COMPUTER MAGAZINE OF THE YEAR*

your computer

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5th Annual Personal Computer of the Year Awards

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PRINTERS — PART 1 ▪ R:BASE SYSTEM

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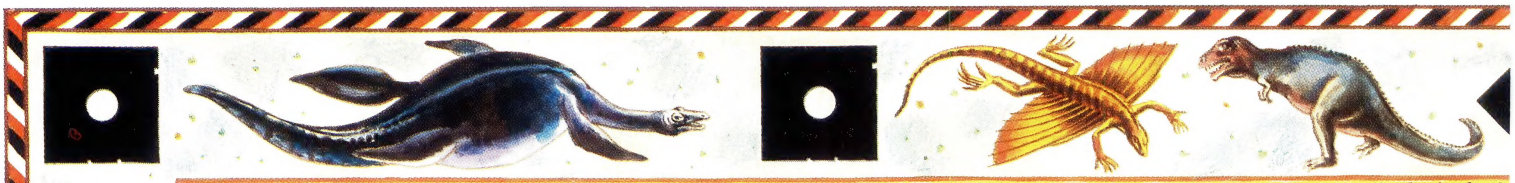

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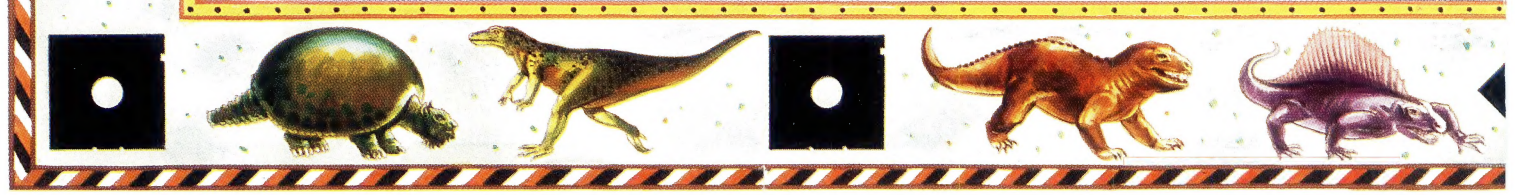

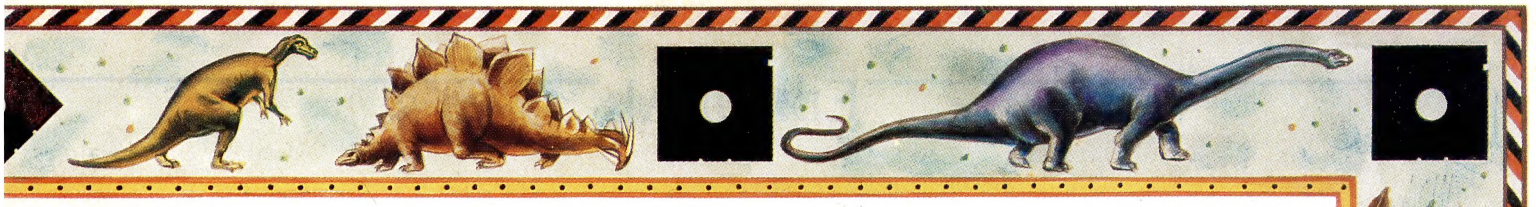

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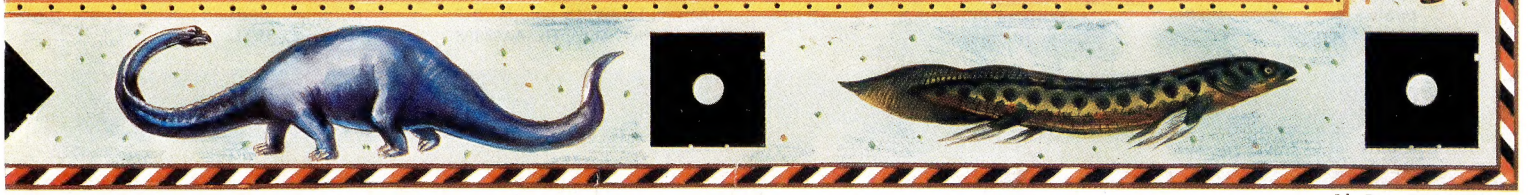

John Bevins DPS AUST M59

EDITORIAL

Emerging Standards

FOR SOME TIME now, the network marketplace has been the scene of bloody battles and outright confusion. Network vendors have come and gone, end users have installed their products and been disappointed with the results, and the whole scene has been a bit of a mess.

Take IBM, for example. If anyone ought to know about networks, IBM should; yet IBM has had to have repeated attacks on the networks marketplace. First, there was the IBM Personal Computer Cluster Program: a low-cost, low-performance network that was incredibly poorly designed and riddled with limitations. That product was released in Australia but never announced because it was a bit of an embarrassment.

Then came the Personal Computer Local Area Network, based on technology licensed from Sytek Corporation. Despite the added complexities of broad-band operation, this product performed reasonably well, and has been the basis of several moderately successful installations that I know of. However, this was never intended to be a high performance network to support lots of PC's, nor was it ever intended to support other machines, and so network purchasers have voted overwhelmingly for the Token Ring Network.

