workstation has a dedicated line to the file server, there are no complex protocols for communications; instead a workstation just transmits when it is ready, and the file server is bound to receive the message. Electronic mail between workstations is handled by a 'store and forward' technique through the file server.

The ring is a much more sophisticated arrangement. Here there is no central node; instead, each of the workstations is attached to its neighbours on either side. Messages are broken into packets of manageable length, which are then transmitted in one direction only around the ring; a kind of electronic 'Postman's Knock'.

On receiving a packet, a workstation examines the destination 'marked' on it to see if the packet was addressed to it. If it is not, the workstation simply retransmits it to the next station on the ring; if it is destined for that workstation it will open the packet to get the data, and may take the opportunity to transmit a fresh message around the ring.

Nodes cannot simply transmit when they feel like it, since if they did the network would become difficult to



control. In the most common version of the ring network, called the token-passing ring, a station cannot transmit unless it currently holds the 'token', which is a special packet symbol transmitted around the ring.

Each node on the ring must be active; that is, it must receive each packet, examine it, and retransmit it if necessary. If a node fails – particularly the retransmission function – the whole network is brought down. Two things should be borne in mind, however: first, the node will consist of several sections, the most important of which is the repeater tap. The others may fail and affect only that node, but only if the repeater fails is the entire network affected. Second, trans-oceanic telephone cables contain hundreds of repeaters which continue to work for decades under extreme conditions of temperature, pressure and humidity. The same reliability can be expected from network repeaters.

The ring network looks like being one of the winning types in the marketplace.

The *bus* arrangement is probably the most common. In this type, a single cable is snaked around a building: if the two ends were pulled apart, it would form a straight line like a rope. All the workstations on the net are connected to this single cable, which may be either a low-cost twisted pair or a more expensive coaxial cable.

Because all the workstations are on the one cable, if two transmit at the same time, their messages will become scrambled. Thus, as for rings, a protocol is required. Several are possible; for example, the stations could be numbered into a logical ring and use a token-passing technique to determine which station has the right to transmit.

However, the major technique in use is the Carrier Sense Multiple Access/Collision Detection (CSMA/CD) technique. Here, a station just goes ahead and transmits whenever it finds a clear time - but as it does so, it listens to the bus cable signals, and if it cannot hear itself, it decides that someone else was transmitting at the same time. In this case, it will wait for a random period of time, and then try again. It's rather like a party line technique.

This is the technique used in the Xerox Ethernet system, among others. As well as CSMA/CD, it is possible to have CSMA/CA (Collision Avoidance) systems, and these are now starting to appear.

Several other network topologies are possible, but the main one is the so-called 'unconstrained' topology, which is generally used to link mainframes or minicomputers in arbitrary networks. A cluster of superminis linked together would be an example of this topology, and some micros, particularly those running UNIX-like operating systems, can handle this kind of networking.

Another example of unconstrained topologies is the large-scale networks such as ARPANET, Tymnet, Telenet and our own Austpac. These are generally operated by telecommunications authorities – in the case of Austpac, Telecom – and generally use the X.25 packet-switching protocol. However, although interesting in their own right, they fall outside the scope of this article.

Access Methods

As mentioned above, topology has some influence on, but is generally unrelated to, the access method used by a particular local area network. Several schemes are in use, breaking into three major types.

Polling is where only one station is able to transmit at a time, either by being specifically enabled by a master network controller, or by virtue of holding a token, as occurs in token passing rings.

Contention techniques, such as CSMA/CD and CSMA/CA, rely upon the network being able to resolve the situation that occurs when two stations try to grab the bus at the same time.

Networks can further be distinguished by whether they are baseband or broadband. *Baseband* systems provide one communication channel between the various devices on the network, again analogous to a party line. Broadband networks work rather more like radio stations – multiple radio stations can transmit at a time, and they can be distinguished by the radio receiver.

This kind of operation is called *frequency division multiplexing*; in other words, the available frequencies are divided up among the stations on the network. Techniques such as CSMA/CD are called *time division multiplexing* (TDM), as the available time is divided up.

Broadband systems are capable of carrying much more data than baseband types. In practice, each available channel is devoted to carrying one particular network, and access to that network is generally through TDM techniques.

Broadband systems can also carry other types of signal, not just data. Typical applications might include video conferencing, carrying intercom signals, security video systems, paging systems, background music distribution and other information which has to be distributed around a building or complex.

Finally, one can distinguish between the various types of LAN through the medium they use to carry the signal. The cheapest medium is *twisted pair* wiring; this is similar to conventional telephone wiring. As always, a compromise is required: twisted pair is also the most limited in bandwidth, and therefore the slowest, and it is suitable for baseband networks only.

Coax cable is a screened cable, and thus suitable for use at higher bandwidths; it is therefore the usual medium for high-capacity baseband and broadband systems. Of course, it is more expensive than simple twisted pair cable, and while some systems will work on standard television cable, others require special cables – such as triaxial – which are even more expensive.

Fibre optics is the technique used in recent high-capacity telephone circuits, and is extremely promising for high-speed networks. It is currently expensive, and it is difficult to tap into a fibre optic cable; it is certainly impossible to do so while keeping the network running.

Communication Standards and Network Architecture

The complete network consists of both hardware and software; the hardware will consist of the network itself and the stations attached to it, and the software will be similarly split. From the network designer's point of view, it can be difficult to decide where one starts and the other ends, and it is useful to be able to break the network up according to some logical rules.

This also assists in standardisation efforts, as people working with different networks will speak the same language. More importantly, it helps to ensure that different components of the network can talk to each other, by defining the protocols in use on the network for hardware to talk to hardware, network software to network software, and applications software to applications software.

The most prevalent tool for defining network architectures is the *ISO OSI Model* – the International Standards Organisation Open Systems Interconnect Model. This breaks the architecture of the network into seven layers.
From the lower levels of the model:

The *Physical Link Layer* defines the electrical and mechanical aspects of interfacing to the network medium. This layer includes the software device driver for each network node, plus the hardware itself, such as connection devices, network taps and the cable itself.

The *Data Link Layer* performs error-correction tasks and controls access to the network.

The *Network Control Layer* performs addressing of messages and routing between nodes, and controls the flow of messages between nodes.

The *Transport Layer* provides overall end-to-end control of communications once the path between two stations has been established, regardless of their locations.

The *Session Control Layer* establishes and controls system-dependent aspects of communications between specific nodes in the network and bridges the gap between the lower layers and the station's operating system.

The *Presentation Layer* protocols are concerned with translation of encoded data into a displayable form, be it graphics or text. Examples of this layer are Prestel protocols and the North American Presentation Level Protocol (NAPLP) used by the Telidon system for geometric display generation.

Finally, the *Application Layer* consists of additional services on the network such as electronic mail, file transfer, network control and others. ❑

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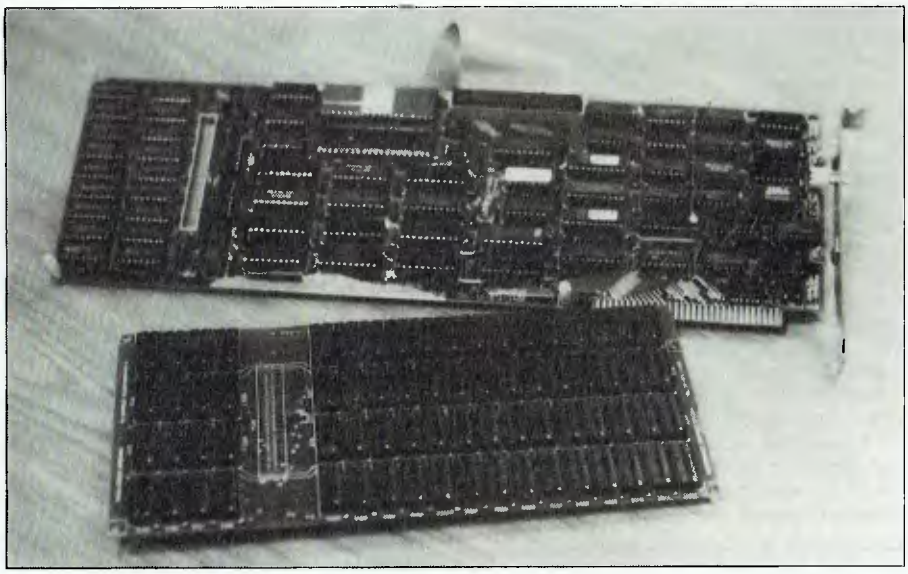
Les Bell shoe-horns a V8 under the bonnet of his IBM PC, tries Digital Research's Concurrent CP/M, debugs his Lisa, ponders on Unix, takes delivery of his CompuPro System 816, and has a preliminary look at Ashton Tate's dBase III – all of it 'in between' a normal month of writing reviews and features and talking his head off at seminars . . .

PROGRAMMER'S WORKBENCH

WELCOME BACK to the Programmer's Workbench. Since I last wrote, a lot has happened, as you might expect, so there's a lot to catch up on. We've been looking at a number of new products, including the PC Express card which shoe-horns a V8 under the hood of an IBM-PC. Also in this episode: Concurrent CP/M 3.1 arrived a while ago, we've been running it on the PC and have a few comments; our new machine, a Compupro System 8/16, finally arrived from the US; dBase III also passed through Customs; plus we've been doing the usual programming in dBase and PL/I, and so on.

First, the PC Express card from Intelligence Research in the UK. This is a card for the IBM-PC, carrying a 10 MHz 8086 processor, with logic to control access to the PC bus 8-bit data path. The board, which is full-size, can also carry 128K of memory, using 64K dynamic RAM chips or 512 Kbytes, using 256K RAMs. In order to provide as much memory as possible with a sixteen-bit data path, which the 8086 requires to operate at full speed, the card also has a daughter card which can carry a further 512 Kbytes of 64K chips, allowing a total of 640 Kbytes – the maximum the XT can carry. The memory must, of course, be a bit faster than the standard chips in the PC.



Installation of the card is quite simple, though it has its nerve-wracking moments. The 8088 in the PC must first be removed from its socket. While this can be done by levering it up with a small screwdriver, I'd suggest that you invest in a proper chip-pulling tool and minimise the risk of breakage. A cable from the PC Express card is now plugged into the PC motherboard, allowing it to drive the PC as though it was an 8088 chip.

With this cable installed, and the card in place, with its dip switches set to reflect the amount of memory available, it should be possible to boot the PC as though nothing was different. The first notable effect is that the appalling delay while it tests its memory (a necessary evil) is shorter, since memory accesses are much faster. Apart from everything happening faster, there should be no other differences.

While the 8086 can access its on-board memory at 10 MHz, the hardware on the PC board and bus obviously can't run that fast; so when the system accesses the PC ROM, disk controller, colour card and so on, it automatically slows down to 4.77 MHz for complete compatibility. Since, particularly in BASIC, the PC spends much of its time accessing the ROM BIOS, and this would negate the effect of the PC Express card, some trickery is needed. Intelligence Research supply it, in the form of the FASTROM program.

This copies the system ROM ▶

...WELCOME BACK TO PROGRAMMER'S WORKBENCH...
...A LOT HAS HAPPENED AS YOU MIGHT EXPECT...
1ST, THE PC EXPRESS CARD....WHICH AH..HAS A DAUGHTER HELPING US DOWN THE OL' SIXTEEN BIT DATA PATH
I MUST WARN YOU THAT ANYTHING YOU SAY MAY BE TAKEN DOWN & U
DID YOU KNOW THE 'C' VERSION OF THE SIEVE OF ERATOSTHENES WAS RUN USING MICROSOFT 'C'?
YOU RAT! ....ALL THOSE POOR PUNTERS...
..PC BASIC, TAKE ALL THIS DOWN
YESSIR
...THERE, COMFY?
THANK YOU DBIC*, THIS CO-OPERATION WON'T GO UNNOTICED...
& I'LL JUST SWITCH ON THE AFTERBURNER...
HA! NOW THEY'LL KNOW WHAT THE PC EXPRESS IS ALL ABOUT.*.
MAY I OFFER THE USE OF MY FACILITIES? ...JUST TAKE OFF MY CUFFS
FLASH
KLIK!
BLOOD
*COMPUTER AGE OFFICIALESE FOR "DANGEROUS BELL IN CUSTODY"
* EDITOR'S NOTE: DON'T BLAME US
NOW TO THE REAL BUSINESS...HERE IN MICROCOMPUTER PARADISE
[A DIVISION OF BELLCO MEGAINTERCORPETC]
HOW'S IT GOING BILL?
WELL~ I'VE RESTRICTED MYSELF TO MAJOR OPERATING SYSTEMS...& STILL MANAGED TO ELICIT A WIDE VARIETY OF REACTIONS.... ALL DISGUSTING
ZZT!
WZZP!
dBASE III
LISA DE BOGGA
UNIX ENHANCE-MENT PORT 4-UNIX
SPECIALISED TOOLS
OLD dBaseII WASN'T THE FASTEST HORSE IN THE STABLE....
...BUT WE WON'T WIN THE MELBOURNE CUP WITH THIS THING.... ...THESE PROFESSIONAL COMPUTER TYPES ARE TOO EASILY OFFENDED...
WE'D BETTER STICK TO HORSES OR COMPUTERS
MAYBE WE CAN SWITCH THIS THING FOR FINE COTTON..
OR COARSE LINEN...
HEEL!
GRRR
Help! I'm BEING dBASED by a UNIX
BJACKMAN

Benchmark	Plain PC	With PC Express
Interface Age Benchmark (BASIC)	861.57	402.82
Sieve of Eratosthenes (BASIC)	1953.53	924.98
Sieve of Eratosthenes (C)	13.30	8.42
File Create Disk Test (BASIC)	26.99	20.61

Table 1: The results of a number of benchmarks.

contents into the PC Express RAM and performs transparent address mapping; so instead of accessing the ROM at 4.77 MHz, it accesses the 10 MHz RAM instead. This speeds up BASIC programs, and programs that spend a lot of time inside the ROM BIOS.

Just how does it compare with the IBM-PC? Take a look at Table 1, which shows the results of a number of benchmarks.

The first two benchmarks, which are written in BASIC, show a consistent 2.1 to 1 or so improvement over the plain PC. These were run with the ROM contents copied to RAM by the FASTROM program, so that the processor always runs at full speed. The C version of the Sieve of Eratosthenes was run using Microsoft C, and here the improvement is only 1.58 or so. This probably reflects the different memory management used by the compiler; we only had 128K of high speed RAM on the PC Express card, and most of that would have been occupied by the ROM copy and operating system, so that the program would mostly have been in the remainder of the PC's memory. Hence the less startling performance.

Of course, a fully populated PC Express with 640K of RAM will show a consistent 2.1 to 1 improvement for all processor-intensive benchmarks. The final benchmark shows that since file creation is largely disk-bound, the faster processor cannot work miracles. It does produce an improvement – a significant improvement – but whether it is a worthwhile improvement would depend upon the application.

As well as the FASTROM.EXE program, a number of other programs are supplied with the card, which increase its utility still further. These include a print spooler, memory disk drive emulator and a software switch which can slow the processor down with just a touch on the ALT and F10 keys.

The insertion of the PC Express card in no way affected the operation of the PC, other than making it go faster. For example, CP/M-86 booted and ran normally, and so did every other piece of software we tried. If the extra performance is likely to be a problem (for example, if the F-16 performance of the normally Cessna-like Microsoft Flight Simulator causes you to augur in), there is a switch on the back of the board which lets you switch off the after-burner, so to speak.

Finally, the burning question: how much is it? A basic PC Express board with 128K of memory will set you back $1,375 retail, and a fully-populated board with 640K is a mere $2,650. I say mere, and mean mere, because I just paid over $2,200 for only 256K of memory (no 10 MHZ 8086 processor) for one of our other machines, and feel I was getting a bargain there. So the PC Express is

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not that expensive, at least from some points of view.

O/S Points of View

For the last few weeks I've been speaking at a twice-yearly seminar for professional computer types, called Microcomputers In Professional Computing. While waiting my turn to go on, I was able to watch the song-and-dance act of the previous speaker on Operating Systems, who by some coincidence was Bill Bolton of 'Your CP/M Computer' fame, and otherwise known as the Walking Encyclopedia of Microcomputing.

Bill restricted himself to the major operating systems, because once you start getting into the lesser known ones (like TRS-DOS, Apple DOS 3.3 and so on – there, I've offended everyone equally) that would be a three-day seminar in itself. But even restricting himself to CP/M (and its derivatives), PC DOS/MS-DOS and UNIX, Bill managed to elicit a wide variety of reactions. These ranged from 'What's CP/M?' (no disgrace – I get similarly bamboozled by OS/VS and other mainframe jargon) to 'How dare he say that!'. One thing is certain; nobody is neutral on the subject of operating systems.

Let me first of all declare my vested interests, as occasionally rival authors are prone to point at me and declare me to be 'CP/M and Z-80 orientated'. Here in Microcomputer Paradise, we actually run the following operating systems: CP/M 2.2 (2x), CP/M-86 (2x), CP/M-8/16, MP/M-8/16, Concurrent CP/M, PC DOS 2.0, MS-DOS 1.25, Lisa O/S, and we have UNIX V5 on order. No matter which operating system wins, we can't lose. On balance, I tend to stick with CP/M as I can make it perform best for me, but looking at that list you could be forgiven for thinking that I'm just as confused as everybody else!

Leaving aside the Microsoft/Digital Research axis, some of the points that Bill made about UNIX are worth examination, in the light of strong press support for the view that it will dominate by the end of the year.

While UNIX has a very flexible user interface, Bill has hit upon a very important point: the user needs to understand quite a bit about the system to use it. Agreed, it is possible to write shell scripts or even a completely new shell to get round this, but a) this presupposes the presence of a system whiz to do it, and b) nobody ever actually does.

Part of the problem is that UNIX is a multi-user system, and multi-user systems have their own particular problems of system administration and so on – which is why MP/M ain't as straightforward as CP/M. But another problem is the very set of features that programmers love about UNIX: pipelines which allow filter programs to be used as a collection of tools, the hierarchical file structure and so on.

These features are elegant, powerful and simple – provided you are familiar with the underlying concepts of multitasking, timeslicing, tree structures and other abstract notions. The trouble is that programmers are so familiar with those ideas that we forget how difficult they are to master at first.