IBM now seems to be committed to the Token Ring as various divisions within the company have released products which run on the network, ranging from the new Token Ring Adapter II for the XT and AT to a Token Ring interface for the 3174 Cluster Controller, which puts 3270-type terminals onto the ring.

In the software area, too, IBM seems to be getting serious with a wide variety of options, from the NETBIOS, Network Program and DOS 3.2, which allow PC's to network, through to NetView/PC, a new operating system which allows PCs to operate using SNA (Systems Network Architecture), IBM's top-level network protocols. Detail is being filled in, too: for example, new software products allow users with a modem to dial into a Token Ring network and use its facilities, as well as permitting network PC's to dial out through a communications server.

With all this activity the obvious conclusion one can draw is that IBM is serious, and the Token Ring is likely to become an 'industry standard' as a result.

Meanwhile, can it be that we are likely to lose another 'industry standard'? The 80286 processor has been around since 1982, and the IBM AT since 1985, yet Microsoft and IBM have still to ship an operating system which uses the machine in its intended protected mode. Nor have any other software developers released protected mode applications software.

The latest word is that Microsoft will not be able to release an 80286 DOS before 1988 now. However, Compaq and other vendors have already started shipping 80386-based machines, and it is possible that IBM will soon join them. Since the 80286, in protected mode, is unable to run existing software while the 80386 can, it seems quite possible that the rest of the industry will bypass Microsoft on this one.

Already, Digital Research has released a version of Concurrent DOS for the 80386, which makes use of the chip's VM86 (Virtual Machine) architecture. We will shortly see prototypes of PC/MOS, another multi-tasking, multi-user, operating system. And Microport Systems is ready to begin shipping its Unix System V.3 for the 80386, complete with the ability to run multiple copies of MS-DOS simultaneously using the VM86 feature. In fact, Microport President Chuck Hickey told delegates at the PC '87 Conference that the standard demo for the package is to run multiple copies of Flight Simulator in Windows!

With all this activity, Microsoft seems in danger of losing the initiative. While the MS-DOS system calls will remain as a standard to provide services to applications software, it remains to be seen whether MS-DOS itself will be servicing those function calls.

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WIN $3,000 WORTH OF COMPUTER GEAR WITH FRAMEWORK II 15

All you've ever wished for in an office printer.

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Brother M-1709 $1,245 r.r.p.

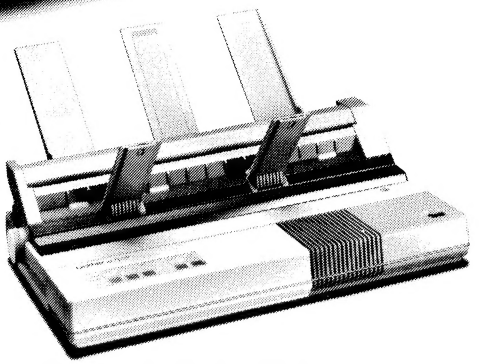
It was almost as if the designers had overheard your grumbles. Then solved them all with this unique printer.

The Brother M-1709 is faster than every other printer in its price range. 240 cps in draft mode, 50 cps in NLQ–*real* NLQ.

And dramatically quieter at the same time. No more grumbles about "buzz saws" in the office environment.

It has an enormous buffer memory–24K, or about ten typed pages. So no more grumbles over your computer sitting idle while your printer does its job.

Selection of many of its fonts and functions has now been simplified to a simple touch control panel. Meaning no more confusion over imbedded commands.



Brother M-1509 $999 r.r.p.
Speed, looks and performance.
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But the feature which, for many, will mean the greatest relief of all, is the one we call "parking"–"paper parking". You can use fanfold paper as well as cut sheets (even with the optional cut sheet feeder) just by "parking" one while you use the other. No more time wasted having to remove one in order to use the other.

The Brother M-1709 has everything you've ever wanted to see in an office printer. And more.

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INGLIS REPORT

THE RECENT RELEASE of the Inglis report unveiled some major suggestions, according to the Federal Minister for Industry, Technology and Commerce, Senator John Button. These were a 'giant first step' in developing a high tech purchasing policy for the government.

As the report revealed, there is a technological 'cringe' amongst government departments which has to be stopped with future co-operation between government and private enterprise.

The report suggests that all Commonwealth agencies provide forward procurement plans identifying requirements for technology intensive projects and services for three years ahead. It further suggested that the government appropriate $35 million over five years to fund joint research and development ventures between companies and government departments.

Senator Button believed that another significant suggestion was that all Commonwealth agencies (other than departments), be required to pay customs duty on imported high technology equipment.

The final area which Senator Button felt warranted closer examination was the recommendation that ministers be given the authority to apply a 10 per cent discretionary price-preference for purchases applicable to their portfolios, to assist the development of local industry. This would also help to avoid additional disruptions to an already depressed labour market.

The Inglis report has come in for some criticism from the Australian Information Industry Association (AIIA) executive director, Bob Mounic, who expressed disappointment with the Reports recommendations, saying the committee had delivered 'more of the same.'

The AIIA put together their own, largely-ignored submission to the Inglis committee. According to Mounic, the AIIA proposed a three-staged program to boost the development of Australian software capabilities by creating a potential world market for software initially developed for a single government department.

Mounic further said that the AIIA was disappointed because the government did not appear to look into this valuable marketing strategy. The AIIA pointed out that a lack of certainty in the government's preference policy has been further exacerbated by the Report's recommendation of more, rather than less, Ministerial discretion in preference cases.

The Report does not, according to Mounic, provide a strong enough policy for implementing local content levels. A required level of local content would encourage all tenderers to maximise the Australian content of their offerings.

He highlighted the inefficiencies of government as one of the major areas neglected in the Inglis report saying, 'The most fundamental omission of the committee was its failure to give sufficient attention to methods of lowering the cost of doing business with government. This impediment is by the far most inhibiting one for smaller companies wishing to participate in the government market.' □

WOZNIAK IN ADELAIDE

It seems that Australia is becoming a haven for some guests you would think would be quite happy in their native financial hunting grounds: but Apple's messiah, Steven Wozniak, slipped into the framework of Australia's computer future when he accepted an invitation to join the board of Integrated Silicon Design (ISD).

Adelaide-based ISD is one of only two companies in Australia specialising in the design and application of silicon chip technology. It is a joint venture between management investment company Samic, and the University of Adelaide

Ian Kowalick, managing director of Samic, said Australian industry had yet to appreciate the full potential of microelectronics and was loosing markets to countries further advanced in their use of this technology. □

COMPASS CORNER

Last year saw a sizable increase in sales of portable computers, according to figures gathered by Compass Research and noted through its Micro StoreBoard research program.

Apparently, one of the factors behind the increase, has been the uptake of portable computers by dealers. Prior to this, most portable sales had been made directly by vendors into their own user base, notably by Hewlett Packard and Data General.

Also, portables picked themselves up with the addition of the 80286-based machines, offering faster operation speeds — a remarkable example is the Toshiba T3100, which on its own, significantly boosted the total value of portable sales late last year.

Many of the new portables have shown consistent sales of their entry-level models (the Sharp PC 7000 and the Toshiba T1100, for example) throughout 1986 — a necessity for a healthy market.

The 80286-based portables market is expected to be one of the fastest growing areas of the PC market in 1987. Total portable sales are expected to account for just under 10 per cent of the market for 1987, rising from 6 per cent in 1986.

Behind this growth prediction, is the fact that most major vendors are expected to announce new portable products in 1987. Compaq's already-released Portable III will compete in the 80286 market with the Toshiba T3100 which took a 5 per cent share of the 1986 portable market for itself (*on last quarter sales alone*).

A major contributing factor to the portable's success has been its ability to be priced competitively with desk-top PC's. For users, this means that they no longer have to pay in excess of desktop prices for portability.

The portables have also taken the road of the clones to the market. Chendai released its portable in 1986 and a number of other clone vendors will enter the market in 1987, which is very likely to cause prices to drop further.

Technological advancements in screens have released the portables from the shackle of hard-to-read displays; with their much-improved keyboards and increasing IBM compatibility, the portables now have a chance to compete head-on with desktop PC's — they are no longer restricted to vertical markets. □

GREAT SECRET BUY

Highly sensitive secrets from the Ministry of Defence's Royal Signals and Research Establishment (RSRE) at Malvern, England, have been discovered by a student on a $90 second-hand computer from an army surplus store.

The unexpected leak of information came from one of England's most important research and development sections, which deals with the development of technology and microchips for specialised communications. The fact that the leak was due to a mistake by the group's own technicians proved embarrassing; the leak itself could possibly endanger the workings of RSRE, which has still not recovered one of the computers.

The security leak was discovered by Mark Storer, a computer science student at Oxford Polytechnic, who went to an army surplus store to buy some socks and walked out with a computer instead (*know the feeling?*)

Although no floppy disks were supplied with the computer, the hard disk drive had not been erased before it was sold. Among the hundreds of files on the disk, which would have been invaluable to Eastern Block military strategists, was a breakdown of past and future budgets of the division of RSRE that handled special programs, such as designing and manufacturing sensitive equipment — the information still carried its top-secret self-destruct security codes.

Ordinary commercial software on the computer was worth thousands of dollars on its own, but the classified information would have made Mark a very rich man. As it is, some information which pertained to the portfolios of employees at the RSRE has proved doubly embarrassing — the information itself is in breach of the British Data Protection Act.

As if all that wasn't bad enough, other information on the computer referred to memos written by the staff about dissatisfaction with working at RSRE

and complaints about low wages.

According to the Australian Department of Defence, 'redundancy operations' for Departmental computers is carried out with stringent checks to make sure no classified information is leaked. □

AUSSAT TO LEAD

Australia could lead the world in providing the first mobile communications system using satellites, Aussat's manager of space and communications operations, Dr Wayne Nowland, told a CSIRO conference recently. Nowland said the development of technology in the next generation of satellites could see more than 20,000 mobile communications terminals in use by 2000. □

US MARKET OPENS UP FOR AUSTRALIA

A recent change has been made in American tax laws, introducing a 'super royalty' provision. This should make the US a considerably more attractive market for Australian companies exporting technology, according to tax accountant, John Fisher, the international tax partner for chartered accountants Cooper and Lybrand. □

HIM IN AUSTRALIA

Following along the lines of the newly formed American HAM (H-P, Aldus, and Microsoft) alliance of three leading desktop publishing suppliers, is the Australian equivalent HIM alliance.