My own straw poll among DOS 2.0 users shows a large percentage never bother with the hierarchical directory file system; they find it an unnecessary complication that they

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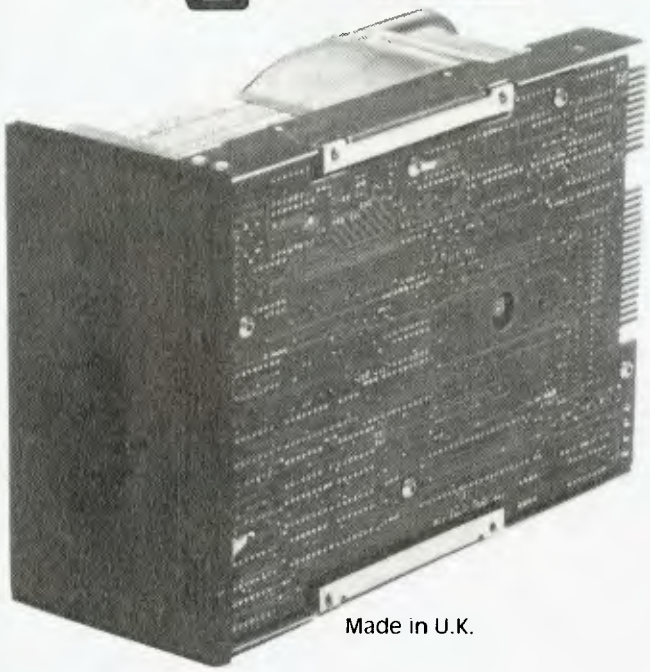

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can quite happily live without. Same for pipelines; they'd rather use a sorted directory utility than sort a directory through a pipeline, if you see what I mean.

This class of user wants a set of specialised tools for the common functions, not a large set of general-purpose tools from which common tools can be built. The behaviour of a single program can be documented and explained: the behaviour of pipelines has to be deduced from their principles of operation.

As Bill put it, UNIX was 'designed by programmers for programmers'.

Because of the complexity of its features, Bill maintains (and I agree) that a system guru should come with every UNIX system. In other words, every UNIX system needs someone to run it who is familiar with the system, can write shell scripts (at least, or better, C) and is devoted to maintaining the system.

Another major obstacle to the acceptance of UNIX in the commercial world is the lack of record and file locking. While virtually every port of UNIX contains some kind of 'enhancement' to do this, there is no standardisation as yet and until AT&T releases its locking the situation will not improve. Every commercial multi-user system, particularly on-line order entry, inventory and the like, needs record locking.

Another area which worries me, although Bill didn't mention it, is system security. The UNIX protection schemes seem to be quite well known; indeed a favourite game on our campuses and doubtless in the US is cracking the latest systems installed on computer science department machines. Indeed, it is sometimes vital to obtain super-user status, in order to allocate oneself more system time to complete an assignment! And who could fail a student with such an intimate understanding of operating system technology?

But commercial systems need security, and a system that can be cracked every fortnight or so by the average CompSci student wouldn't, at first glance, seem to provide it.

These seem to be the main areas of concern about UNIX, and until they are resolved – which shouldn't be long now – UNIX will make only slow progress into the commercial world, and will remain confined to the scientific and technical areas which are its traditional base. Maybe next year?

Debugging Lisa

We've had the Lisa here for over six months now, and have gradually come to terms with its way of doing things, which is quite different from the way other computers work. But it's not the fact that Lisa is different that impresses, so much as the quality of the system – and that really is different.

The underlying concepts have really been thoroughly worked out. For example, the disk directory is completely redundant and can be automatically reconstructed by the system, so that back-ups are not quite as necessary as they would otherwise be. This is, of course, in recognition of the fact that the average Lisa user is chairman of a multi-national corporation and probably either a) too busy to make back-ups or b) not smart enough.

Other little things catch the eye from time to time. For example, while drawing little boxes against lines of text in an overhead transparency, Lisa at once took over and started automatically moving the boxes into position. After I'd repositioned the first one, it assumed that subsequent boxes would be similarly re-positioned and put them in the right place. The effect was eerie, as the computer displayed almost human intuition.

One of the best features of the Lisa for the software developer is its debugger, which is one of the most advanced I've seen. It has one or two little weaknesses – like no way to terminate a program and return to the O/S – but is so loaded with other features that these can be forgiven.

One's first encounter with the debugger can be rather startling. It is installed as part of the Workshop and Pascal development system, but seems to integrate with the operating system. Whenever there is any difficulty with any of the Office System programs – that's the mouse-driven integrated software that is synonymous (synonymouse?) with Lisa – it dumps you unceremoniously into the debugger rather than its own user-friendly error-trapping, on the assumption that you must be a programmer and can therefore fend for yourself.

That's all very well, but if you are used to the simple DDT single-line dump of processor registers, Lisa's debugger is a rude shock. For example, Table 2 is a typical DDT86 display.

There aren't too many registers to worry about, so it's not a major problem to decipher (really!). Now look at Table 3 as an example of Lisa's debugger.

There's a bit more to this, and most of it hits the eye straight away. The 68000 has twenty 32-bit registers, and the register dump is correspondingly complex. Like DDT, it disassembles the current instruction, but unlike DDT, it tells you where it is, not as an absolute address, but as an offset from the beginning of a procedure (if known). It also dumps the current domain (DO=1 – from the memory management hardware) and the process ID of the interrupted process (P#=00006 – the Lisa OS is multitasking, so other things can be going on at the same time).

```
     0A>ddt86

DDT86 1.1
-x
            AX   BX   CX   DX   SP   BP   SI   DI   CS   DS   SS   ES   IP
--1------ 0000 0000 0000 0000 005C 0000 0000 0000 0000 0000 1010 0000 0000
OR      AX,DF11
```

Table 2 A typical DDT display

```
Trace Point
EMPTYRGN+0006 205F                    MOVE.L  (A7)+,A0
PC=003054AC SR=8018  0  US=00F7CA96 SS=00CC0000 DO=1 P#=00006
D0=00F80501 D1=000000FF D2=00000000 D3=00000000
D4=604C2E2C D5=00007FFF D6=00F20772 D7=00F206FA
A0=0034107A A1=00F20CAC A2=00CE004C A3=00F805FA
A4=00F80306 A5=00F7F6BC A6=00F7CAFE A7=00F7CA96
```

Table 3 Lisa tells you a lot more . . .

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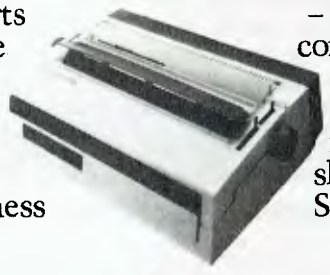

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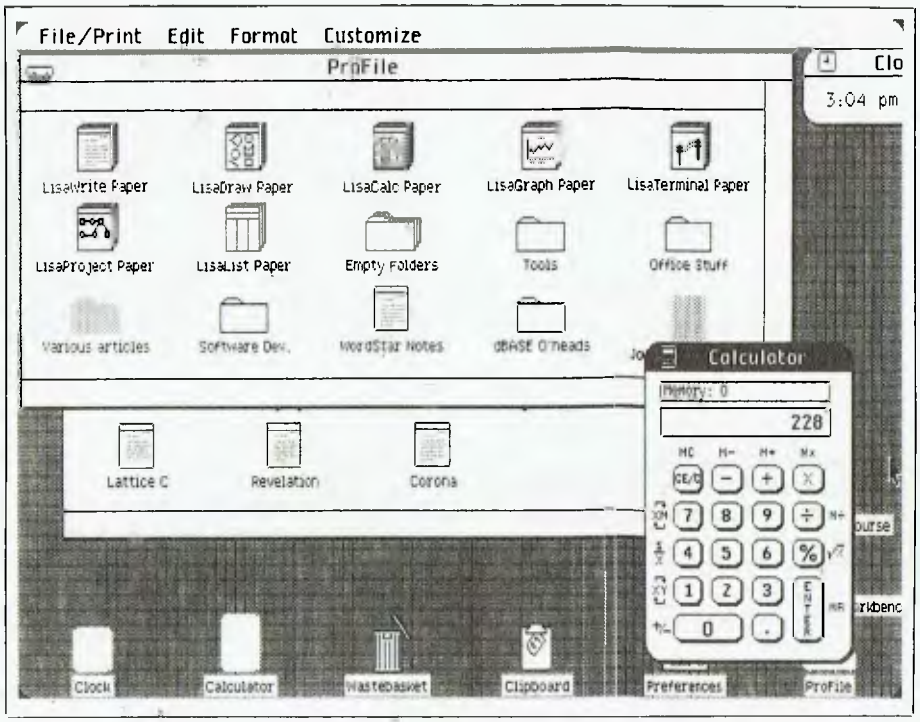



```
Level 7 Interrupt
00240238      4E73            PC       RTE
PC=00240238 SR=2000  0  US=00F78F50 SS=00CBFFFA D0=0
D0=000000E8 D1=00000000 D2=00000000 D3=00000000
D4=5FF44FE4 D5=47C44384 D6=42844444 D7=48245014
A0=00CC3C88 A1=00CC3CC2 A2=00CE004C A3=40047FFC
A4=5FF44FE4 A5=00CC40CA A6=00F78F58 A7=00CBFFFA
At 00240238
Stack frame at 00F78F58 called from 002C583B
Stack frame at 00F7FBAE
0024021B      6E20                    BGT.S   *+$0022         ; 0024023A
0024021A      2078 0200               MOVE.L  $0200,A0
0024021E      2068 9F33               MOVE.L  $9F33(A0),A0
00240222      2248                    MOVE.L  A0,A1
00240224      5340                    SUBQ.W  #$1,D0
00240226      6D12                    BLT.S   *+$0014         ; 0024023A
00240228      03C0                    ADDA.L  D0,A1
0024022A      B229 0258               CMP.B   $0258(A1),D1
0024022E      660A                    BNE.S   *+$000C         ; 0024023A
00240230      E580                    ASL.L   #$2,D0
00240232      2F70 0000 0002          MOVE.L  $00(A0,D0.W),$0002(A7)
0024D238      4E73            PC      RTE
0024023A      41FA 10FE               LEA     BAD_SCAL,A0     ; 0024133A
0024023E      2F48 0002               MOVE.L  A0,$0002(A7)
00240242      4E73                    RTE
OSQUIT+0000   4E56 FFFC       OSQUIT    LINK    A6,#$FFFC
OSQUIT+0004   2A78 0200                 MOVE.L  $0200,A5
OSQUIT+0008   2A6D 9FD8                 MOVE.L  $9FD8(A5),A5
OSQUIT+000C   4857                      PEA     (A7)
OSQUIT+000E   4EAD 0B1C                 JSR     $081C(A5)       ; 00403E3A
00F78F38      8F4A 002A 0050 002A  005B 0000 00CC 5452 .J.*.P.*.X....TR
00F78F48      0000 00F7 A022 0164  0024 011C 0000 0000 .....".d.$......
00F78F58      00F7 FBAE 002C 583C  0000 0030 0001 4B6E .....,X<...0..Kn
00F78F68      FFE8 0000 0000 0000  FFF0 A030 0000 0000 ...........0....
00F78F78      0362 2F2E FFD8 A030  046A 4CDF 1B01 00F7 .b/....0.jL.....
00F78F88      FBAE 0022 10E8 002C  57D4 00F7 8F5E 0000 ...".....,W....^..
00F78F98      0000 0000 0000 0009  0001 0000 4E55 F890 ............NU..
00F78FAB      9FED 0010 A022 02FC  2B4F F898 2B4E F894 .....".....+O..+N..


Level 7 Interrupt
00240238      4E73                    RTE
PC=00240238 SR=2000  0  US=00F78F50 SS=00CBFFFA D0=0
D0=000000E8 D1=00000000 D2=00000000 D3=000000B0
D4=5FF44FE4 D5=47C44384 D6=42844444 D7=48245014
A0=00CC3C88 A1=00CC3CC2 A2=00CE004C A3=40047FFC
A4=5FF44FE4 A5=00CC40CA A6=00F78F58 A7=00CBFFFA
>pu
```

Perhaps the best feature of all is the PU command. This should be used as soon as you realise you are in the debugger for whatever reason, and before you scroll essential information off the screen. Its function is to print a bug report on the printer connected to the upper parallel port – hence Print Upper (PU).

The bug report consists of the following: dump of the primary screen; dump of the alternate (debugger) screen; description of the error; trace display; stack crawl; disassembly of 20 lines of code from PC minus 20 (hex) bytes; and display of words from RA6 minus 20H bytes for 80H bytes.

Lovely! I mean, if you can't figure out what went wrong from that lot, you're not trying. Best of all, this kind of system eliminates entirely those phone calls that go, 'Thanks for calling us about your problems with our SuperDuper Accounting System. We really like to know when our system crashes, but can you just recall what you were doing when it fell over? You were trying to print Mr. Brown's balance, I see ...' With this system, the maintenance programmer knows exactly what was going on when the system crashed. Here's what he has to help him:

The primary and alternate screen dumps are graphics dumps of the applications screen and the debugger screen. The Lisa lets the user switch between them at will, so that when the system crashes and you are left looking at the debugger screen, you can just type <Option Enter> and see what was on the other screen a microsecond before you crashed.

Description of the error: the 68000 processor and the Lisa hardware can detect all kinds of problems, including subscript out of range, illegal string index, division by zero, illegal instructions, or privilege violations, and others. The subscript checking feature is one of the things that put me off Pascal; checking subscripts in software slows down programs noticeably, but with hardware checking a la 68000, it makes sense. It could even be added to C ...

The trace display is the register dump shown above, which is obviously essential to debugging – I just wish there wasn't so much of it. The stack crawl shows the procedure returns on the stack; in other words, which ▶

subroutine called the subroutine that called the subroutine that called this one – together with the parameters they all passed on the stack.

Finally comes a listing of the assembly language being executed at crash time, together with a dump of an area of memory which is apparently crucial in some way to the system – my knowledge of 68000 assembler isn't good enough yet to tell me why.

From the way the debugger names the procedure it is currently executing, you may have deduced that the Lisa debugger has access to the symbol table of the complete operating system. You would be right. I couldn't quite believe that, until I typed SY, the command to dump the debugger symbol table, and watched pages of listing go by. Not only does it have the operating system symbols, it also has those for the applications, whenever they are running. Evidently, every procedure compiled by the Pascal compiler has its symbols loaded into memory along with the code.

There are many more commands, including the ability to set up to sixteen breakpoints, and to set up timing buckets to profile a program's performance and find those critical areas of code. I haven't yet plumbed the depths of this debugger – frankly, I hope I never have to – but it is certainly the most powerful program of its kind I have ever encountered.

So all you system hackers out there can now set out to incorporate these features into your system monitor programs. If you manage all the above, then, as an advanced exercise, try coding the 'IX statement' command which immediately executes the assembly language statement supplied without affecting the user's program counter and the 'procname' command, which calls the named procedure or function. If you manage all that, you've got the job!

Concurrent CP/M

Much as I like the Lisa, I can still write code faster for CP/M, and have more CP/M applications around than any other kind. So I'm always interested in the state of the art in CP/M and was therefore particularly pleased when Arcom Pacific, in the person of Bill Bolton, sent me a copy of Concurrent CP/M to take a butcher's hook at.

I've already declared my interests, so I won't repeat them here. I have, of course, used DOS 2.0 and CP/M-86 on the IBM-PC, and come to the conclusion that while DOS 2.0 has the software support, CP/M-86 is, for the time being, my preferred software development environment. This is largely a matter of personal preference, since similar tools are available for both operating systems and in many cases identical tools are available (for example, the Computer Innovations C Compiler and DRI's languages), but when it gets down to assembly language interfaces to O/S features the CP/M style is the one I know best. Plus, my CP/M-86 programs will run multi-user under MP/M-86, which is a major benefit. While the UNIX-like features of DOS 2.0 attract me greatly, I'll wait until I see DOS 3.0 before making up my mind whether to use them or not. Right now, they're not a major factor.

Concurrent CP/M is an interesting new twist in the operating system market. From a cynical viewpoint, it is possible to view it as a shallow attempt by DRI to score off Microsoft by implementing the DRI multitasking technology in the IBM-PC marketplace. Or is it a genuine leap forward?

I tend towards the latter view. CCP/M is not merely single-user MP/M on an IBM-PC; it really is a new technology. The major features are: you can run up to four programs at once, with instant switching between programs using the control key and numeric keypad. Each program outputs to its own display, which can be a separate 'virtual console' or one of several overlapping windows on the main screen. There's no need to hit control-C when changing disks any more. And file operations are considerably faster.

Concurrent CP/M uses the real-time multitasking kernel of MP/M to support multiple programs (they're called tasks or processes once they've loaded) at one time. However, while the system supervisor and scheduler are similar, that's about the limit of the resemblance.

The new operating system implements what DRI calls the 3.1 file system, as used in CP/M Plus (remember the dBase performance of the Morrow MD-11). This automatically logs in switched disks and, more importantly, is very much faster at locating files, particularly on hard disks.

But perhaps the major benefit of the new system is its 'windowing' capability (which was first displayed and shipped a week after the announcement of Microsoft Windows, much to that company's chagrin). Up to four windows can be displayed at the same time and, using the 'WMENU' window manager, they can be moved around the screen, resized, blown up to fill the screen and otherwise manipulated. Striking the control key plus 1, 2, 3 or 4 on the numeric keypad selects the appropriate window and moves it to the front of the pile.

Within windows, applications behave much as they do under conventional CP/M. However, the window system supports cut and paste capability for applications that can make use of it, and the GSX (Graphics System eXtension) system supplied as part of CCP/M supports a mouse driver for the Mouse Systems Mouse, making applications such as DR Graph mouse-driven.

Windows can be set up by the user in two ways. The WINDOW command accepts a great long list of parameters on the command line, and if they're all right, it instantly resizes, recolours or moves the specified window. However, a more useful way of manipulating windows is through the Wmenu window manager. Once this is loaded into memory, it resides there permanently as indicated by the legend 'Win' in the CCP/M status line at the bottom of the screen.

Wmenu is invoked by pressing the control and plus keys at the same time. The 25th line now becomes a Lotus-like menu of commands for manipulating the windows. The user can reposition them, re-size them, control scrolling within them, set foreground and background colours and automatically write out SUBMIT files using the WINDOW command to set them up.

At any time, windows can be blown up to fill the screen or shrunk to a small area to allow monitoring of activities. Most users, however, will simply use CCP/M to run multiple programs with only one program actually in use at one time; the productivity benefits of CCP/M come from being able to switch between tasks in response to unscheduled interruptions such as phone calls.

We've tried a number of applications and utilities under CCP/M, with no difficulties at all. dBase needs to be installed for MP/M operation, but that's no problem, and WordStar works just fine, as did the various utilities we shunted across from our MP/M system.

There are a few minor deficiencies in the system. First of all, there is no system status program – equivalent to MPMSTAT – to advise the user what programs are running; on the other hand, a lot of that information is available from the 25th line status displays anyway. Nor is there a copy of DDT86, ASM86 or any other technical utilities; CCP/M is very much an end-user product. A Programmer's Pack is available at extra

cost, as the typical user is never going to write his own assembly language programs.