HAM will spend A$3.2 million worldwide over a 12 month period to promote their desktop publishing products as a complete desktop publishing solution.

The Australian operation of the alliance will include Hewlett-Packard Australia, InfoMagic (Aldus Corporation's local representative), and Microsoft Australia. Details of the alliance have been discussed between the three companies and an agreement is expected to be signed soon.

Products covered by the alliance include Hewlett-Packard's LaserJet printers and the Vectra AT-class personal computer; Aldus's PC version of its PageMaker desktop publishing software; and Microsoft's Windows graphics operating environment, and their Word wordprocessing software and Mouse, a cursor controller.

Two new products expected to be released by the alliance are the ScanJet image scanner and the LaserJet Series II printer. □

MELBOURNE COMPUTERLAND CENTRES MERGE

Five of Victoria's eight ComputerLand computer centres are to merge, forming the largest single ComputerLand group in Australia.

The move combines the Box Hill, Camberwell and Moorabbin group with the Dandenong and Gipsland group, strengthening the position of both in the southern and eastern areas of Melbourne and Victoria. The purpose of the merger is to combine the management skills of both groups and achieve cost savings through rationalisation.

The new group comprises a small percentage of Computerland's franchised operations — the company has a network covering 80 countries worldwide with more than 800 outlets.

John Verhardt, managing director of the new group, hopes that the multi-store operation will enhance the ability of franchisees to service the public. More services will be offered to a much larger client base, he said.

The five centres are dealers for IBM, Compaq and Apple business computers marketed exclusively to the business sector. Combined sales for this calendar year is expected to be around $10 million. □

VIC UNIVERSITY BUS UP DOMAIN

The battle Australian universities are fighting to each gain a the best computer engineering or programming faculty for themselves heated up with Melbourne's Monash University installing 23 Domain technical workstations. The supplier, Victorian company Domain Computers, is a subsidiary of American Apollo Computer Inc.

The installation makes Monash the largest Apollo installation in the southern hemisphere. Senior lecturer at in the universities mechanical engineering department, Ray Maxwell expressed the department's aim as teaching students with a view to optimise individual skills, particular engineers. The university is trying to establish an environment as close as possible to that engineers will be working in when they leave the academic world.

The workstations will be linked across the campus using Ethernet, while in each department they are linked by the Domain token passing ring. The networking of the system will allow students to benefit by working in different teams, each working on various facets of a project and sharing common databases and software.

Seventeen workstations have been installed in the mechanical engineering department, 3 in computer sciences, and one each in the mathematics, earth sciences, and electrical engineering departments to encourage professional interaction.

In addition to undergraduate teaching, Monash is using the Domain facilities for postgraduate research. Consulting work for local corporations with research on manufacturing problems will be the third arm of the operation.

The University has established a proprietary organisation called Montech to deal with commercial applications concerns and to market it both in Australia and overseas. □

THEFT OF PLASTIC CASH

A theft involving plastic credit cards in Brisbane has caused concern as to the security of the cashcard automatic teller machines (ATMs) and the security of personal identification numbers.

The theft did not make the headlines when it occured in January, but was a perfect example of problems that arise with cashcard security. Michael Roggenkamp, lecturer in the computer studies at the Queensland Institute of Technology (certainly someone who knows something about computer technology), discovered the theft of his Commonwealth Bank Keycard while on holidays.

Following the theft, Roggenkamp immediately informed police and closed the account the same day. Following the advice of the bank when he had opened the account, no pin number was left for the thiefs to use and no one was told the number, but within two hours of the theft $300 was withdrawn from his account.

According to Roggenkamp the only other way the account could have been breached was that the thief forged the signature on the card. Roggenkamp also raised the issue that employees at the bank could have deducted the money knowing that the card was stolen.

According to spokesmen from several banks the security on their internal systems is thoroughly tested enough to negate those claims. □

HISTORICAL PICTURES ON DISK

A Queensland based information storage specialist company has come up with what it believes is the world's first link between laser disks and text retrieval. The disks will allow up to 54,000 images to be stored on each side of the disk, and linked to a modified version of the company's Corporate Retriever text retrieval system.

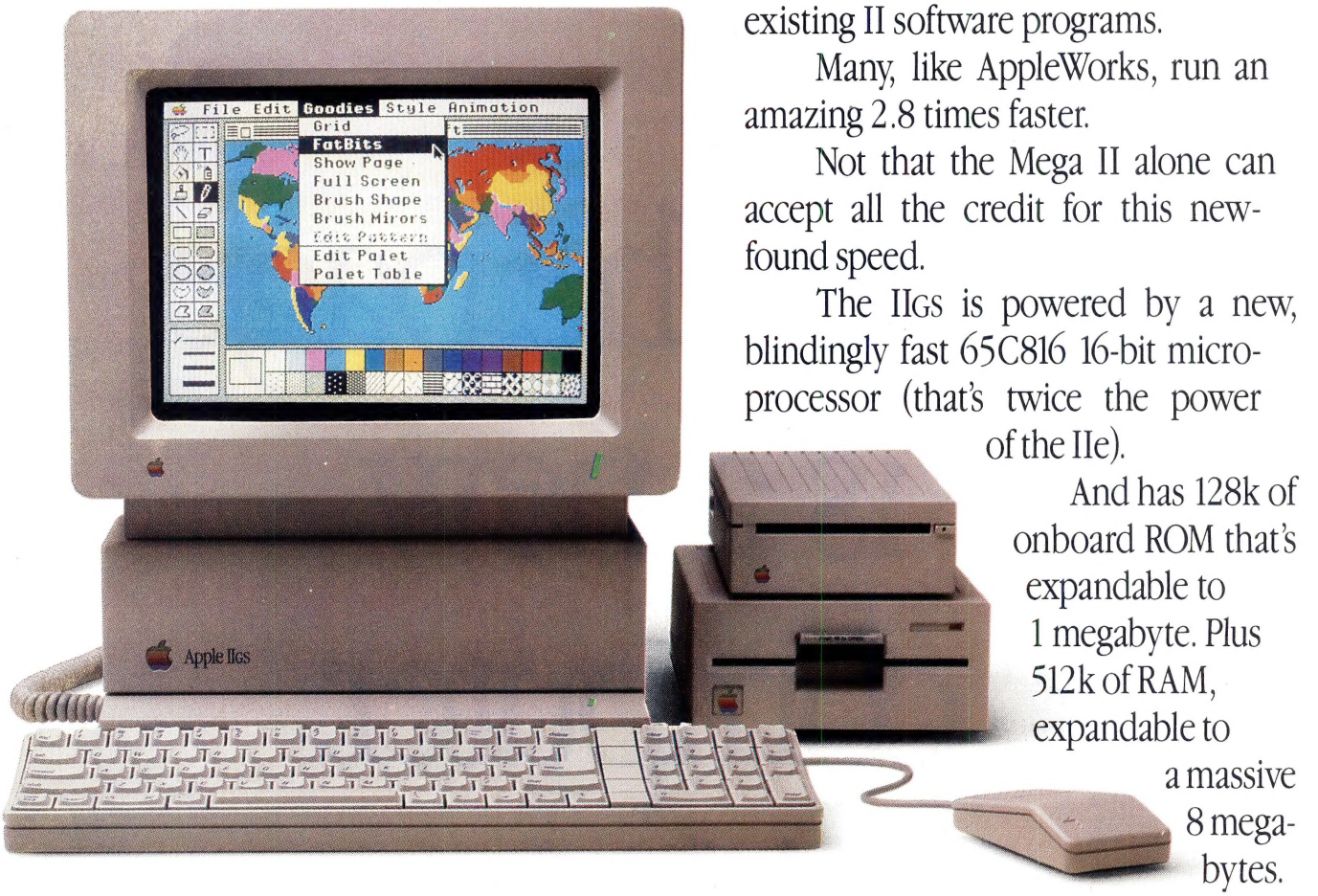
The system, called QCOM, will be used in the 1988 Bicentennial to allow people to scan through 204,000 historic photographs. The first user of the system is the NSW Government Printing Office which will transfer its very comprehensive, but fragile, photographic archives onto laser disks.

The system is versatile enough to accommodate very exact questioning as to the characteristics of a photograph such as placement of figures in the photo. Information retrieval is fast, with an average retrieval time 2.5 seconds per image.

One problem that the technology will encounter is that when such places as libraries, art galleries and museums (major markets for the disks) want to transfer information onto disk they will have to first create a video tape and then send the tape off to be processed. The problem is that the only place that converts the information is to be found in England. □

Over the page
is a new
computer.
Inside it are
two more.

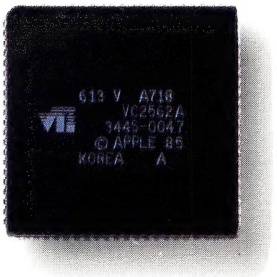
The new Apple IIGS.



The new Apple IIGS features among other things, a built-in Apple IIe and IIc.

Both of these computers, or rather, their functions, have been built into the Mega II chip you see here (and that's its actual size, of course).

Two years in the making, you'll find the revolutionary Apple Mega II microchip alongside many other new custom chips on the IIGS motherboard.



We put it there for one simple reason.

Compatibility.

The IIGS runs virtually all of the 10,000 existing II software programs.

Many, like AppleWorks, run an amazing 2.8 times faster.

Not that the Mega II alone can accept all the credit for this new-found speed.

The IIGS is powered by a new, blindingly fast 65C816 16-bit microprocessor (that's twice the power of the IIe).

And has 128k of onboard ROM that's expandable to 1 megabyte. Plus 512k of RAM, expandable to a massive 8 megabytes.