A forthcoming enhancement to Concurrent CP/M, called Concurrent DOS, adds the ability to run IBM-PC DOS programs under Concurrent CP/M. The system automatically senses disk formats, and maps DOS system calls into CCP/M calls. The DOS 1.0 calls are all supported, as are most of DOS 2.0. Some DOS 2.0 facilities, such as handles, 'pipelining' and the hierarchical file system do not fit well with CP/M's design philosophy, but Concurrent DOS makes a plausible attempt at translating them anyway – for example, translating hierarchical directories into user areas.

DRI's avowed intention is to support the 20 most popular DOS applications under Concurrent DOS, so that programs such as Lotus 1-2-3 and others will work fine. When implemented on non-IBM hardware, Concurrent DOS provides MS-DOS support, with all the hardware dependence that implies.

Although Concurrent DOS provides a subset of DOS 2.0 commands, DRI is known to be working on a further version, called V4, which will bring it up to the DOS 2.1 level.

We'll report more on Concurrent as we really start pushing it.

Compupro System 8/16

It's here at last! For some time we've been feeling the pinch because although we're not exactly short of computers here, we still need to have a large system for software development. A while back I investigated the possibility of adding a hard disk to Brutus, our main S-100 machine. While it could be done, the possibility of S-100 bus incompatibility problems was quite high, so I decided what the hell, it's only money, I'd only spend it on socks and drugs and rock and roll anyway, so why not buy a whole new computer.

After advising so many people to buy Compupro gear with the Gifford MP/M 8-16 operating system, I felt I'd better put my money where my mouth was and ordered one. And it's here at last!

Jerry Pournelle has described the Compupro box as the Mack truck of computing. If anything, that's an understatement. It's the Centurion tank of computing.

The box we have is perhaps the ultimate in good solid hardware that just delivers. It delivers performance, and keeps on doing so, no matter what. Well, *now* it delivers performance, but at first we did have a few problems, particularly with the hard disk.

It turned out that our DISK 3 controller had a transistor bent back and shorting against the resistor behind it, which was causing all our problems. After it was straightened, the disk formatted and verified correctly and hasn't missed a beat since, but for a while there it fell over with monotonous irregularity. At least it forced us to think about back-up strategies while we were still viewing the new hardware with a probationary eye. Now we're no longer lax about back-ups – particularly Maria, who lost a number of dBase programs on one occasion!

Anyway, all's fine now, and it gave us an excuse to investigate the Archive attribute which PIP can manipulate for back-up purposes in MP/M and Concurrent CP/M systems.

Our system has the dual processor, Disk 1A controller (which handles both 8" and 5 1/4" disks), Disk 3 hard disk controller, System Support 1 board to handle interrupts and so on, and 512 Kbytes of memory. The disks are a pair of 1.2 Mbyte floppies and a 21 Mbyte Rodime drive. The terminals are Freedom 200s from Liberty Electronics.

As a first cut at the system, while getting the hard disk sorted out, we ran MP/M-8/16 on a floppies-only system, and we can tell you that while it can be done, performance suffers dramatically. A hard disk is the only way to go.

MP/M-8/16 supports both 8-bit and 16-bit programs at the same time, so we were able to continue to use much of our existing software by porting it onto the new machine. We recompiled some of our own software to produce 16-bit versions, but in practice the improvement in performance is not all that dramatic.

Our system was delivered with Compupro's implementation 2.1F of MP/M-8/16, but we expect to upgrade very shortly to Gifford's new implementation of Concurrent CP/M 8/16, which offers improved system security features, higher performance through cache buffering and additional utilities. In particular, Gifford's system supports virtual terminals, a feature which allows each user to run up to four programs simultaneously and switch between them at will, using the multiple memory pages of any smart terminal.

Meanwhile, the Compupro version is holding up pretty well. The performance of the system is higher than we expected, and it puts up with pretty heavy loads, particularly when we all start compiling programs simultaneously.

MP/M-8/16 is a significant enhancement over CP/M. Just take a look at the output of the MPMSTAT command, shown in Table 4, and you'll see what I mean.

As you can see, I was the only user on the system when running the command. Notice also the support for up to ten terminals on the system, and the ability of MP/M to support 'virtual consoles', which allow each terminal to actually run more than

Table 4 MP/M Status display

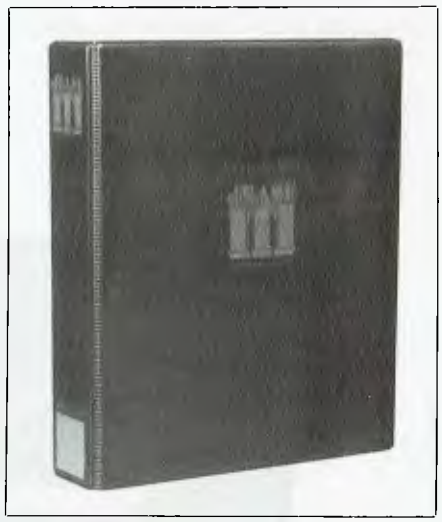
```
MP/M-86 2.1 [20 July 82]
Copyright (C) 1982, Digital Research

****** Status Display - Values Shown In Hexadecimal *****
Number of Physical Consoles = 0A
Number of Virtual Consoles = 00
Number of List Devices = 03
Number of Free Process Descriptors = 2F
Number of Free Memory Descriptors = 8F
Number of Free Queue Control Blocks = 10
Free Queue Buffer Area = 0100
Number of Flags = 30
Maximum Paragraphs Per Process = 2000
Ready Process(es):
MPMSTAT [01] Idle     [00]
Process(es) DQing:
Process(es) NQing:
Delayed Process(es):
Polling Process(es):
Process(es) Flag Waiting:
01 -         Tick     [00]
0A -         Shell0   [00]
22 -         Shell2   [02]
23 -         Shell3   [03]
24 -         Shell4   [04]
25 -         Shell5   [05]
26 -         Shell6   [06]
27 -         Shell7   [07]
28 -         Shell8   [08]
29 -         Shell9   [09]
Flag(s) Set:
04  20
Queue(s):
MXdma                MXLoad               MXcli
MXdisk
Process(es) Attached to Consoles:
[00]       - Shell0
[01]       - MPMSTAT
[02]       - Unattached
[03]       - Unattached
[04]       - Unattached
[05]       - Unattached
[06]       - Unattached
[07]       - Unattached
[08]       - Unattached
[09]       - Unattached
Process(es) Waiting for Consoles:
[01]       - Shell1
Process(es) Attached to Printers:
[00]       - Unattached
[01]       - Unattached
[02]       - Unattached
Process(es) Waiting for Printers:
Memory Partitions:
Start Length Process | Start Length Process | Start Length Process
0FF6   0400  MPMSTAT   0F8F   0067  * FREE *  13F6   0400  * FREE *
17F6   0400  * FREE *  1BF6   0400  * FREE *  1FF6   0400  * FREE *
23F6   0400  * FREE *  27F6   0400  * FREE *  2BF6   0400  * FREE *
2FF6   0400  * FREE *  33F6   0400  * FREE *  37F6   0400  * FREE *
3BF6   0400  * FREE *  3FF6   0400  * FREE *  43F6   0400  * FREE *
47F6   0400  * FREE *  4BF6   0400  * FREE *  4FF6   0400  * FREE *
53F6   0400  * FREE *  57F6   0400  * FREE *  5BF6   0400  * FREE *
5FF6   0400  * FREE *  63F6   0400  * FREE *  67F6   0400  * FREE *
6BF6   0400  * FREE *  6FF6   0400  * FREE *  73F6   0400  * FREE *
77F6   0400  * FREE *  7BF6   0400  * FREE *
0A>
```

one process at a time – rather like the ability of Concurrent CP/M to support virtual consoles. As far as I know, however, the Gifford system is the only one to actually implement this feature – a comment that applies to many of the facilities which MP/M and other sophisticated operating systems potentially offer.

One of the biggest problems we faced on installing the system was naming it. Some time ago, we found that it was becoming difficult to keep referring to 'The S-100 System', 'The Kaypro' and so on. Worse still was trying to fit the full names onto the labels for the cables that link them all together. When the Lisa arrived, the obvious thing to do was to call it – her – Lisa. And so the Kaypro became Kate, and the S-100 system, because of its big blue box, became Brutus. The arrival of the Compupro system caused temporary confusion, until Andrew came up with the answer. The new system sits by Brutus, it is also S-100, and it begins with C (CompuPro) and so – of course – it became Cassius.

I guess Caesar must have been my 6800 system which was done in by Brutus in 1977. But like a mystery novel, there are some loose ends to be tied here. Who (or more to the point what) is, was, or will be Mark Anthony? And while Hyperion needs no renaming, being a perfectly acceptable name from Greek mythology, what on earth (or in the Heavens) should we call our IBM-PC? Up till now, it's been a mysterious, faceless company man, but it really needs a name. In fact, I'll offer a bottle of Scotch – or for tee-totallers, a copy of Who's Who in the Ancient World – for the best suggestion for a name for our PC received by December 10.



dBase III

It's here at last! For those mortals who have been struggling with dBase II, dBase III has appeared much as the holy grail – unattainable, much sought after, and guaranteed to solve all the problems mankind faces.

We've finally got our hands on a copy, and given it a preliminary once-over. The result, we must admit, fills us with mixed feelings.

First, the good news. The major restrictions of dBase II have been overcome. The biggest one which faced most programmers was only having two files open at one time; this has now been lifted to ten. Since many applications were perpetually opening and closing files, this should speed such applications up, as they can now leave the files open.

Next, the file sizes can be much greater, in both length and 'width'. dBase III files can contain up to 1 billion records – that is 1,000,000,000 records – though with a maximum size of 2 Gbytes which means each record would have to be just two bytes long. Still, it's very much more than dBase II allows. Up to 128 fields per record are allowed, and records can be up to 4000 bytes in length.

A couple of new field types have

been added to dBase III. Perhaps the most significant of these is the memo field, which supports up to 4 Kbytes of text in a separate file. This is effectively a variable length field. The date field type stores dates in an internal format which can be used for date calculations and conversions, such as deriving the day of the week for any given date, or the number of days between dates.

Numeric calculations are now performed in IEEE floating point format, so that numeric precision has increased from 10 digits to 15.9 digits. The increased floating point accuracy slows the system down somewhat, but there is the possibility of using an 8087 to redress the balance.

Although up to ten databases can be open at one time, the maximum number of files which can be open in total is still 15. Add to this the fact that databases count as two files if memo fields are used, and things don't look so rosy. Against this must be set the innovation of procedure files, which can contain up to 32 procedures. Since this can replace a lot of the little command files which tend to lurk at the tips of the command file tree, fewer command files need to be open at one time.

Memory variables have increased from 64 to 256 (phew!) and memvar space to 6 Kbytes. That should simplify a lot of programs! For programmers who could never get used to the STORE <exp> TO <memvar> syntax, dBase II accepts lines of the form <memvar> = <exp>.

A major new feature is the SET RELATION TO command, which effectively replaces the SET LINKAGE command, and also removes the need to STORE keyfield TO memkey / SELECT SECONDARY / FIND &memkey, as is frequently done in dBase II. This feature makes the system automatically position secondary databases as though they are JOINed. In other words, at last this makes dBase II a true relational database.

As is usual with any complex new product, many of the best features are 'sleepers', the significance of which will only become apparent as we dig into it and make heavy use of them. For example, hidden among the SET parameters of the new version is SET FILTER TO <condition>, which makes records which do not meet the specified condition effectively disappear from the database. This makes it much simpler to write general-purpose labelling programs, for example, or general-purpose report generators.

Version	Stage 1	Stage 2	Stage 3	Total
dBase II V2.41	204.73	270.67	326.66	802.66
dBase III V1.0	1421.69	152.93	196.32	1770.94

Table 5 dBaseII vs dBaseIII

No doubt other seemingly innocuous commands will come to light in the coming months.

Now for the bad news. There are a couple of things on the negative side about dBase III that stop our approval from being unconditional and absolute.

First of all, it's only available for the IBM-PC and close clones – though we know a version exists for the AT&T 3B2 under UNIX. Now, while we must concede the commercial sense of this, in that the PC is the most popular machine currently on the market, it says little for the product's much vaunted portability that Ashton-Tate have no intentions of releasing a version for other hardware or operating systems. In particular, there are a large number of users who have settled on large, powerful, multi-user systems for their inventory and similar applications – like the US Air Force, for example – and this leaves such users with no upgrade path, short of scrapping their hardware and replacing it with networked PC's – which frankly is just not on.

Secondly, there are some areas of concern related to performance. dBase II wasn't the fastest horse in the stable, but we were expecting a major leap forward with III. The reverse seems to be true – at least based upon our preliminary benchmark.

That statement requires considerable qualification, so here is a full run-down. It's true that many individual verbs – like INDEX and PACK – are typically 30 per cent to 50 per cent faster than in II. This is presumably due to the increased buffer space available in the new version, which speeds disk access. However, the components of the system that were previously processor-bound are now even more so.

Table 5 tells the story. It's our standard three-stage benchmark, where stage 1 generates a file in which one field contains pseudo-random numbers, stage 2 indexes the file on that field, and stage 3 finds all records which start with '55', deletes them and packs the file.

Stages 2 and 3 are certainly faster, as indicated above. But stage 1 bogs down terribly. I conjecture that there are a couple of reasons for this.

First, dBase III has been rewritten in C, while dBase II was in assembler. Now, the best C compilers can only approach half the efficiency of assembly language; most are approximately one-third as efficient. Hence the interpreter portion of dBase III can only be half as fast as that of dBase II. Add to this the increased complexity of the floating point format, and you can see why dBase III is at least partly processor-bound.

This will most affect those existing dBase II systems which go to extraordinary lengths to avoid updating index files or otherwise use lots of code to avoid dBase verbs like UPDATE or TOTAL. Because of the added interpreter overhead, these programs will run more slowly. Those which use straightforward code with no attempts at optimisation will possibly run faster.

This suggests that dBase III will require a new design philosophy, and that experienced dBase II programmers will have to unlearn a few things.

Products Mentioned

Compupro 8/16: Automation Statham Pty Ltd, 47 Birch Street, Bankstown 2200. Phone (02) 709 4144.

Concurrent CP/M and dBase III: Arcom Pacific, 252 Abbotsford Road, Mayne 4006. Phone (07) 52 9522.

Lisa Pascal Debugger: Apple Computer Australia, PO Box 374, North Ryde 2113. Phone (02) 888 5888.

PC Express: Intelligence (Australia) Pty Ltd, 4th floor, 204 Clarence Street, Sydney 2000. Phone (02) 267 1711. ❑

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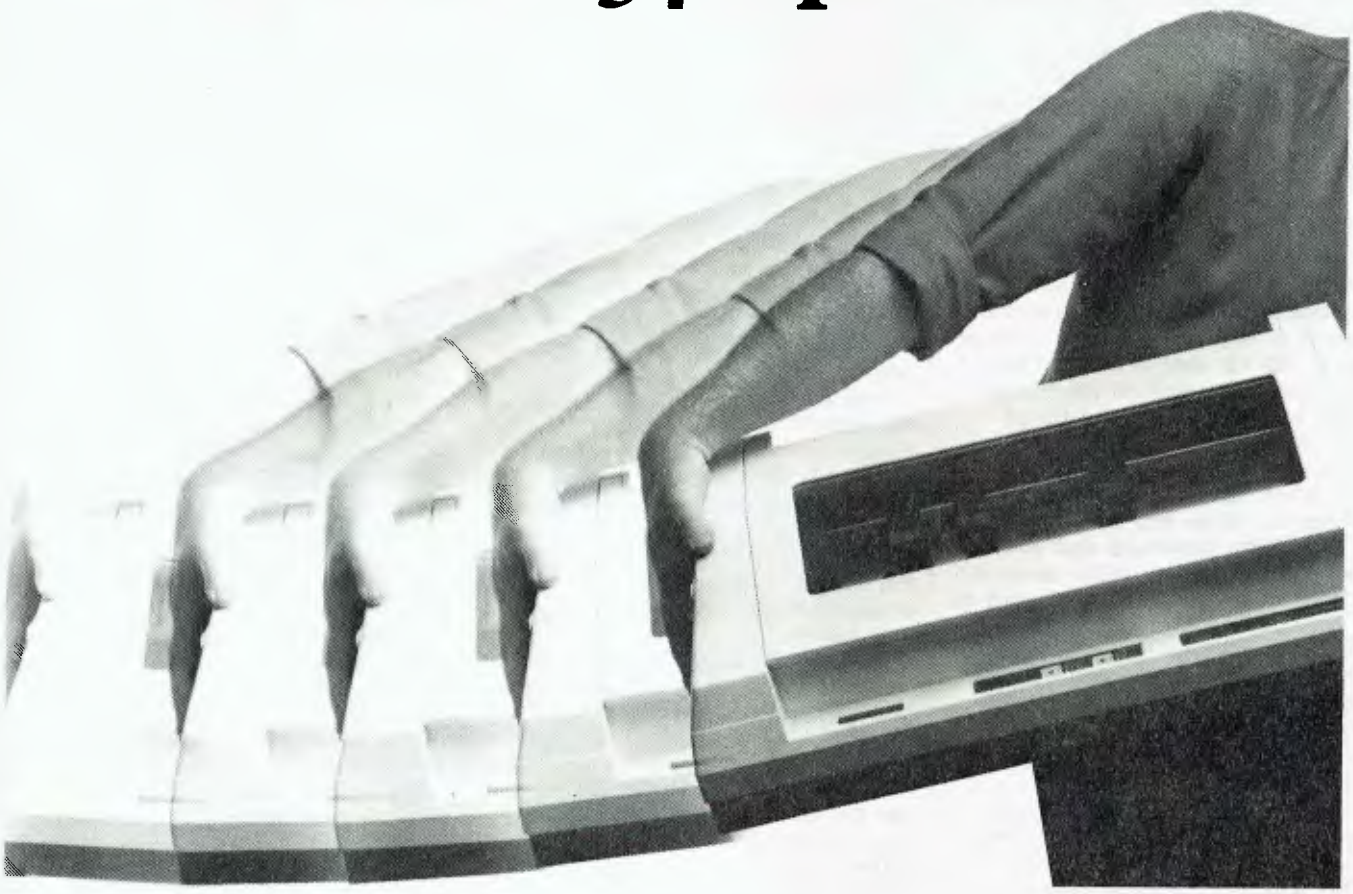

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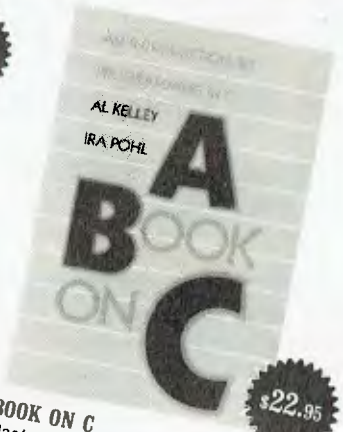

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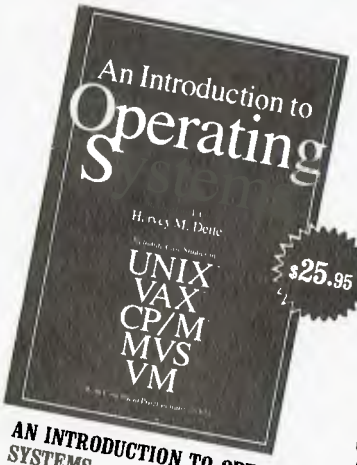

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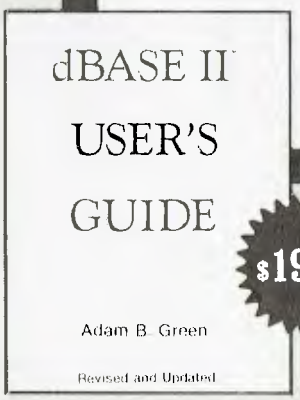

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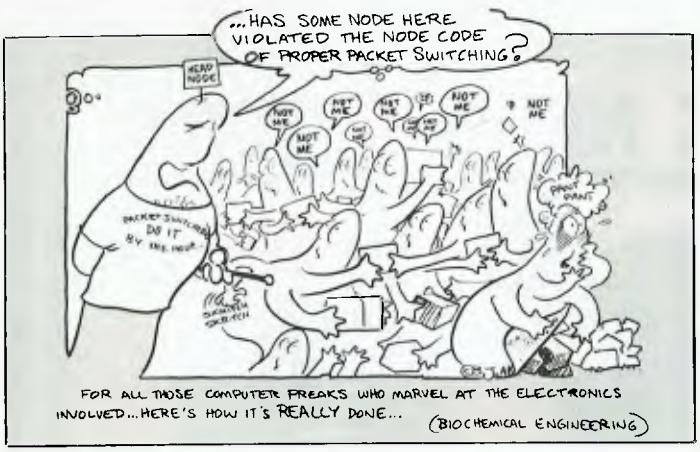

All about Packet Swi

TELENET

ONE OF THE most important developments in computing was the advent of time-sharing, which allowed several programs to run at one time on one computer. By making clever use of the 'gaps' or 'pauses' that occur when one part of a computer is busy but another idle, both computer users and computer owners benefit: users, by receiving the illusion of having the computer all to themselves (time-sharing was responsible for giving thousands of programmers and other computer users their first 'personal computer'); and owners, by squeezing more work out of the computer. The first 'personal computer' for many computer users was a terminal attached to a time-shared system.