Which means you can run the most advanced software without running out of memory.

The IIGS was partly named after its graphics, and no wonder.

The IIGS can create graphics as clear and sharp as the photographs you see in this magazine.

But with one major difference.

The range of colours.

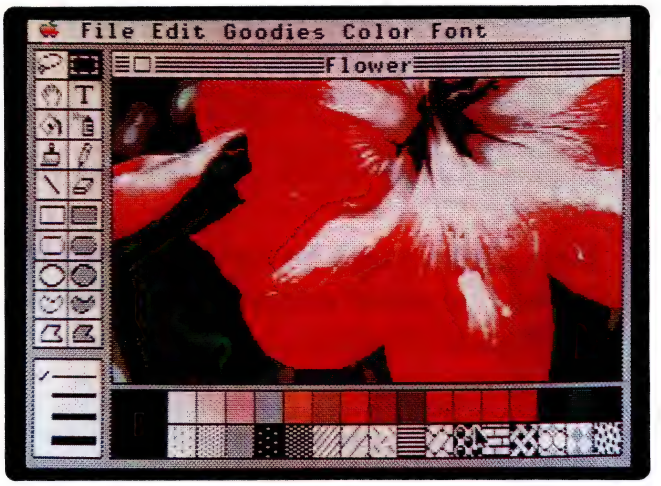
The IIGS has 4,096 in all. From delicate violet to electric red.

Any 256 can be used at a time in either of two graphic modes: 640 × 200 dots or 320 × 200 dots.

But you haven't heard anything yet. And we mean that literally.

The IIGS is so human, it even speaks.

The secret is a 32 channel Ensoniq sound chip, the kind you find in $40,000



sound synthesizers (who says Apples aren't value for money?).

It allows you to compose for and play up to 15 instruments at a time.

(Now you know where the other half of its name comes from.)

Naturally, with such high-fidelity sound, it makes sense to add the optional Bose RoomMate hi-fi speakers.

It also made sense to redesign the IIe keyboard to give you maximum freedom.

This one is detached, so you can move it all over your desk.

Or hold it in your lap.

And to make number crunching easier, there's a numeric keypad built in.

The Mouse, now standard, can be attached to either side of the keyboard.

(We didn't want to make left-handers feel left out.)

Also standard on the IIGS is MouseDesk. The software program that gives the IIGS its Macintosh-like interface.

So now, transferring ideas into action is as easy as clicking a button.

And while the IIGS is easy to use, it's just as easy to expand.

There are eight expansion ports at the back of the machine where you can plug in peripherals.

Anything from disk drives to modems, joysticks to printers.

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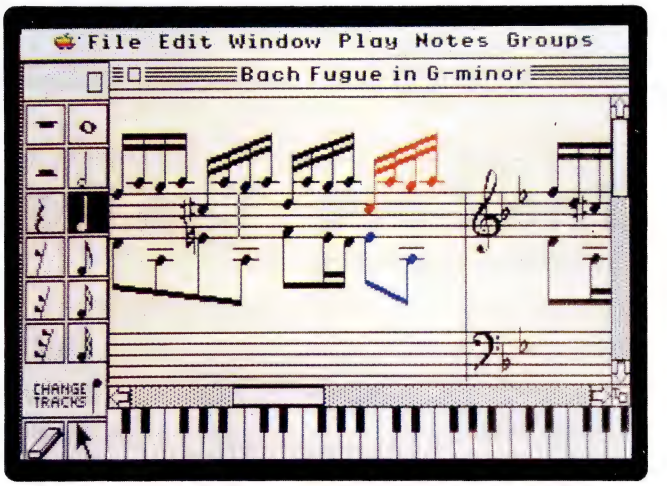

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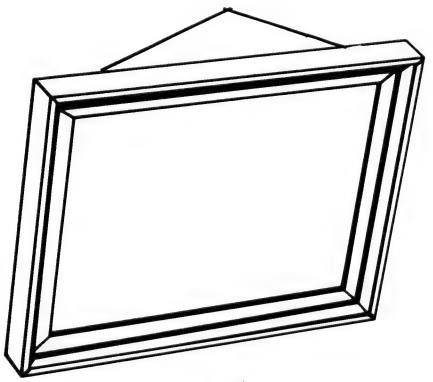

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MICROSOFT WARNS

Microsoft Australia's US parent company has struck another blow to software pirates when a shipment of over 15,000 illegal MS-DOS operating systems was seized. The software seized in the raid by Marshalls of the US Justice Department, was Microsoft's Falcon MS-DOS version of the system.

Microsoft's managing director in Australia, Linda Graham, today warned users to be aware of offers of cheap unauthorised versions of MS-DOS as they are not supported by Microsoft and users with technical problems will not have access to technical assistance.

Microsoft's US operation sought and obtained a temporary injunction against Wetex International, Quadrant Components and other individuals from infringing copyright.

Microsoft's actions come as part of a continued effort to stamp out piracy in the industry by creating examples of how rife the problem is.

Melbourne based ADE Computers has recently been advised by Microsoft (US) of the seizure. ADE is licensed directly by Microsoft to distribute MS-DOS with its range of Opal Turbo PC/XTs and Opal AT Personal Business Computers.

It is common knowledge that illegal copies of many commercial software products are finding their way into Australia and New Zealand because of our proximity to the 'pirate factories' of South East Asia; these packages are then often transhipped for American and European distribution. While most companies victimised by the pirates are aware of the problem, Microsoft is making a point of standing up for its rights under international copyright laws.

Bill Anderson, general manager of ADE Computers, has been supplying details to Microsoft with the aim of stemming the flow of pirated software. □

CLUB AMIGA

Everyone has heard of the Commodore computer, some have even heard of the Commodore Amiga, but to be vogue you will have to find out about Club Amiga, the latest creation of Commodore's special projects manager, Craig Tegel.

The club has been formed to fill the gap in support for the machine which occured due to the Catch-22 situation in which not enough machines were being sold to warrant software design; and the lack of software support, meant not enough machines were being sold.

The new club will provide a monthly newsletter, and a kit with three demonstration disks, Superbase Personal, Delux Video Construction Set and Pagesetter. Members will also receive a copy of the Textcraft or Graphicraft program and future discounts on certain packages.

Joining fee though for the Club Amiga is $50 with a $100 annual subscription fee. □

SOFTWARE TAX

Following the debacle of the introduced tax laws on software last year, the Taxation Department has endeavoured to correct the decision with another ruling.

Rather than clear the air however, the ruling seems to have conflicted with the law, according to Joe Bowers a tax consultant with Touche Ross.

The new ruling will affect all those concerned with writing programs for money, such as those home hobbyists who write for a little cash on the side, or those serious programmers.

The key points ruling are that:

1) The transfer of a computer program by electronic means through a telephone modem does not give rise to any liabilities to sales tax;

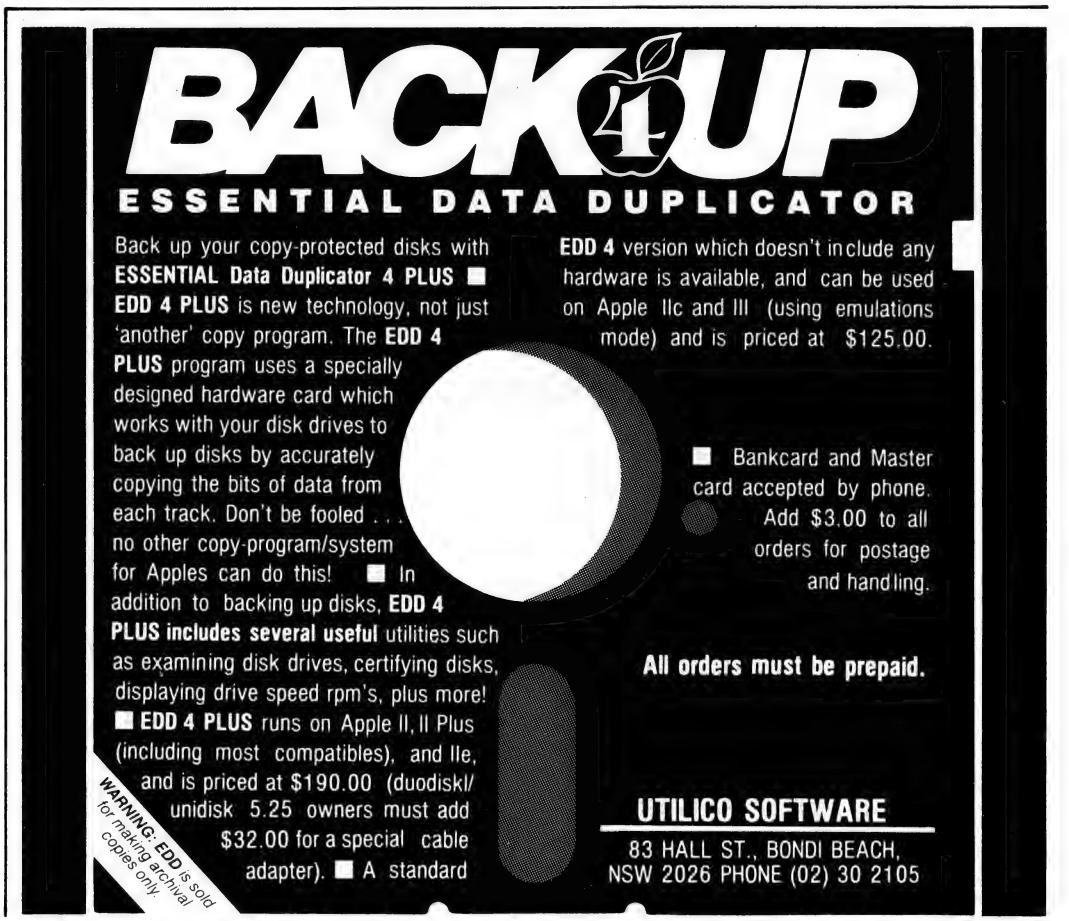
2) The preparation of a computer program by a software consultant will not give rise to a liability, provided it is agreed in writing prior to the preparation of the software, that the copyright in the software will rest with the customer;

3) Where installation is provided in conjunction with taxable computer software, the consideration received in respect of the installation must be included in the sale value of the software;

4) Other services provided with a taxable program such as maintenance, hotline, and so on, must be included in the sale value of the computer program unless the service is provided at 'arm's length cost' and the services are genuinely optional. Where further goods are supplied under a maintenance agreement, then a separate liability to sales tax may arise; and

5) The cost of the operating manuals must be included in the taxable price of the software.