Equally important in advancing computer use and in driving computer usage costs down (and similar in concept to time-sharing) has been the development of a communications technique called packet switching, which allows users to time-share expensive communications lines and thereby cut down the effective costs of remote access.

Cheap, Cheap

The chief advantage of packet-switched users is reduced costs. Maximum charges on GTE Telenet, one of the US's most widely-used packet-switched networks (and also the network Australian users are 'fed into' by OTC's MIDAS service from Sydney to access US databases such as The Source), are $8 per hour, regardless of the distance involved. By contrast, maximum charges for a daytime call to connect a Boston, Mass. computer user with a computer in, say, the western state of Wyoming, could be as much as $29.40 per hour. By the same token, an Australian user could pay between $100 and $200 an hour for an ISD call to The Source in Maclean, Virginia – compared to $12 an hour plus 60 cents per 1000 characters transmitted, using MIDAS.

Telenet is called a usage-sensitive service, and the amount of time the service is used accounts for the bulk of the charges. By contrast, conventional telephone service is both distance- and time-sensitive.

(GTE Telenet, like AT&T, is a company that provides a communications service. So how come Telenet users never see a bill from Telenet? Easy. Some services attached to Telenet, such as Dialog Information Services, include Telenet charges in their monthly bill, and also break them out so users can examine them separately. Other computer service providers, such as the OTC's MIDAS, include Telenet charges in their fee structure without further breaking them down.)

Most of the thousands of computer or terminal users in the US who daily log on to remote services such as Source, Compuserve, Dow Jones and others, are barely aware that the system connecting them to their service is a packet-switched system. Just two decades old, packet switching has become the de facto standard for connecting users to computers all over the world.

How Packet Switching Works

To the user, packet switching works like this. (For the sake of simplicity, we'll describe the sequence of events for Telenet, the largest such system. Other packet-switching systems, such as Uninet, Tymnet, and others, work in a similar manner, although some of the parameters – that is, the specifics – may be slightly different.)

The user places a regular telephone call, which is answered by a sophisticated (and very specialised) computer. The computer answers with the familiar tone, the user turns on the modem, and appropriate lights become illuminated on the modem indicating that a communications link has been established.

The system answers by identifying itself. Telenet sends the user a signal that says "TELENET", along with the address of the node that's been accessed. In effect, this is Telenet's way of saying "Hello".

The user then enters two carriage returns; these two alone are sufficient to tell Telenet what kind of computer is being used. Telenet then responds with an at sign (@), which is its way of asking, "Whom (or who) do you wish to be connected to?"

If there are available lines to the host requested by the user, Telenet will connect the user to The Source immediately. The user must then go through the Source log-on procedure and give the correct password and ID. Once the user's log-on attempt has been successful, it looks to the user as though he or she has been connected directly. The user transmits messages and the computer responds, seemingly with no delay. So far, it looks like no big deal.

tching

So, you thought you only had to dial up, switch on your modem, hit 'return' a couple of times and you'd be able to communicate with big computers in other countries. Well, sort of. Our US correspondent Howard A. Karten explains packet switching from an American point of view – which turns out to be pretty much the same as from our vantage point, given our ability to access the systems he talks about via OTC's MIDAS system.

The Nodes' Point of View

The computers which control Telenet consist of microcomputer nodes in major cities, manufactured by Telenet. These are linked by a variety of methods: lines leased from AT&T, and from other carriers; satellite links; microwave links and others. (There may also be fibre optic links in the system – it's all transparent to the user, as we say in this business.) The same microcomputers are used throughout the system; a smaller Telenet office will have only a few, while major communications centres, such as New York, have banks of them to handle the added volume. All communications with the 'outside world' – both Telenet users and hosts – passes through these nodes.

Within Telenet, what's happening is this: every time a message is received by a node, the node in effect grabs a bite; Telenet's bite is 128 bytes. Telenet node processors add some codes at the beginning and end of the message. These codes indicate the sender's network address, the recipient's network address, and also contain a special check called a cyclical redundancy check. The cyclical redundancy check is a calculation which is used by Telenet to assure that the message arrives intact at its final destination.

The message is transmitted from node to node to its ultimate destination. As each node receives a message, it does a check with the sending node to make sure they both agree on the content of the message. If an error has been detected, there will be a retransmission. This happens between each pair of nodes in the system. Thus – in theory, at least – it's impossible (or at least very difficult) for a message to arrive garbled.

Economic Messages

The thing that makes packet switching work, and work economically, is that every message is broken up into a discrete package. Since each message on the network is a complete package, they are therefore distinguishable from each other – at least by computers, which know where to look for the address.

What the packet-switching system does is, in effect, to put each message on the same telephone line, but at different times. At time 00:00:00, a message from Sender 1, bound for recipient 1, goes on the line; at time 00:00:12, for example, a message between Sender 2 and Recipient 2 goes onto the same line. Telenet can look at the coding on the packages and determine that these are really two different conversations, and not mix them up.

In packet-switched systems, successive messages will not necessarily travel via the same physical route. The term 'packet switching', in fact, is used to indicate that what's being switched around is packets – electronic blips – rather than physical circuits, as happens in ordinary telephone usage.

Another interesting aspect of packet switching is what the computer science folks call 'robustness', or survivability and resistance to disaster ('unplanned outage' is a euphemism communications folks often use). If a disaster were to strike a conventional telephone company office in, say, St Louis, phones in that area might be cut off from the rest of the network and calls in progress would be lost. Nevertheless, the remainder of the network would be unaffected.

In packet switching, theoretically, nothing would be lost. If node 2 suddenly stops working when node 1 is transmitting, node 1 will get no acknowledgement and then, presumably, try a different route.

See-Through

Another factor that makes packet switching work so handily is that it is almost totally transparent to users. The language protocol used in IBM-PC's is called ASCII, but other computers or terminals use a language protocol called EBCDIC (pronounced 'Ep-si-dick') and those, too, can access packet-switched systems with no effort required by the user. The necessary protocol translations are done by the hardware that makes up the packet-switched system.

What this means is that accessing Telenet requires the same hardware and software used for general telecommunications work: basically, a smart or dumb terminal, or a personal computer; almost any telecommunications software; and a modem.

The extra steps necessary to sign on to a PS system are so quick and easy that they go unnoticed by almost all users. Major cities almost always have both 300 and 1200 baud facilities, although the higher speed may not be available in areas with lower traffic volumes. Once data gets inside a PS system, there is no distinction between speeds, and in fact transmissions which entered the system at different speeds travel at the same speed (often 50,000 baud).

Packet switching has become the standard for computer-oriented communications throughout the world. Most US versions of packet switching are referred to as X.25 (after the American National Standards Institute – ANSI – committee of that name), which is a very precisely-defined standard. Other countries, too, have their own versions of packet switching: the French offering is called Transpac, the English offering (designed, incidentally, by Telenet) is called PSS, and so on. ❑

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Commodore 16 and Plus/4

By Andrew Farrell

JUST WHEN you thought the Commodore column was lost forever ... Yes, I hate to end the celebrations, but I'm back. Well, it's coming up to that time of year again. The budget is all over, you've calculated your total savings and now you're looking for a way to spend it. Wouldn't that be nice?

In the real world things haven't changed. Commodore has officially released its new machines, as you're probably well aware by now. No-one has really taken a close look at one yet, but from the few minutes play I had at Commodore recently I feel a few things are worth mentioning.

First, just because it's released doesn't mean you can buy one. In fact, you might see them by Christmas, if all goes well. The 264 will be known as the Plus 4 due to the fact that it has or will have four built-in programs ready to run when you power up. BASIC 3.5 is the updated language to be included in the Plus 4 and the Commodore 16. As I mentioned some time back this language supports the graphics functions very well, and at a surprisingly high speed. The function keys on both machines are also predefined and may be altered by typing the command 'KEY'. Other useful improvements include the addition of DOS commands such as DIRECTORY, which displays the list of files on your disk.

Most of the BASIC 4.0 disk commands have been implemented, except for those relating to relative files. (Well, you can't have everything).

Commodore 16

When the 64 first appeared, many people made the mistake of laughing and saying it was just a 64K Vic 20. How wrong could they get. Well, here's another that may fool a few. It looks like a Vic 20 dipped in dirty grey paint, with a new label and a couple of changes on the back panel. Open it up and the differences are a little more obvious.

Bigger and better: it's got more memory, better BASIC high-resolution graphics, definable function keys, more colours, and the list goes on. The biggest punch will be its price. Are you sitting down? Early estimates are around the $199 mark. Commodore always has been known for the way in which it tactfully attacks the opposition.

Where Do They Fit?

Mr Nigel Shepherd, managing director of Commodore Australia, has promised on several occasions that the Plus/4 is not a replacement for the Commodore 64. At first I found that hard to believe, but after using it I had to change my line of thought. Remember, it has no sprites, no amazing sounds, built-in business software and a keyboard a little better suited to the professional user.

The Plus/4 will successfully fill the gap in Commodore's range for a decent business machine at a very low price. The 64 was almost it, but a few things, including its image, have deterred many people from buying one. One problem was the disk drive: it's hard to take a business machine seriously unless you can use it for serious work. When first released, the Plus/4 will still be using the currently available 1541. However, a new drive is on the way. Photographs of it abound in the press already, so it's nearer than you may think.

Perhaps they have got it right at last. The new Commodore SFS 481 drive will be the Plus/4's saviour. For the technically minded, it will have an access speed of about 295 milliseconds and load 1675 bytes per second. (So Easy Script, for example, would load in around 12 seconds). Of course, with the Plus/4 you'll never have to load a word processor!

The Commodore 16 is going to be a big hit if software becomes available quickly. It will replace the Vic 20, I have no doubts. With a real BASIC it should also penetrate heavily into schools. It's not expandable, after all if you want more memory it will be cheaper to buy a Plus/4. There will be a certain degree of compatibility between the two. The 16 is really just a cut down version of the Plus/4.

Compatibility

The big question is how compatible will the new offerings be with the Commodore 64 and Vic 20. The differences are vast: for a start the cassette player will operate at a higher speed, so you won't be able to interchange cassettes. The disks are compatible, so if you can load them then what? There are no sprites, so they won't work. There's a new BASIC, so memory is organised differently. In fact, zero page (the first 255 bytes of memory) is very different.

Practically speaking, the only people who will have the time and expertise to carry out any transfers from one machine to the other will be the software houses. It won't be a fun task.

What is the significance of all this? I'm glad you asked. To be honest, we will just have to wait and see. Hopefully software specifically for each machine will appear fairly early in the piece. That, however, will depend on one thing: how well Commodore documents the inner workings of it all. In the past the company has been pretty good, so perhaps that is a fair indication of what to expect.

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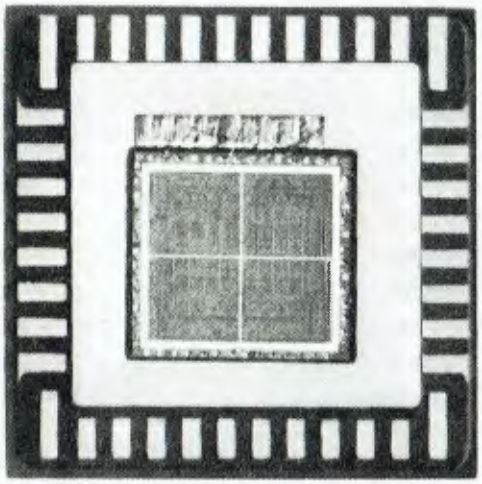

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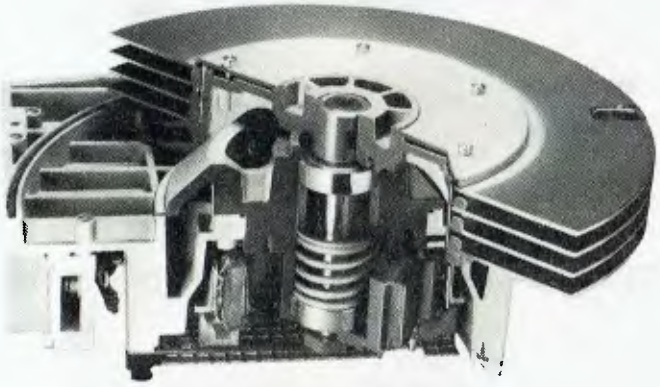

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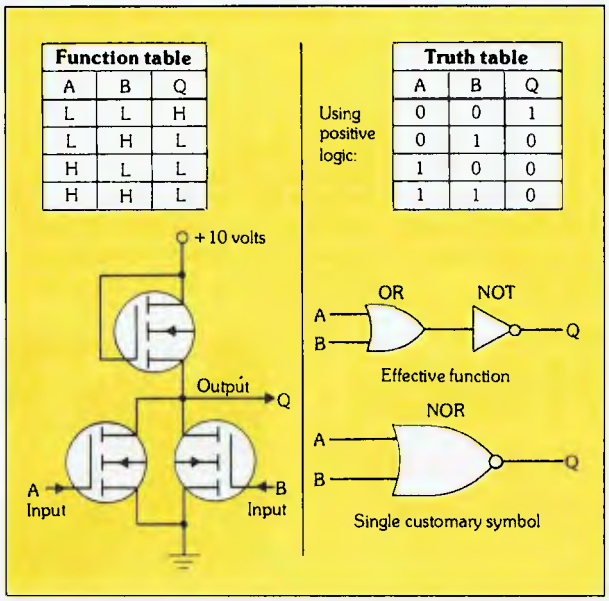

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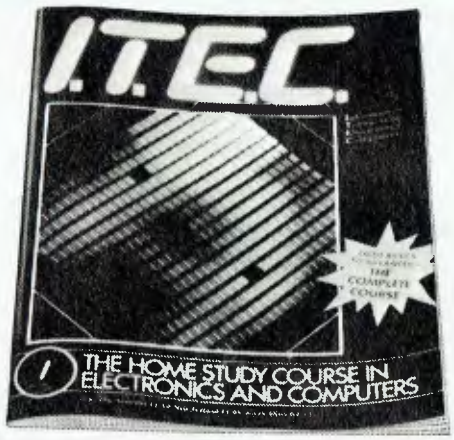

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WS.007

By Lloyd R. Borrett

FIRST, an apology: it's March since I last wrote a column, and June since it was published. I promise to try and get this column out on regular basis in future.

So, what has been happening?

My personal highlights have been getting the Melbourne PC User Group on a firm footing; starting up the group's newsletter; upgrading my computer with a 10-megabyte hard disk and dual half-height floppies; bringing on line Australia's first IBM-PC-based bulletin board system; and MELB-PC's stand at the Melbourne PC84 show. As you see I haven't been sitting around doing nothing. Meanwhile, there have been some announcements of particular interest to PC users. The release of Lotus Symphony, Ashton-Tate's dBase III, the IBM 3270-PC, and the IBM Portable, would be those getting most of the limelight.

That gives me plenty to write about, so let's get on with it.

To Symphony, Or Not To Symphony

Is Lotus' new Symphony the greatest thing since sliced bread? Well, if you listen to the gossip and read the reports coming out of the US you would have to think so. Everyone is aware of the success of the first offering from Lotus Development Corp, Lotus 1-2-3, and justifiably so; but I'm just a little bit concerned about the reaction the announcement of Symphony has received.

Now don't get me wrong. I've every reason to believe that Symphony will be a superb product, as good as, if not better than, 1-2-3. But will everyone *need* it.

The success of 1-2-3 was due to the fact that it was the best spreadsheet package available on the IBM-PC. Not only did 1-2-3 have more built-in functions than most other spreadsheet packages, but it was the first to be written to use the features of the Intel 8088/8086 chips at the heart of the PC. The result was a product that out-performed its rivals in almost all categories.

The runaway success of 1-2-3 proved that personal computer users would willingly pay for a product that integrates the main operations they want to perform with their computers. Who wants to mess with a shelf full of software products, each with its own command structure, and to have to pass through an operating system when going from one function to another? 1-2-3 was the clear answer to a major need.

Symphony aims to take the concept further. It strengthens the database functions, and adds telecommunications and word processing. Best of all, it adds 'open slots' that will allow other software to be integrated into the Symphony structure. But could it be too much?

Most users of 1-2-3 are extensive users of the spreadsheet facility. They use 1-2-3 because it's the best spreadsheet. Many complaints have been heard about the 640K memory limit in the IBM-PC restricting the size of 1-2-3 worksheets. A number of users have asked for an expert mode where the 1-2-3 on-line help facility is cancelled and

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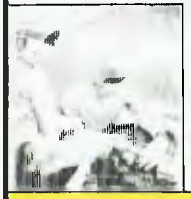

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the resulting extra memory then made available to the worksheet. Do these people need Symphony?

The answer must be no. In order to provide increased functionality, Symphony soaks up more memory in overheads. This reduces the maximum size of the worksheet. Unfortunately, there will be more than one 1-2-3 user who overlooks this and 'up-grades' to Symphony, only to regret it. Upgrading to Symphony means you lose your rights to use 1-2-3.

Consider the situation of the new computer user. Given the press and marketing that Symphony is receiving it would seem to be the only choice. (I wonder how many people held off purchasing 1-2-3, and waited for Symphony.) Many PC users are going to purchase Symphony only to find in a few months time that 1-2-3 was the product they should have had. Will there be an 'up-grade' policy for Symphony users wishing to switch to 1-2-3?

Symphony will be a very successful product, and deservedly so. Unfortunately, it also has the potential to cause much grief if not sold correctly, and I've seen little evidence that it will be. But all is not gloom and doom. The introduction of an Advanced PC, based on the Intel iAPX 286 chip which can handle up to 16 megabytes of memory, is likely to see us asking Lotus to include more functions as standard, and introduce yet another product.

Australia's First IBM-PC BBS

Australia's first IBM-PC-based Bulletin Board System went on line in July. My PC will be enabled as a BBS whenever I'm not using it (that is, most of the time). Electro-Medical Engineering kindly donated a Sendata 2000 auto-answer, auto-disconnect 300-baud modem to the Melbourne PC User Group for use on the BBS. PC Connection Australia provided the telephone line.

The phone number is (03) 528 3750. You need a 300-baud direct-connect modem or acoustic coupler, a telephone line, a serial/asynchronous/communications port, and a program such as PC-TALK III, Crosstalk or MODEM7. I think you'll enjoy the opportunity to ask questions, share tips, and access public domain software in this way. Check out the articles by Bill Bolton and Evan McHugh in last month's issue if you require more information on how to connect to bulletin board systems.

About two megabytes worth of software from the MELB-PC library is available for downloading. Two files are of special interest: the first details how to 'unrestrict' the various versions of Lotus 1-2-3, the other does the same for Symphony.

Public Domain Software

I'm aware of IBM and/or Compatible PC user groups operating in Perth, Adelaide, Melbourne, Canberra, Illawarra, and Sydney. Most of these groups have taken on the task of distributing public domain software to their members. Additions to the Melbourne PC User Group collection include:

CHASM – A cheap assembler.

Finance – A set of BASIC finance programs.

MVP-FORTH – Mountain View Press Public Domain FORTH.

Wordflex – A good word processing program.

Diskcat – Disk cataloguing program.

ASMGEN – An IBM Macro Disassembler.

Genealogy On Display – An excellent genealogy package.

Portworth – A portfolio management system.

These are but a sample of the major items. There are so many great utilities now available, many of which have become such an important part of my everyday command set, that I feel lost when running on a PC without them. And there are more disks coming in from the US all the time.

Many of the more useful files can be downloaded from my bulletin board system, but for interstate users that could become very expensive. I strongly recommend you join a user group and gain access to these disks, as well as all the other valuable services offered.

Avoiding A Hard Disk Disaster

Due to a bug in IBM's FORMAT.COM program, you may get an "ERROR WRITING TO DRIVE C:" message when writing to the hard disk. This is caused by FORMAT.COM marking the wrong locations in the File Allocation Table when it finds a 'bad track' mark on the hard disk.

These patches assume both DEBUG.COM and FORMAT.COM are on drive A. User entries are underlined, the computer responses are not.

Listing 1

```
DOS 2.00
    C>DEBUG FORMAT.COM<return>
    -E 292<return>
    xxxx:0292  7D.73<return>
    -E 316<return>
    xxxx:0316  0B.40<space>   D2.4A<space>
    xxxx:0318  74.78<return>
    -W<return>
    Writing 1780 bytes
    -Q<return>
DOS 2.10
    C>DEBUG FORMAT.COM<return>
    -E 2DA<return>
    xxxx:02DA  7D.73<return>
    -W<return>
    Writing 1B00 bytes
    -Q<return>
```

Format Without Erasing

In the March column I included a suggestion to help hard disk users avoid having the FORMAT command erase their entire hard disk. Well, Wesley Merchant of the Capital-PC Club, has come up with a better way.

The following patches will force users to include a disk drive designation when using the FORMAT command.

Listing 2

```
DOS 2.00
    A>DEBUG FORMAT.COM<return>
    -A 17B<return>
    xxxx:017B   JMP 140<space>
    xxxx:017D   NOP<space>
    xxxx:017E   NOP<space>
    xxxx:017F   NOP<return>
    -W<return>
    Writing 1780 bytes
    -Q<return>
DOS 2.10
    A>DEBUG FORMAT.COM<return>
    -A 191<return>
    xxxx:0191   JMP 16B<space>
    xxxx:0193   NOP<space>
    xxxx:0194   NOP<space>
    xxxx:0195   NOP<return>
    -W<return>
    Writing 1B00 bytes
    -Q<return>
```

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One of the great advantages of having a computer that the British Broadcasting Corporation helped design is they also helped design the software.

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your APPLE

By John Rotenstein

THERE HAS recently been some controversy over the use of Appleworks, Apple's new business system. The problem lies with the system requirements for running the package.

Appleworks is designed to run on an Apple IIe with an extended 128K 80-column card. Because the 80-column card resides in slot three and normal RAM cards reside in slot zero, this program cannot function on an Apple II+. Similarly, it cannot be run on a IIe with a different 80-column card, such as the Vision 80. It is, however, compatible with the Apple IIc, which has an extended 80-column card built-in. Make sure *your* hardware fits the bill before you buy it.

Inputting Blanks

Just a snippet of information about the Applesoft INPUT command. This command is incapable of accepting leading spaces, or commas and colons within the input line. However, there is an undocumented way to overcome this: when you type in your response to an input statement, first type a quotation mark. Whatever you type after that will be accepted.

The Users' Group

The Apple Users' Group (AUG) specialises in Apple and compatible computers. It is one of the largest computer groups in Australia, and is even big by world standards. At present, there are over 850 members throughout Australasia. While only about two hundred regularly attend meetings, the group provides many services and facilities for all its members.

The group produces its own magazine, *Applecations*, ten times a year. This publication contains programs, information and articles from all around the world, as well as details of group business and services. It is sent free to all members, and is also available at certain computer stores for a reasonable price.

People are always interested in obtaining software for their computers. To meet this demand, the Apple Users' Group has a software library with over fifty double-sided disks of public domain software donated by members of other Apple groups from around the world. These programs include utilities, business programs and, of course, games. Blank disks are available very cheaply and storage boxes can also be purchased from the group.

To further satisfy members' hardware and software needs, the group provides monthly 'bulk purchase' specials; these cover a wide range of computer products, and offer considerable savings to members.

The latest additions to the facilities provided by AUG are new bulletin board services (AUGABBS). Visitors may log-on for short periods to obtain more information about the group. The phone number is (02) 451-6575 (300 BAUD, 8+1 protocol). The board is on-line 24 hours a day Monday to Friday, with changing hours on weekends, and has standard BBS features.

The group meets on the second Monday of each month (or Tuesday after a holiday Monday) at Sydney Grammar School, Sydney. Parking is available through the Stanley Street entrance.

The meetings deal with AUG business, as well as giving members the chance to obtain answers to any of their computing problems. Group items are available for purchase, as well as products from other computer dealers who come along.

Most meetings also have a guest speaker or special presentation. When Apple released the new Macintosh on January 25th, there were eight machines available for hands-on use at the AUG meeting two weeks later. The Apple IIc was also demonstrated at an AUG meeting within a couple of weeks of its release.

Other events include an annual Market Day/Christmas Party/Birthday Party in November. On this occasion there are many computer items available for sale, and a very popular auction of hardware and software is held.

AUG caters mainly for the Apple II product range, and is now also supporting the Macintosh. The Group owns both machines, which are available for use at meetings.

For information about joining AUG, please contact the secretary at P.O. Box 505, Bankstown 2200. ❑

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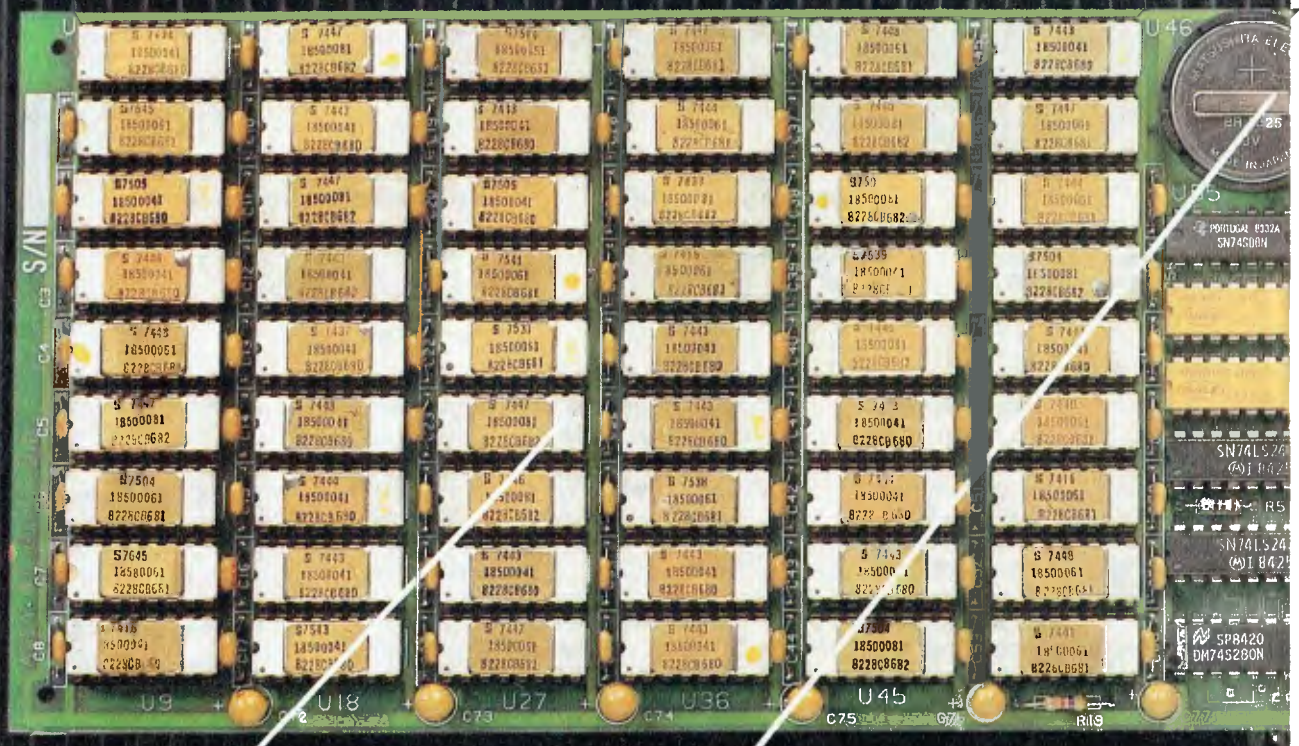

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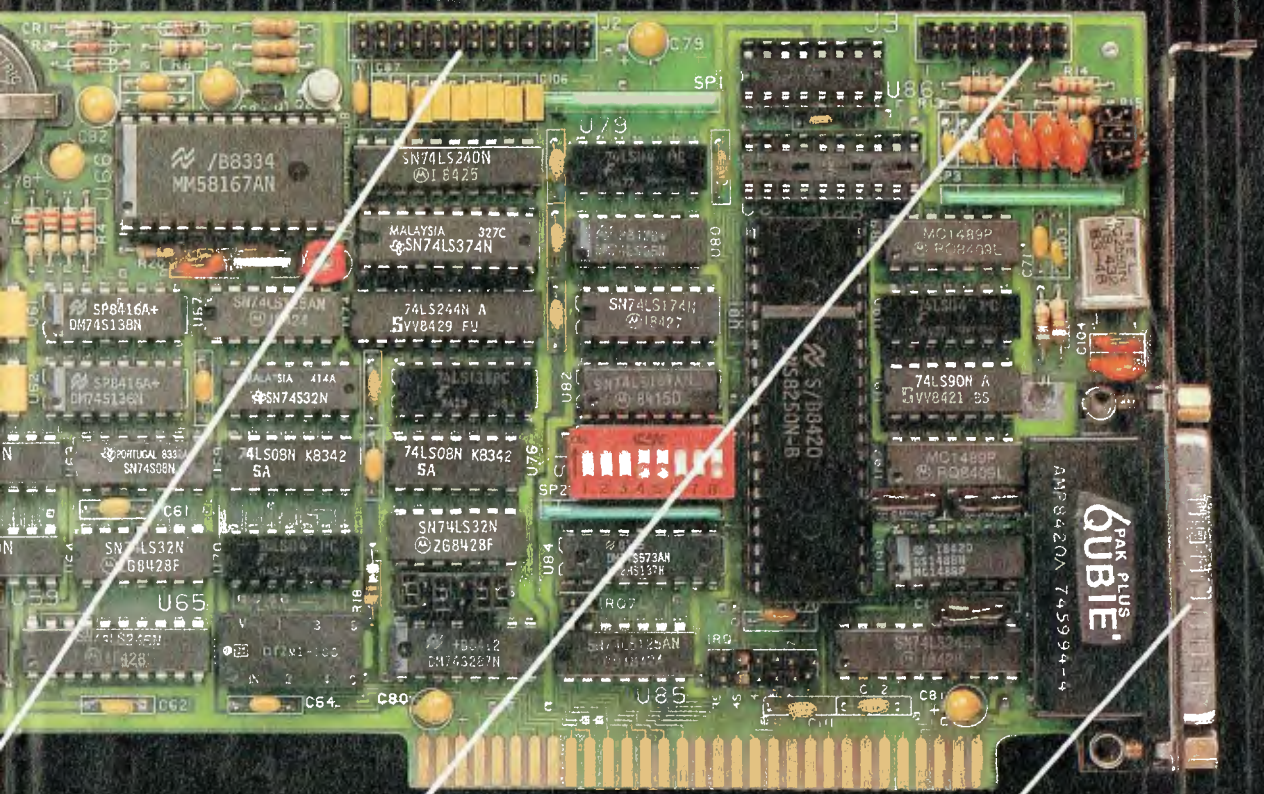

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By Bill Bolton

AS I'VE been concentrating on technical material and example programs for a few months, quite a bit of news has built up.

Concurrent DOS

It's been on the cards for some time that DR would make a move to rename the 'Concurrent' product. To reinforce the fact that 'Concurrent' is a very different sort of operating system from single-user CP/M, it's now being called 'Concurrent DOS'. This coincides with the release of PC-Mode for Concurrent.

The initial release of Concurrent DOS for the IBM-PC supports an optional PC-mode, which allows the user to access a wide variety of applications on the IBM-PC and XT. Since Concurrent DOS includes the Graphics System Extension (GSX), it can also support a wide variety of graphic capabilities through standard operating system calls.

Concurrent DOS has been available to OEMs in beta test for some time, and versions of Concurrent for other machines beside the IBM-PC and its close compatibles should start to appear from other suppliers for their hardware soon. Depending on how the system is configured Concurrent DOS can also support windowing capabilities, allowing more than one active program to be shown on the screen at a time. It can be configured to support a single-user or a multi-user microcomputer system and Concurrent DOS and DR NET can be configured to network across multiple microcomputer systems.

OEMs who are implementing Concurrent DOS for a machine have a lot of options open to them in how they configure the system. The memory management partition boundaries are set by the OEM, based on a fixed partition model. A virtual disk in RAM can be created if the OEM wishes. DR recommends that an on-screen status line be provided on all Concurrent virtual terminals, but leaves it up to the OEM as to exactly what goes into the status line. Not all Concurrent DOS systems will offer the same features and facilities, so make sure you ask the supplier exactly what is implemented.

Starlink Turns IBM-PC Into a Multi-user System

Starlink is a new hardware/software package from DR. It allows an IBM-PC to become a five-user system. The package comes with everything you need to add four terminals: the four I/O ports and connectors, the multi-user card and the operating system to make it all run properly. Once connected, all five users may work independently on different applications.

Obviously, unless the terminal is an exact copy of an IBM-PC screen you won't be able to run any software that is specific to the IBM-PC screen. However for many applications, such as word processing or spreadsheets, almost any terminal will do because most programs like WordStar or SuperCalc have installation menus to set up the screen handling.

The users share the same processor, printer, hard disk and, if necessary, the same files.

Working with a multi-user system is not going to give you the same flexibility and capabilities as a network of IBM-PCs, but it will be a lot cheaper than buying four new IBM-PCs and networking hardware. Many applications only need to have some way of sharing the otherwise under-utilised resources of a single PC among several casual users. Starlink on an IBM-PC will certainly give you the same sort of facilities as a conventional terminal-based multi-user system like the ICL PC, with the advantage of at least one user having full IBM-PC facilities.

Starlink is an IBM-PC plug-in board which includes an Intel 8088 microprocessor, 64K of RAM and cabling to an external connector box that has DB 25 connectors for four terminals. It requires an IBM-PC outfitted with at least 512K of RAM. At least five megabytes of hard disk is recommended. It comes with full instructions on how to set the system up. The operating system software behind Starlink is, of course, Concurrent DOS with PC-Mode.

Unix System V Library Undergoing Evaluation

The joint project between DR and AT&T to develop a library of Unix System V software is going well. Software from independent vendors is currently being evaluated. By the end of 1984, Digital Research will be channelling Unix System V software products to the marketplace via OEMs and retailers.

Australian authors of software suitable for Unix System V can request 'Software Screening Forms' by writing to The Unix System V Library, Digital Research, Freepost 2, Clayfield 4011. A question and answer guide included with the forms provides an overview of the pro- ▶

Operating systems. CP/M-80 – where it all started.

- CP/M-80 was the first independent DOS for micros
- 'Software bus' concept developed quickly
- Strong applications support
- Strong commercial language support
- Only one part of CP/M-80 is hardware dependent
- Relatively easy to 'port' to a new machine
- Very stable, robust file system
- Very cheap in OEM quantities, often bundled to end user
- Requires little technical knowledge to use
- Cryptic error messages
- Complete but obscure end user documentation
- Fairly compact, works well on small disks
- Appropriate for available CPU resources
- Very active software user groups
- De facto standard due to spread of machines
- Maintained upward file compatibility
- Maintained upward DOS interface compatibility
- Application portability paths provided to new processors
- Application portability paths to new DOS (Unix) ❑

Operating systems. PCDOS – the new standard.

- Shares some, but not all key points of CP/M-80
- Highly computer system architecture specific
- Computer system architecture is 'real' standard
- Only partial 'software bus' through MSDOS
- Requires little technical knowledge to use
- Strong applications support
- Strong commercial language support
- Low cost to end user
- De facto standard only due to IBM support
- IBM PCDOS documentation good (MSDOS less so)
- Very active software user groups
- Graphics available through GSX
- Still some cryptic error messages
- Doesn't fully utilise machine capabilities
- Some doubts about robustness of file system
- Maintained file system upward compatibility
- Hasn't maintained upward DOS interface compatibility
- No application portability paths indicated
- No multi-user or network support ❑

ject. All software vendors who participate are expected to complete a screening form. Software is evaluated on the basis of its uniqueness and compatibility with Unix System V.

If accepted, a marketing contract is negotiated for distribution of the software. Packaging carries the AT&T and Digital Research logos, and manufacturing is done by Digital Research. Royalties will be paid quarterly.

"Digital Research and AT&T are committed to quality products," said Bruce Weiner of Digital Research. "The UNIX System V Library will provide users with excellent software that is well-documented and easy to use. We encourage software vendors to participate. The UNIX System V projects complement our existing line of operating systems. Users are provided with an upgrade path from one to the next. We intend to meet the demand for a wide range of business applications, so end users can benefit from the powerful features provided in UNIX. The applications library will speed the acceptance of UNIX System V."

Digital Research is porting a version of UNIX System V to the Intel iAPX-286 family of microprocessors. AT&T Technologies retains exclusive rights to the product. Intel and Digital Research were granted non-exclusive rights to market object code versions, and work on the Intel project is proceeding independently of the UNIX System V Library.

DRI PCDOS Languages

Reports from many users indicate there is very good correspondence between the CP/M-86 and PC/MSDOS versions of the various DR languages.

The indomitable Frank Lee has ported most of his PL/I code across to PCDOS and says that apart from a few minor changes concerned with the way he was using the operating system interface, all his PL/I code is now portable in both directions between the CP/M-86 and PC/MSDOS versions of the DR PL/I compiler.

GSX for PCDOS

GSX for PCDOS and a range of device drivers is supplied with all DR PCDOS products which need the GSX interface. This includes CB86, DR Draw, DR Graph and Access 10. The GSX for PCDOS is identical in performance and specification to the CP/M-86 version.

As well as the PCDOS version of GSX, several other machines now have GSX supplied with their MSDOS implementations; for example, the NEC APC and NCR Decision Mate V.

The latest release of the GSX device driver library is version 1.3. This includes new drivers for the Diablo C150 Colour Ink jet printer, Houston Instruments DMP 29/40/41/42 series plotters, Strobe 100/260 series plotters, HP7475A plotter, Philips GP 300L printer and Polaroid Palette CRT camera. The GSX device drivers aren't available separately. They are supplied with your operating system (if it supports GSX) or in some cases, such as GSX for PCDOS, with applications products that need GSX.

DR has also introduced a GSX-86 Programmer's Toolkit. The Toolkit includes two versions of GSX for the IBM-PC, one for CP/M-86 or Concurrent DOS, and one for PCDOS. Included in the kit are the GSX Programmer's manual, GSX Programmer's Language Reference Manual, GSX-86 User's Guide and GSX-86 Technical Note for customising GInstall (a menu-driven program that allows end users to select GSX drivers). GInstall may be modified for any computer-specific set of screen and peripheral drivers, in conjunction with Display Manager.

The Programmer's Toolkit is *not* intended to help someone install GSX for a machine which doesn't have it already. It is intended to assist programmers in using GSX graphics in their applications programs.

Assembler Plus Tools

DR has repackaged some of its assembler products. The SID and MAC programs are no longer available as separate items. The Assembler Plus Tools for CP/M-80 contains MAC, RMAC, SID, ZSID, LINK80, LIB80 and XREF80. The Assembler Plus Tools for CP/M-86 contains SID86, RMAC, LINK86, LIB86 and XREF86. The Assembler PLus Tools package for PCDOS contains PCDOS versions of the same packages as in the CP/M-86 version.

The XLT86 translator for CP/M-80 to CP/M-86 assembly language source code translation has been withdrawn by DR.

Modem Update

Since I last did a review on modems, DataSat submitted the latest version of the World Modem for an update review. The World Modem II looks identical to the previous model and under tests had identical technical performance characteristics. The main difference was in the programming of the ROM which controls the World Modem microprocessor.

The World Modem II now responds as an equivalent manual-connect Telecom Datel modem would. I was able use it to replace manual-connect Telecom Datel modems at several test sites with no modifications necessary to cabling or the communications software on the computers involved. As such, DataSat has now satisfied one of my major criteria for a commercial modem, the first supplier to do so. DataSat has also issued a vastly improved manual for the World Modem, though it is still a rather technical document instead of a friendly user manual.

PAMS News

By the time you read this, Lloyd Borrett should have his IBBS system on line in Melbourne. An IBBS is a BBS system on an IBM-PC running PCDOS. Lloyd has the telephone line installed for the IBBS and was just waiting for a modem and some other minor bits of hardware to get the system on-line as I wrote this column. Check for the number in the AUSTPAMS lists on other RCPM or BBS systems.

I am hopeful that the Software Tools RCPM will soon have a 16M hard disk on line. I have the drive; I'm just waiting for a Compupro Disk 3 DMA controller card to arrive. I don't intend to use the hard disk to put more public domain material on line at this stage. I am installing it in the interests of speeding up response time (yes, I know its pretty snappy as it stands, but I want to improve it if I can) and decreasing wear on the floppy drives.

When I have the increased capacity on line I hope to start experimenting with a categorised message system. Even with 1.2M on the existing floppy disk A: drive, as the amount of public domain software to be catalogued has increased, the catalogues have been eating more and more of this space. The system help files have also been getting bigger lately. This has meant there hasn't always been enough spare space for users to upload their program contributions, and some of the language help files have had to go. The hard disk should solve all those problems.

As for AUSTPAC, no philanthropic corporations have come forward with offers of equipment or money to help put the Software Tools RCPM (or any other RCPM for that matter) onto AUSTPAC, so I guess it's not going to happen. Oh well!

By Bill Bolton

I HAVE been covering a variety of other operating systems besides CP/M for most of the life of this column. So, to reflect what the column really covers I have renamed it from 'Your CP/M Computer' to 'Your Computer Operating System'.

It's certainly *not* my intention to cover all computer operating systems. I know nothing much about operating systems for the Apple II, and have no particular wish to learn. The column will basically continue to cover Digital Research, IBM PCDOS and Microsoft operating systems. It will be moving to cover UNIX in the future, and also possibly the Macintosh environment (I hesitate to call it an operating system at this stage) if it matures to become a serious proposition for business users.

Applications Notes

The following applications notes are the first of a series I'll be reproducing from a journal called *MicroNotes*, which is published by Digital Research to give technical information on the company's products. See Listing 1.

CP/M-86 V1.1 for IBM-PC and PCXT. Application note 05 Floppy Disk Format

Applicable products and release numbers: CP/M-86 V1.1 for the IBM-PC and PCXT.

The IBM-PC floppy disk drive can be either a single-sided (SS) or double-sided (DS), double-density, 40-track per side unit. It is capable of reading and recording data using the Modified Frequency Modulation (MFM) method. Additional information regarding the specifics of the IBM floppy disk controller and floppy disk adapter can be found in Chapter 2 of the IBM-PC Technical Reference Manual.

The values of BSH and BLM determine (implicitly) the data allocation size BLS, which is not an entry in the Disk Parameter Block (DPB). For the values listed above the BLS is 2048 and 1024, respectively, for the double- and single-sided drive.

The product of BLS (DSM+1) is the total number of bytes held by the drive and, of course, must be within the capacity of the physical disk, not counting the reserved operating system tracks.

The DRM entry is one less than the total number of directory entries, which can take on a 16-bit value. The values of ALO and ALI, however, are determined by DRM. The two values ALO and ALI can together be considered a string of 16-bits numbered 00-15 (left to right). Each bit position reserves a data block for a number of directory entries (bits are assigned starting at 00 and filled to the right). Each directory entry occupies 32 bytes; thus for 64 directory entries one bit is set for the double-sided drive (BLS = 2048) and two bits are set for single-sided drive (BLS = 1024).

The CKS value is determined as follows: CKS = (DRM+1)/4, where DRM is the last directory entry number.

CP/M Plus V3.0 Patch 15, 3/7/84, CCP Patch 03

Products and serial numbers affected: CP/M Plus V3.0, Serial numbers 2-000-00001 through 2-000-xxxxx.
Program: CCP.COM
Error Description:

- If a DIR command given for a disk that has system files on it is terminated by a control C, a subsequent DIR command for a disk that does not have System files on it will incorrectly print the message "SYSTEM FILE(S) EXIST". - The error message 'Cannot Load Program' is not terminated with a '$'. This results in garbage being displayed after the error message is printed. *Patch Procedure:* Make a back-up copy of CCP.COM before making any changes. The program SID is required to make the changes. The changes are made by the following sequence of commands. User entries are in bold type.

```
A>REN CCP.SAV=CCP.COM
A>SID CCP.SAV
CP/M 3 SID - Version 3.0
NEXT MSZE  PC  END
0D80 0D80 0100 CBFF
#A683
0683  CALL 403
0686
#A403
0403  XRA A
0404  STA D4D
0407  JMP 699
040A
#S0368
0368 20 24
0369 32 -
#WCCP.COM
0019h record(s) written.
#G0
A>
```

```
      Single Sided Drive:
      1,248: 128  Byte  Record  Capacity
        156: Kilobyte  Drive Capacity
         64: 32 Byte Directory Entries
         64: Checked Directory Entries
        128: 128 Byte Records / Directory Entry
          8: 128 Byte Records / Block
         32: 128 Byte Records / Track
          1: Reserved Track

      Double Sided Drive:
      2,528: 128  Byte  Record  Capacity
        316: Kilobyte  Drive Capacity
         64: 32 Byte Directory Entries
         64: Checked Directory Entries
        256: 128 Byte Records / Directory Entry
         16: 128 Byte Records / Block
         32: 128 Byte Records / Track
          1: Reserved Track

      Format Character : E5H

      Physical Tracks:     Double Sided          Single Sided

                            0 --> 39              0 --> 39
                            0 --> 39

      Logical Tracks:       0 --> 39              0 --> 39
                           79 <-- 40

      Disk Parameter Block:

                                Double Sided          Single Sided

                SPT                0020                  0020
                BSH                  04                    03
                BLM                  0F                    07
                EXM                  01                    00
                DSM                009D                  009B
                DRM                003F                  003F
                AL0                  80                    C0
                AL1                  00                    00
                CKS                0010                  0010
                OFF                0001                  0001

FIELD                          DEFINITION

SPT       Total number of Sectors Per Track

BSH       Data allocation Block Shift Factor,  determined by the
          data block allocation size

BLM       Block Mask which is also determined by the data  block
          allocation size

EXM       EXtent Mask,  determined by the data block  allocation
          size and the number of disk blocks

DSM       Maximum number of Data blocks Supported,  determined the
          total  storage  capacity of the disk drive measured in BLS
          (data allocation Block Size) units

DRM       Maximum number of DiRectory entries for the drive

AL0       determine reserved (ALlocated) directory blocks
AL1

CKS       Size of the directory CheCK vector

OFF       OFFset from the beginning of the  physical  disk,  the
          number of reserved tracks at the beginning of the
          disk
```

Listing 1.

CP/M-86 V1.1 for IBM-PC and PC/XT, Application Note 04, Early iAPX 8088 Problem

Applicable products and release numbers: CP/M-86 V1.1 for the IBM-PC and PCXT.

Early Intel 8088 microprocessor chips have an obscure design problem that can cause unexpected memory writes if an interrupt occurs when the stack is moved. It takes two instructions to load the Stack Segment:Stack Pointer (SS:SP) register pair, and if an interrupt is acknowledged after the stack segment is loaded, and before the stack pointer is loaded, the interrupt status will be 'pushed' to an arbitrary place with indeterminate results.

It is recommended that all iAPX 88/86 software disable interrupts prior to doing stack loads. The following is a representative sample of a code sequence which will accomplish this:

```
mov     bx,new_stack_segment
pushf                       ; save old interrupt flag
pop     ax                  ; into AX
cli                         ; disable interrupts

mov     SS,bx               ; these two instructions
mov     SP,new_stack_pointer; must be contiguous.

push    ax                  ; place flags in new stack
popf                        ; so we can
sti                         ; restore interrupt flag
```

Non-maskable Interrupts (NMI) can still occur, as can trace interrupts generated by the debuggers using the TRAP flag.

The CPU chips were fixed some time ago (IQ, 1980). The new i8088's mask *all* interrupts automatically for one instruction following any segment register load.

i8088 chips with "(C) INTEL '78" have the problem.

i8088 chips with "(C) INTEL '79" have been fixed.

All IBM-PC's and PCXT's shipped prior to the middle of 1983 seem to have the *old* version of the 8088 and will have the problem. It is possible that they are still shipping machines with the old chip.

New SIG/M Volumes

SIG/M public domain volumes from 153 to 192 have arrived and are now available on the Brisbane, Sydney and Melbourne RCPM systems. There are also some new PC/BLUE volumes (up to at least volume 60) waiting in customs for me as I write, and by the time you read this they should be available on the Software Tools RCPM, PC Connection IBBS and DSE-BBS. I'll let you know more details of what's in both the SIG/M and PC/BLUE new volumes next month.

PAMS News

There are several new systems on the list this month. Lloyd Borrett has the PC Connection IBM BBS system up and running in Melbourne. The IBBS software for IBM PC systems isn't public domain, but is available at modest cost from Lloyd.

Steve Engle, SYSOP of the Dick Smith Electronics BBS is co-operating with Lloyd in modifying the IBBS software for Australian conditions. I'm also having a look at some of the modem interface aspects of it.

The Newcastle Computer Club has its RCPM system on line now, but please note the restricted hours. Later the club hopes to go 24 hours with it. The Adelaide Micro Users Group now has its system on line daily, but still on restricted hours. The RCPM file transfer facilities on the Newcastle system are only available to financial members of the club, however visitors can access the bulletin board section of the system.

In Sydney, Larry Lewis has the Prophet BBS up and running on a Tandy TRS-80. The Prophet system appears to be very fast and has several interesting aspects. Larry says its based on "Bread Board" software.

In Gippsland Max Moore has the first part of his MAIL BUS system in operation. At the moment only the mail boxes are working. The concept of the MAIL BUS is to minimise the time you need to be connected to the system to transfer. You can put anything you like in the numbered mail boxes of other users and recover information from your mail box using Christensen protocol. The idea is totally different from anything I have ever come across before on any sort of remote access system. Max charges $10 a year to use the system.

The number of the Attache BBS in New Zealand has changed, the new number is in the list this month.

The Software Tools RCPM now has a Compupro Disk 3 hard-disk controller on loan, and as soon as I can get the new BIOS implemented the hard disk should be on line.

PAMS Numbers

Australia

Software Tools RCPM (ST-RCPM): (07) 378 9530 24 hours EST.

Your Computer BBS (MiCC-BBS): (02) 662 1686 24 hours EST.

Micro Design Lab RCPM (MDL-RCPM): (02) 663 0151 24 hours EST.

Sydney Public Access RCPM (SPA-RCPM): (02) 808 3536 24 hours EST.

Omen RTRS (OM-RTRS): (02) 498 2495 1630-0900 + 24 hours weekends.

Sydney TRS-80 UG RTRS (STRUG-RTRS): (02) 332 2494 24 hours EST.

Prophet BBS (PROPHET-BBS): (02) 628 7030 24 hours EST.

Dick Smith Electronics BBS: (02) 887 2276 24 hours EST.

Newcastle RCPM (NCLE-RCPM): (049) 68 5385 1700-0830 + 24 hours weekends.

Melbourne CBBS (MICOM-CBBS): (03) 762 5088 24 hours EST.

Sorcerer CBBS (SCUA CBBS): (03) 836 4616 24 hours EST.

TARDIS RCPM (TARDIS-RCPM): (03) 67 7760 1800-0800 + 24 hours weekends.

PC Connection IBBS (PCC-IBBS): (03) 528 3750 24 hours EST.

Gippsland RCPM (GL-RCPM): (051) 34 1563 24 hours EST.

Gippsland MAIL BUS (GL-MBUS): (051) 27 7245 24 hours EST.

Adelaide Micro UG BBS (AMUG-BBS): (08) 271 2043 1000-2200 CST.

Computer Ventures BBS (CV-BBS): (08) 255 9146 24 hours CST.

Outback RCPM (OUTB-RCPM): (089) 27 7111 24 hours CST.

OMEN II RTRS (OM2-RTRS): (089) 27 4454 24 hours CST.

OMEN III RTRS (OM3-RTRS): (09) 279 8555 0800-2400 + 24 hours weekends.

New Zealand

Attache RBBS (ATT-RBBS): ISD 64 9 78 9084 + 24 hours NZT Domestic (09) 76 9084. ❑

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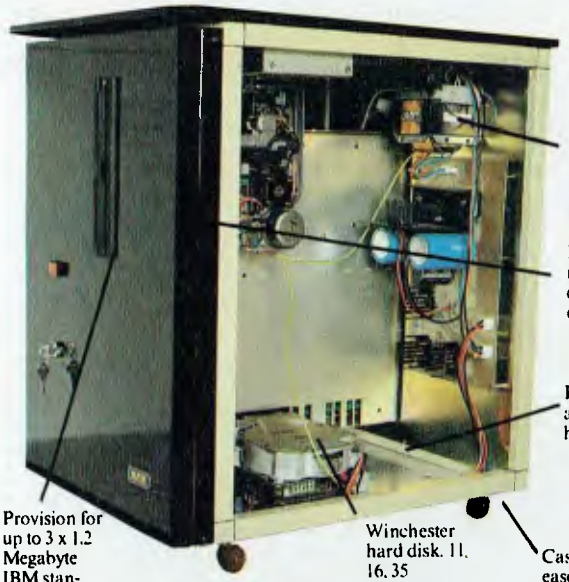

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3. Universe can expand to help your whole business. Adding extra workstations is fast and easy. A few PCs offer 'networking' where several small computers share the data storage. This arrangement is *unworkably slow* in the majority of business applications. Universe provides the right solution. Our Multiuser system gives everybody fast access to information.

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Animator for Cobol
Fortran 77
C-Basic 86

DEVELOPMENT

Wordmaster
Macro-80
Sid & Zsid
Mac
Aztec-C
Distell & Disilog
Rasm-86

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Micromodeller
Masterplanner
T/Maker III
CalcStar
Abstat Statistics
Scratchpad 2.0
Statpak
Milestone
Planfin
Profin
Micronet
Multiplan

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Rescue
FMS-80
Data Minder
Datastar
Dbase II
Dbase II (report writer)
Quickcode
Condor
Knowledgeman
Mdbs III
Infostar
Dataflex
Delta

ACCOUNTING

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CP/M-86
Concurrent CP/M-8/16
Concurrent MP/M-8/16
Concurrent MP/M-86

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W.A.: AED WA, Computer Services of WA (09) 450 5888

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Input Signal	: Composite Video/Sync. 1.0 Vp-p (Negative Sync.)
Input Impedance	: 75 ohm
Input Signal Connector	: RCA (female) Pin Jack
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You know, it always happens: You think you brought along everything, but then you find you left some data behind when you set out on a business trip. But now that's no problem. Using telephone lines and my PC-8200 as a terminal, the built-in "TELECOM" program enables you to retrieve information from files at your home office.
You can also use this communications function to access data bases, such as Dow Jones News/Retrieval, and have the information printed out on the PC-8221A Thermal Printer, or printed out beautifully on any bigger printer with parallel Centronics specifications, such as the NEC PC-8023. And you know, it's not just possible, it's easy!

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With the PC-8200, bar code reading couldn't be simpler or faster, and it's a big help in a lot of areas too.

SPECIFICATIONS

CPU	80C85 (CMOS version of 8085), 2.4 MHz	Audio Cassette Interface	600 baud Format conforms to N-BASIC specifications
RAM	16K-byte CMOS RAM (standard) Up to 64K-byte RAM can be mounted in the main unit in 8K-byte segments	Power Source	Choice of: Four AA batteries Special Ni-Cd battery pack AC adaptor (recharger)
ROM	32K-byte CMOS ROM (standard) Up to 64K-byte ROM can be mounted in the main unit	Dimensions	300 (W) x 215 (D) x 35 (H–front) mm 61 (H–back) mm
LCD	40 characters x 8 lines 240 x 64 graphic dots. Effective display area: 191.2 (W) x 50.4 (H) mm	Weight	Approx. 1.7 kg

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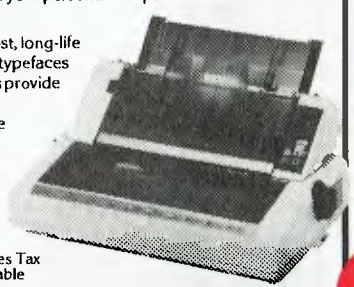

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By Ernie Sugrue

The Wizard of Frobozz: Zork II

Zork II is the second in the series of Zork adventures by Infocom. While I think Zork I has more depth than Zork II, I enjoyed the latter more because there are no unmappable areas (like the maze in I), except the carousel which is only unmappable while it is moving.

OK, now for the nitty-gritty. You begin Zork II at the point where you finished Zork I – in the dark barrow. You may exit the barrow and all remnants of Zork I, bar the sword and the lantern which are lying at your feet, will be forgotten. The white house, while it may not be returned to, can be glimpsed for a brief moment from afar.

You're Off To Kill the Wizard

Your main foe in Zork II is the 'Wizard of Frobozz' whom you must destroy (or have destroyed for you) toward the end of the game. Before you can get rid of the Wizard you need three coloured spheres in order to cast a spell, and ... well that's what you must do.

Other treasures you need include a gold coin, a stamp, zorkmid bills, a portrait, and you also require a variety of items which aren't exactly treasures to help you in your journey.

There are three main problem situations: when the Dragon is attempting to be killed (hint – he *must* be drowned); before a riddle is solved (see the hint section for a clue); and when the demon is ready to do your bidding.

You may also encounter problems when you attempt to leave the bank or vault with the portrait and money – the alarm system is foolproof, unpickable and unbreakable. Tough ...

Zork II is smaller in size than Zork I, but certainly not in entertainment value. After you amass the 400 points required to complete the adventure, you may feel there is still more game left – just keep going. When you're finished and have the title of 'Superior Adventurer', you are reminded of the availability of Zork III. Oh well, two down, one to go.

Adventurer Paraphernalia

To solve the Zork II adventure I used two Infocom products to help me: the map of Zork II and Invisiclues for Zork II. They were both extremely well done, with the map showing in clear detail all the passageways of the game and the main objects in each room (but not those that are not immediately visible).

The clue book was also good, with both humour and hints. To reveal the answers to the questions posed, you must use a magic pen (supplied) to rub over the answers, which range from a gentle nudge in the right direction to a full answer. The clue book also includes a list of helpful items and treasures, also in magic ink, and some things to do once you have finished the game. For example, have you tried: speaking to the dragon; squeezing everything (princess, demon and so on); reading the matchbook, newspaper and so on; plus a long list of others.

Altogether, the game, hints and map make a great set, even if you have solved the game itself.

If you'd like details of other Infocom games and products, send me $1 for photocopying of material, or Infocom will probably send them to you free (but it'll take a month). The address is:
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55 Wheeler Street,
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* *excludes existing older dealer stocks.*

If you have already purchased G-Pascal these extra programs may be ordered by sending $20 direct to Gambit Games.

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POWER UP! Kid's Guide to the Commodore 64

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Colourful illustrations and a friendly robot highlight this guide to the Commodore 64 for kids 8-11. The hands-on approach features short, easy lessons, and the spiral binding makes it ideal for use right at the computer. Engaging exercises are full of surprises and discoveries. By the end of the book, kids will be programming their own guessing games, 'thank-you' notes, multicoloured pictures, and simple animation.

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Written in a practical, straightforward manner for the beginning business user of the Unix operating system (Version 7). All the commonly used commands and their options are explained and illustrated, and a sampling of Unix-compatible hardware and software is reviewed. A comprehensive command summary and listing of Unix resources is also included.

These books are available at bookstores and computer stores everywhere but if you experience difficulty **OR** if you wish to receive regular information on new books, contact the distributor, **ANZ BOOK CO.,** 10 Aquatic Drive, Frenchs Forest 2086. (02) 452-4411.

your KAYPRO

By Jeff Richards

NON-LINEAR Systems has completely revised the Kaypro range, and the new machines are now arriving in Australia. The basic configurations of dual 200K disks (Kaypro II), dual 400K (Kaypro IV) and hard disk (Kaypro 10) models are retained, but the II and IV have new CPU boards, and new software is being included.

The original Kaypro II had the Ferguson BigBoard as its heart, and the Kaypro IV was the same machine but with double-sided disks. When the hard disk model was introduced the original CPU board was judged inadequate for the task, so the design of the BigBoard 2 was adapted. This had the advantage of a dedicated screen controller and a hard disk interface. The latest changes have seen the CPU from the Kaypro 10 enhanced and installed in the II and IV.

This means that essentially identical CPU boards are used throughout the range. Improvements over the original Kaypro 10 are an integral modem and a battery-backed real-time clock. Improvements over the original II and IV are an additional serial port, enhanced screen display and a cooling fan.

I had a chance for an extended play with the new IV and it is a very useful machine. All the functionality of the original model has been retained, with only a slight increase in complexity. Although an early release, the utility software supplied was comprehensive and apparently bug-free, but unfortunately inconsistent in its operator interaction.

Non-Linear has gone to some lengths to maintain compatibility with the original model. For instance, the serial port is at the same address, and MODEM7+ from the II works on the new IV with no changes. However, the system status port and the parallel port have moved, so the EPROM programmer will have to be altered. Because of the dedicated screen controller, any software that used direct screen access will have to be reworked for the new models.

To further enhance compatibility, a 'Multi-Format Disk Utility' is provided. This permits either A or B drive (or both) to be set up as one of 14 different disk formats. The formats include Osborne, Xerox, TRS-80 and Morrow. Because all flavours of CP/M handle file storage in the same way, data files from the 16-bit machines are understandable to CP/M-80; so the formats also include IBM, TI and NEC. Of course, programs from the 16-bit machines will not load or run on the Kaypro, but you can access data files created on these machines.

There is one small limitation: when drive A is set up as an 'alien' format a warm boot will not attempt to re-load the CCP, so not all programs will complete correctly if you use a non-Kaypro format in drive A. The utility does allow you to format a blank disk in any of the above formats. As a bonus, the system automatically recognises and adjusts for a single-sided disk in drive B, and a single-sided version of COPY is included so Kaypro II disks can be bulk copied.

The new screen controller is a significant improvement. Features available include dimmed, reversed, underlined and flashing characters, or any combination. The cursor can be turned off and on, and a cursor position remembered and later recalled. The original commands such as line insert and delete have been retained, so software that can take advantage of these features, such as WordStar, operates very efficiently. There are two commands I could not get to work: video mode and status line. They are mentioned in the command descriptions but not in the summary, so perhaps they are a late omission.

The screen appears not to be directly accessible from main memory (the monitor ROM is mapped right through to the bottom 32K) so the new models are not as usable as the original models for terminal emulation. (I have heard that old IIs went up in value overnight – this may be the reason.) On the BigBoard 2, video RAM was actually in a third memory bank, but I couldn't find any way of accessing it in the Kaypro.

Graphics commands supported are draw and erase pixel, and draw and erase line. In addition, character shapes as on the TRS-80 are available as characters 128 to 255. (A total of 256 shapes is available by use of inverted video.) I can't think of any reason for using these, given the pixel on-off commands. Resolution in either mode is 160 by 100 – not great, but adequate for simple charts and diagrams.

No-Good Modem

The modem is of no use in Australia. On my machine it did not even have a US registration number, so the chance of obtaining a Telecom permit would be slim. The advertising brochures talk of a 'modem connector' – neatly avoiding the claim that there is a usable modem connected to it.

The two serial ports are labelled serial printer and serial data. They are both set up in the same form as the original models. I plugged a printer into one and a modem into the other and they both worked without any cabling changes. The parallel port also worked in precisely the same manner as in the original models, although at a different internal address. The keyboard is unchanged, but the screen has been altered to a very long-persistence phosphor – strange at first, but easy to get used to.

The drives are slimline, so they only take up half the height of the front panel. They have a twist-type latch rather than the flap of the earlier models, and the software is now able to sense that a disk has not been properly inserted. The drives are very quiet and gave no problems in reading a variety of disks. The cooling fan no doubt helps disk drive reliability considerably. Details aren't quoted, but I suspect the lighter drives are offset by the weight of the fan, resulting in a package of much the same weight.

Software varies among the different models. The IV had the Perfect series, plus WordStar and the Word+. Three BASICs (MBASIC, S-BASIC and C-BASIC) are supplied, although I hear that S-BASIC will be dropped. Microplan is still there, along with utilities like MFDISK and a communication program called SUPRTERM. Apparently dBase II either has been or will be included in some models. My impression is that the software package is far from finalised, and prospective purchasers would be advised to try and wring from their dealer one copy of everything.

Documentation is almost unchanged. The Perfect manuals are the same good – but not outstanding – standard. The S-BASIC manual has been typeset, but this does little to improve it. WordStar comes with a reference manual, a training guide and a general text by Peter McWilliams on word processing – a very complete package.

The changes to the Kaypro product line are welcome, especially as they are accompanied by a price reduction. Although the product has moved somewhat away from the simple, rugged, basic machine that proved so attractive initially, the added features are generally worthwhile and contribute to the usability of the machine in its most common application – as a general-purpose workhorse. ❑

rie

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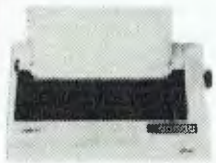

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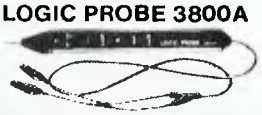

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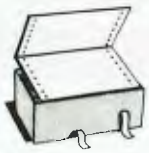

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DIARY '84

As the microcomputer industry grows, so do the opportunities to meet with like-minded people, to learn more at seminars, classes and exhibitions and generally to dig deeper into the wonders and bewilderments of microcomputers.

We asked Horan, Wall and Walker, The Information Agency, to compile a list of some of the more interesting goings-on around the country. Here are the results of their gatherings:

Saturday 1 December

Basis User Group

This meeting is actually part of the Annual General Meeting of the Apple Users' Society of Melbourne (AUSOM). But it's your sort of meeting if you own a doLINGO, a Medfly or a Panther. This is a new sub-group of AUSOM. Out of the 200 people who show up you're sure to find people into Basis 108 machines. Burwood State College Lecture Theatre, Burwood, Victoria. (03) 589-2072. 2 pm-4 pm.

Monday 3 December

The Green Triangle Users' Group

Vic McCarthy runs this club for all computer users in his area. It is a small, new club and welcomes new members. It runs Commodores mostly, but other machine users are welcome. The Computer Place, Anthony Street, Mount Gambier. (087) 38-0061. 7 pm-9 pm. $10 per annum; kids $1.

Wednesday 5 December

Southern Districts Commodore Group

You can expect about 30 to 40 people to turn up atthis meeting — and about twelve machines. Thse people are *keen* Commodore users. Their monthly newsletter is full of all sorts of C64 and VIC 20 info. They also have a small public domain library. Find out more at the meeting. API Hall, Kurrajong Road, Prestons. (02) 602-8691. 6 pm to about 9 pm. $10 to join plus $24 for regular issue of the magazine.

Saturday 8 December

TRS80 Users Meeting in Sydney

This six-year-old club caters for Tandy TRS80, System 80 and compatible computers. At any given meeting you will find 60 to 100 people and up to 15 machines. There is a monthly newsletter and they have a 24-hour bulletin board called Club 80 (02) 332-2494. Visitors to this bulletin board are welcome. Further information may be obtained from Jim Whittaker on (02) 772-2009. SYDTRUG Club Rooms, 15 Chegwyn Street, Botany. (02) 332-2494. 12 noon onwards. Membership $20 a year.

Saturday 15 December

Sydney MicroBee Users Group

This club has 500 members and meets on the third Saturday of every month. The club also runs a large library library of public domain programs for the Microbee and has a paper library with all Applied Technology manuals and many other computer books which may be borrowed by members. Visitors are welcome to the meetings. McMahons Point Community Centre, Blues Point Road, North Sydney. 1.15 pm until about 5 pm. Membership is $24 per annum.

Thursday 20 December

Tasmanian Commodore Users' Association

This club has about 110 people on its books, of whom about 50 turn up at any one meeting. More info on the club and its activities is available from the club secretary, Vince Steggard, on (002) 72-0295. The club puts out a montly newsletter, which will start being delivered to you upon payment of your annual $10 subscription. Room 11A, Elizabeth Matriculation College, Elizabeth Street, Hobart. 7.30 pm-9.30 pm.

Thursday 20 December

Devonport Computer Interest Group

This club ran the first annual computer show in Tasmania. It has about 50 members, publishers a monthly newsletter and welcomes new members. The club has special interest groups for BBC, MicroBee, Commodore and Tandy machines. The club is currently looking into the possibility of establishing a bulletin board. Like to get involved? Call Jim Stevenson on (004) 92-3237, or turn up to their pre-Christmas meeting. Devonport Technical College, Valley Road, Devonport. 7.30 pm-9.30 pm.

THINK AHEAD FOR . . . Wednesday 6 March to Saturday 9 March, 1985

Office Automation Expo '85

Billed as Australia's first office automation exhibition, and run by a Sydney outfit, you can expect more of the usual and hope for some of the unusual. Naturally, it will be catering more for the business community than the personal computing enthusiast. Much can be learned from the business community. This is not a Zen saying. World Trade Centre, Melbourne. (02) 212-4199.

Wednesday 13 March to Saturday 16 March, 1985

PC 85 The Fourth Australian Personal Computer Show

The big daddy of Sydney micro show biz. Centrepoint, Sydney. (02) 267-4500.

Wednesday 22 May to Saturday 25 May, 1985

Data '85

Mostly for business but worth a look. Centrepoint, Sydney. (02) 212-4199.

Tuesday 16 July to Thursday 18 July, 1985

Videotex '85

Telecom's Viatel videotex service will be one of the biggest computer-based developments we can expect to see in Oz during '85. And yat gotta be in it ta win it — if you can afford it. This conference will be expensive — but a must if you want to play business in this sandpit. Regent Hotel, Melbourne. (03) 429-6088.

Wednesday 17 July to Saturday 20 July, 1985

PC 85 The 5th Australian Personal Computer Show

Ditto the Sydney show. In other words — big! World Trade Centre, Melbourne. (03) 267-4500.

Wednesday May 1 to Saturday May 4, 1985

Computer 85

10 000 visitors came to the Computer 84 pow-wow, and similar success is predicted for this year's event. Perth Entertainment Centre, Perth. (09) 325-0111.

And finally:

All people interested in attending the inaugural meeting of the WA Wizzard Users' Club should contact John Reid on (09) 410-2359. John has some public domain software he is willing to share and says he's happy to hear from users of other brands of computers.

Like to publicise your club, seminar or computer event? Write to (or ring) Horan Wall and Walker, The Information Agency, PO Box 8 Surry Hills 2010. Ph (02) 331-6600.

LINGO 128 Vs. THE LOT

You make your own detailed comparison between the Lingo 128, the Cat, the Apple and the Basis Medfly.

When you look at the Cat in Dick Smith's supermarket, you might like to ask whether, when they say it is 95% compatible, do they mean 95% of each programme? Have a look at the August "Your Computer" review!

We have always liked the Medfly, we sold enough of them to know them well! But, when you compare the Lingo against the Medfly, ask whether the Basis Medfly organisationis still manufacturing computers?

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64K Basis Medfly

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Features needed to build to same level as Lingo 128:	
2 disk drives + controller	**645**
Extra 64K memory	**120**
RF modulator	**25**
Voice synthesizer	**35**
Amber monitor	**220**
Custom ROMs	**140**
Comes with 3 mths. guarantee	
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Dick Smith's Cat

As supplied **$699**

Features needed to build to same level as Lingo 128:	
2 disk drives + controller	**847**
Emulator required to run Apple software	**99**
RF modulator	**35**
Z80 procesor for CP/M	**449**
Extra 64K memory (approx)	**120**
Serial adapter RS232C	**129**
Voice synthesizer	**35**
Amber monitor	**299**
Total	**$2712**

Apple IIe ,

As supplied **$2518**

With 80 column facility RGB color, printer port, single drive, controller, hi-res. monitor, average of quoted prices.	
Extras to bring to same level as Lingo 128:	
Second drive	**465**
64K card	**578**
RF modulator	**51**
Voice synthesizer	**35**
Total	**$3647**

	Lingo 128	Medfly	Cat	Apple IIe
Processor	6502	6502	6502A	6502
Z80 processor for CP/M built-in	YES	YES	NO	NO
RAM memory standard	128K	64K	64K	64K
Enhanced microsoft basic	YES	YES	YES	NO
Size of interpreter in ROM	24K	NIL	24K	12K
Numeric keypad	YES	YES	YES	NO
80 column text display built-in	YES	YES	YES	NO
Voice synthesizer included	YES	NO	NO	NO
RGB color output standard	YES	YES	YES	NO
RS232 serial adapter included	YES	YES	NO	NO
Centronics printer port included	YES	YES	YES	NO
Twin drives built-in	YES	NO	NO	NO
Data capacity of each drive	164K	164K	164K	143.5K
Whisper quiet Chimon Japanese drives	YES	NO	NO	NO
Numeric keypad	YES	YES	YES	NO
Separate process for keypad	YES	YES	YES	NO
RF modulator included	YES	NO	NO	NO
Text card included	YES	NO	N A	N A

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By Geoff Cohen

THE NEW Osborne IBM-PC compatible has been demonstrated at several shows in the USA, and seems to be one of the more compatible compatibles, running the standard test software of Lotus 1-2-3 and the Microsoft Flight Simulator. I don't have the full technical specifications, but the Osborne PC appears to be a new design, with 256K RAM, twin double-sided disk drives, two serial ports and one parallel port. There is provision for fitting a colour (RGB) adaptor, 512K RAM and the 8087 maths chip.

Back here in Australia, Osborne sales are again steadily increasing and Osborne computers sold in Australia now come with a full six-month warranty on parts and labour.

Friday!

I read Les Bell's review of Friday! in *YC* (June 84), and have only one minor complaint to make. There seems to be an error in the disk capacity Les said is needed for Friday!: the full system needs around 206K for FRIDAY.COM, DBASEOVR.COM and all the .CMD files, not the 126K quoted. Only putting some command (.CMD) files on the A disk will not help, as Friday! will crash if it tries to run a command file that isn't present on the disk. There appears to be no way to tell the program that some command files are either not present, or are on another disk drive. Fortunately I know Alan Vidler of AV Software, who has an answer to this problem. Here are the details ...

AVBIOS 220K

Alan has been selling his AVBIOS for over a year now. It offered many improvements on the standard Osborne BIOS, including 75 function keys; over 750 bytes free for these keys (better than Osborne's 75); disk capacity increased to 190K on A and 198K on B; and the ability to read and write to many extra disk types such as Morrow and Kaypro. This was a big improvement, and didn't even use any extra space in RAM.

However, the disk capacity was still a bit small for some applications, and it was annoying to be able to only read and write the extra disk types onto previously formatted disks.

Alan has now come up with his Supacopy program (plus a modified AVBIOS and ROM) to fix all these problems. The new software allows FORMATting and COPYing of any of these extra formats, plus the new AV special 220K format mentioned above. The new software will read, write and copy most 13 cm, 40-track, soft-sectored, single-sided disks; and will copy 20 cm disks, as well as 13 cm 40- and 80-track double-sided disks if extra hardware is fitted.

RC Electronics

Many Osborne users know I run my own business, and specialise in designing hardware and software for the Osborne 1. While I don't want to use this column to push my own business interests, I will treat my products the same as I would any other for the Osborne, and briefly mention any new items that generate interest in the Osborne community.

In this vein, for those who are interested in upgrading their Osborne's, we have upgrades for the Osborne 1 and Executive which give real-time clocks (battery-backed, of course), plus 880K per disk drive, extra parallel ports, and so on.

I am currently designing an IBM upgrade for Osborne computers, which will provide full colour graphics and the ability to plug in nearly any standard IBM upgrade board. When running 8-bit Osborne software, the RAM on the IBM board will function as a RAM disk; when running IBM software, the disk drives, ports and so on of the Osborne will be used (this, of course, is the whole idea because it reduces the cost). This upgrade is similar in principle to the 16-bit adaptor boards available (for example, Copower 88), but unlike most of these it will run IBM graphics software.

If anyone else has a 16-bit upgrade, or any other hardware or software products for the Osborne, I will be happy to mention them in this column. Just give me a call on (062) 54 7608.

Mulbud

To change the subject completely, I have discovered an example of how Australian high technology is being used to help people in other countries: in this case, it's farmers in third world nations. Dr Dan Etherington and Peter Matthews of the Australian National University have designed a computer budgeting system on the Osborne, to improve performance of horticultural and agroforestry farms. I've asked Dan to explain ...

"Mulbud is an interactive computer package designed to assist in the economic appraisal of land-use systems involving trees, either as 'sole' enterprises or in combination with other enterprises. This package arose out of attempts to assess optimum intercropping combinations for Western Samoa and Sri Lanka and has been further developed in collaboration with the International Council for Research in Agroforestry (ICRAF). The package gets its name from the fact that it is concerned with multiple enterprises, multiple products, and multiple time periods, and provides farm budgets of such systems.

"Forests, orchards, plantations and, indeed, tree crops in general, live for many years. Appropriate economic analysis must take account of the long-term nature of such investments. In addition, 'agroforestry' land-use systems introduce the complication of purposely

annual crops and/or livestock. The aim is to get higher productivity, more economic returns, and better social benefits on a sustained basis than are obtainable from monoculture on the same unit of land. The future is uncertain, but expected earnings need to be discounted to be compared to present costs – most conveniently done on a microcomputer.

"It is necessary that economic evaluations of tree-crop projects be undertaken. And it is important that they be well done because tree-crops usually commit farmers to a selected course of action for decades, rather than one or a few seasons. The intention of the Mulbud package is to help researchers concentrate on data collection and interpretation, leaving the 'mechanical' problems associated with economic analyses to the computer.

"Mulbud has been designed with the expectation that many users will have had little or no previous experience of micro-computers. It also allows for the fact that they may have had minimal training in economics. Thus, the program is extremely user-friendly, fail-safe and obvious. For example, the fundamental building blocks for Mulbud are 'minimum consistent enterprise data sets'; users specify these by filling in a form on the VDU screen. This form can be recalled at any time, to change or 'edit' the data. Mulbud can then be used to build multi-enterprise budgets. Budgets are analysed and the tables are displayed and/or printed in final report format with appropriate economic indicators and flexible, user-defined sensitivity analysis. In some respects Mulbud can be likened to a sophisticated template for a spreadsheet, but it is much easier for newcomers to micro-computing to use.

"The Multi-Enterprise Budget task enables researchers to 'model' a desired farm plan by scaling data sets, shifting them in time and then merging them to simulate varying temporal, and by implication spatial, arrangements. These budgets must conform to land, light, labour and credit constraints.

"Biological interactions between enterprises may be crucial, but are rarely known in precise mathematical form. Furthermore, where they are known, it is in a particular environment and it is unlikely to be possible to derive general interaction equations valid for all possible enterprise combinations. This is even less likely for all temporal and spatial arrangements in all environments. Experience, fragmentary evidence, hunches and 'guesstimates' of farmers and research teams will be the most likely source of information on these interactions. Each iteration or 'run' with an individual Mulbud enterprise data set or with a 'model' might be viewed as a bid in an auction in which participants can react and refine their assessments. A series of 'what if ... ?' bids can be made, to assess the likely impact of unknown but possible interactions. Crucial parameters can be identified and be the subject of specific research studies. As knowledge of the systems is built up, so guesstimates can be replaced with measurements. In this way analyses become more refined and, of course, more accurate.

"The current version of Mulbud (Version 3) is an extensive update of the two earlier versions which were tested on a wide range of data in Costa Rica, Kenya, New Zealand, Papua New Guinea, Sri Lanka, Thailand and Tonga. The matters under investigation ranged from options for intercropping under coconuts; credit and subsidy policies for banana farmers; the alley cropping of maize and beans between *leucaena* hedgerows; intercropping of coffee with food crops; silvo-pastoral alternatives in areas suffering overgrazing; oil palm rehabilitation; and the profitability of peach and Kiwi fruit orchards under different yield, price and wage rate assumptions. Some of these studies used annual data, while others made use of Mulbud's ability to handle seasonal data with up to 60 time periods."

Bye

Well that just about sums up Dan's project. I must say it's nice to see computers used for something other than games or run-of-the-mill accounting systems. Also, the low price of the Osborne makes Mulbud available to a very wide range of users. For the technically minded, Mulbud was written in Pascal MT+, and (just) fits on a double-density Osborne 1 computer. It may also be used on most other CP/M computers.

That's it for another month, please keep those newsletters and hints coming in. Cheers – Geoff Cohen. ❑

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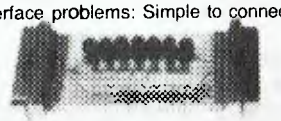

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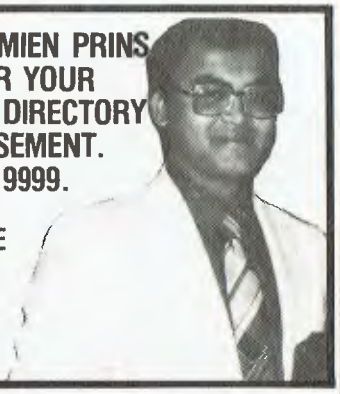

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Computer VZ-200: With 24K RAM, 30 games, books or swap programs which include Panik, Ladderchallenge and Hoppy. Phone: (042) 56 3446.

Microbee Computer Club: Microbug Australia meets on the second Wednesday of each month at the Victorian State College, Burwood Campus, 221 Burwood Highway, Burwood, Victoria, starting at 7 pm. Members from country areas and other states are welcome. Phone (03) 873 4455.

Oric 48K Colour Computer: Including a data cassette player and some games tapes – $350 ono. Phone 080 7071 and ask for Matt.

Atari Programs: Damage Control is a mostly machine language arcade game, using DLI's, VBI's, redefined characters, music and other Atari features. Music Maker is an ML VBI routine, which allows you to have music playing in your programs or even while you type in a program. Fantastic! The price is $7 for either program or $10 for both. Send a disk or cassette, SASE and payment to S Lawrence, Box 1025, Bundaberg 4670.

Microbee: Unwanted original software. Ztrek, Chess, Robotman, Pilot, Escape from Colditz – $6 each. Chopper, Kilopede, Sydney Approach – $8 each. Phone J Arnold (02) 625 8950.

COMX35: User Club Join Now! Hope Street, Bunyip 3815. Phone (056) 29 5379.

Oki Users – Help!: I need help finding documentation for the Oki if800 computer. Larry (02) 949 3124.

Tandy MC-10: With software and cassette lead. Worth $150. Sell $100. Phone Tom on (047) 31 4492.

Commodore 64: Reset key and memory back up program. No more lost programs due to screen lock up. $12. Write to P.S. Dicka, 26 Moore Street, Blair Athol 5084.

Microbee Disassembler: Loads programs, allows address displacement, inputs Hex code, prints serial or parallel, saves code to tape, easy to use. Tape – $9.50. Prompt replies. Contact J Arnold, 36 Victoria Street, Rooty Hill 2766.

Microbee 32K : with b/w monitor, plus software – $600. Write to John Brain, 2 Oxley Street, Nyngan 2825 for more information.

System-80: Blue label, with keypad 48K, twin disks, double-density, green monitor, Newdos/80, cables, much software; immaculate condition – $1800 ono. Phone Richard (02) 498 5617.

Vic-20 Software: Cartridges – $15; original cassette games – $10. Also wanted to swap any software. Phone (03) 723 1728 ah for details.

VIC 20 Program Library: High-quality games, utilities, educational and miscellaneous programs available. Send SAE to Chris Groenhout, 25 Kerferd Street, Watson 2602, for list.

Microbee: Hyperspace. A high-resolution arcade game, requires joystick – $5 (tape + listing). Contact T Knowler, 9 Waterman Place, Fraser 2615.

VZ-200: Send $20 and a blank 30 tape for Invaders, Hoppy, Pakman, Super Snake, Asteroids, Dynasty Derby; or $4 each. Phone (069) 53 3208.

Kaypro II Owners: Wanted urgently to buy, replacement copies of bundled software damaged while moving. Write to Box 337, Kingscote 5223; or phone (0848) 22631.

Vic-20: Statistics software package. Correlation, prediction, anova, chi-square. Send $7 for tape to Wallace, 9 William Crescent, Millgrove 3139.

Verbatim Diskettes: In sealed boxes of 10 – only $37. Disk box for 100 diskettes – $30. North Sydney (02) 92 8504 ah, ask for Peter.

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Apple Software: Including Lode Runner, Dragon Maze, and so on. Contact David Browning, 14 Richard Austen Crescent, Middlemount 4746.

IBM Equipment and Software: Hayes Smartmodem 1200B. Autodialling and Autoanswer modem. Complete with Smartcom II software. Brand new, ex-US. $650. Peachtext 500 software pack. Word processing, electronic spreadsheet, spelling proofreader, thesaurus, database manager. The lot for $450. Peachtree Accounting Software. Accounts receivable, accounts payable, general ledger, invoicing. Normally over $2800. The lot for $1800. Davong Memory Expansion Board plus two serial ports, max 256K – $450. Ashton Tate 'Friday' Database Manager – $700. Phone (02) 86 6368.

Vic-20: Datasette, cartridge, joystick, BASIC 1, books, tape, good condition – $400 ono. Phone (063) 52 2008.

32K Microbee: With monitor. Both in perfect condition. Worth over $700 together. Selling at an amazing $499. Phone (03) 547 3014.

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Supertalker: Mountain hardware, in good condition, with speaker, microphone, disk and manual – $200. Popular Apple games going cheap. Contact Simon Droscher, 19 Pitt Street, North Nowra 2541; or phone (044) 21 6724 after 4 pm.

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Commodore-64: Sell/swap top software (for example, Pole Position, Centipede and Galaga). Phone (03) 580 1721, or send SAE to Mark Blair, 51 Eighth Street, Parkdale 3194, for more information.

System 80: Copy of 'Sound Off' program, and instructions. Will negotiate. Write to J.T. Madden, 5 Clewley Crescent, Toowoomba 4350. Phone (076) 35 3430 after 4 pm.

System 80: 16K, with B/W monitor, books, manuals and software (including EDTASM). Top condition – $400. Write to T. Cammell, 333 Piper Street, Broken Hill 2880.

Apple Compatible: 64K, CP/M, 80-column, parallel & serial, disk drive, GS/monitor, detachable keyboard, plus extras – $1700. Phone Peter on (03) 762 1227 AH.

Wanted: Contact with David Woolford. Sorry, lost your address and phone number. Jamie Young, 10 Leonard Street, Highbury 5089.

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B/W Rank Arena 30 cm Monitor: Excellent condition, suitable for Microbee. Give-away price – only $100. Contact Jeff Robson, 38 Crawford Road, Cooranbong 2265; phone (049) 77 1192.

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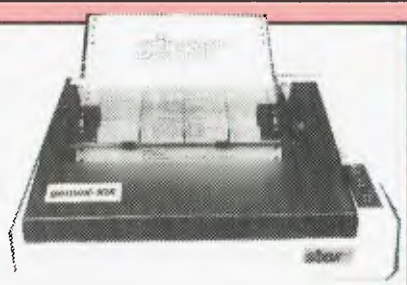

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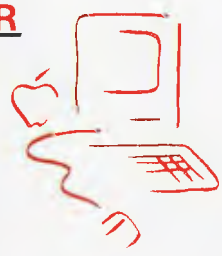

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AD INDEX

ACT	OBC
AED	25
ANZ Book	151
Applied Computer	42
Applied Technology	38
Arcom Pacific	7
Ashton Scholastic	92
Automation Statham	25
Banana Soft	64
Barson Computers	142
Bentleigh Fragrances	153
Brisbane C.A.E.	54
Business Scope Qld	66
Capricornia Inst Educ	60
Cash and Carry	176
City Personal Computers	75
Colex	41
Commercial & Professional	132
Commodore	105
Compak Computer Centre	162
Compsoft	67
Computer Connection	66
Computer Simulations	110
Computer Site Services	44
Computer Spot	170
Computerland	114
Consultech	111
Corgi Bantam	65
CPU Enterprises	66
Cypher Research	62
Datascape	165, 167
Datatei	120
Datron	121,137
Deforest	22
Deker	148
Dick Smith	90
Dolphin Computer	112
Edusoft	123
Electronic Resources	66
Emona	71
Energy Control	110
Federal Marketing	68
Futuretronics	81,84
Gambit Games	157
Hartley	50
Hi-Tech Software	12
imagineering	173,175
Intelligence	74
Interfaceware	100
J.R.T. Software	117
JEN Data	15
John Sands	89
Labtam	131
Mac Designs	166
Metrop Business Machines	172
Micro Analog General	88
Micro-Educational	169
Micromail	10
Microware Australia	60
Mitsui	130
Mr Floppy	140
MuitiTech Computers	62
Nashua	9
Nissei Sangyo	23
Olivetti	34
Output Media	45
Ozi Soft	IBC
Perfect Information	3
Pitman Publishing	21
Porchester Computers	98
Portable Comp. Co.	97
Prentice Hall	14
Public Domain Software	136
Q-Com Pty. Ltd	62
Qld Inst of Technology	64
Quantum	110
Qubie	58,146
Rexel	22
Richard Burton & Assoc	13
Rifa (MacGraths)	156
Rod Irving	160
Sigma Data	78
Sigma Oki	95
Sigma Qume	166
Silver Reed	124
Six-S Business Advisory	IFC
Software City	72
Software Suppliers	56
Speedy Software	62
Strategic Comp Services	17
Sunshine State	57
Swiftforms	56
Syscom Terminals	66
Systems Solutions	174
Tandy	145
Tetrad	23
The Byte Shop	61
Think Computers	157
Trident Tech Systems	90
Uni Co-op	135
Vic Centre	144
Wanfrey Strachan	138
Warburton Franki	86

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All Contributions: should include your name, address, and home and office phone numbers (in case we need to check details). Each page of your submission, and any material sent with it, should also carry your name.

Contributions by Telephone: Contributors who have modems and suitable software (in the MODEM7/YAM mould – see our stories on Christensen Protocols in the May and June 1983 issues) can arrange direct transfer to our computers through our Bulletin Board system, which is on-line 24 hours a day, seven days a week. Contact our office by phone for details on transferring material in this way.

Contributions on Disk: Contributions can be accepted in a wide variety of disk formats, although some have to be converted outside our offices, which will add to the (often lengthy) delay between receipt and acknowledgement. The preferred medium is IBM standard format single-sided, single-density, 20 cm CP/M disks. We can also handle, in-office, IBM, MicroBee, Kaypro II and Osborne 13 cm disks, and 13 cm Apple DOS or Apple CP/M disks. If you have one of the formats listed by Competron in Brisbane (usually advertised in this magazine), we can accept that too. Please pack them extremely carefully if posting and label all disks with your name, address and phone number.

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