Bowers has raised the legality of points 3, 4, and 5 as they do not specify a legislative basis for the inclusion of such services, although he felt that the taxation department was relying on sections 18A and 18B in the Sales Tax Assessment Act, or the equivalent in other Acts, to sup-



port their case.

Section 18A deals with the setting of assumed sale value and true sale value in the market which would be negated if the software was sold at cost.

Section 18B concerns the agreement entered into by the purchaser and the programmer where consideration for the services only needs to be included in the sale value when it has been agreed to by the purchaser or manufacturer. As Bowers pointed out the provision only maintains that acceptance 'has been given' and not 'has and will be given' which will allow further planning and agreement opportunities.

When future versions of software or new releases are taken up by a company or manufacturer then section 18B will not apply and tax will not be charged. □

EVENTS

Computers and Manufacturing Management Conference: May 11-12 Melbourne and May 13-14 Sydney. The conference highlights include: advanced manufacturing technology — the Japanese approach to 'just-in-time manufacturing' in Australia, flexible manufacturing, how STC integrated MRP II and JIT to achieve tighter manufacturing control, Hewlett-Packard's eliminating the shop-floor paper chase, total quality control, upgrading manufacturing resource planning, and more. For further details phone Susan Day in Sydney on (02) 411 8344.

Honeywell Users Associations: 1988 Forum and Exhibition. July 21-23, 1988 in Sydney. Direct enquiries to ACMS (02) 332 4622.

Communications '87: The Australian International Electronic Communications and Information Technology Exhibition will be held at the Royal Exhibition Building in Melbourne. The exhibition runs from May 31 to June 3. For more information contact Australian Exhibition Services on (03) 267 4500.

Office Technology: The Australian International Office Technology Exhibition will be held on May 31 to June 3 at the Melbourne Royal Exhibition Building. For more details contact AES see above.

The 1987 Microelectronics Conference will be held at the Townhouse Hotel, Melbourne, April 8-10. Contact the Institute of Engineers on (062) 73 3633.

The Institute of Personal Management Australia (Vic) is holding a conference and user's fair on Human Resource Management Systems on September 9-11. Details from (03) 387 9955.

Scansearch will be running courses on scientific databases, such as medical, paramedical, biotechnological, and technical. The sessions are $75 each and will be held in most cities from April to June. Contact Louise Warner on (02) 331 5211.

Cincom will be holding consecutive briefings on Future Directions in Management Information Technology, in Sydney on June 3-4. Contact Clare Neal (008) 02 2285.

The Australian Computer Society is organising seminars in Sydney on Advanced Programming on May 14-15, 22, 28-29. Contact (02) 233 7677.

The IREECON '87 conference will be held on September 14-18 at the Sydney Showground with the theme of the Digitisation of Communications. Contact Sherie Morris (02) 327 4822.

ACC '87 The official Australian Computer Society computer conference is to be held in September. The conference will be dealing with The MBA Experience, or Management, Banking and Artificial Intelligence. Contact Pearl Levin (03) 573 2184.

The Swiss Federation of Informatics is seeking papers for the European conference on Computers in Education in July 1988. The deadline is in October 30, 1987. Address inquiries to ECCE 1988, Professor Barnard Levat, Centre Universitaire D'INFORMATIQUE, 12 Rue du Lac, CH-1207 Geneve, Switzerland.

Management Technology Education will be holding the Third Asia Pacific MIS Manager's conference on June 3-5 at the Holiday Inn, Surfer's Paradise. The conference theme is Improving Performance, Productivity and Quality of Service. Contact Leanne Stutchbury (02) 290 3555.

The Australian Colleges of Advanced Education are calling for papers for the 18th Annual Computer Conference, to be held at the South Australian Institute of Technology on August 24-26. The deadline for papers is June 7. Contact the Institute for details.

1987 AFR New Product Expo is on in Sydney, July 23-26. Contact (02) 439 7738, and in Melbourne November 11-15, contact (03) 266 4424.

The Centre for Continuing Education at the ANU will present two courses on computer documentation from June 29 to July 1. Contact Shirley Kral (062) 49 4505.

A relational databases design course will be held at the NSW Institute of Technology on May 11-15. Contact Insearch (02) 20930 (xt 90120).

The South Australian ACS is holding workshops on management of the new development technologies, May 6, and beyond the fourth generation, May 7-8. Contact (08) 218 3315. □

OVERSEAS EXHIBITIONS

CommuniTech and Computer '87 Malaysia: The second Malaysian International Electronic Communications, Office Technology and Business Computer Show will be held at Kuala Lumpur from November 10-14, 1987. For more information contact AES.

Siggraph 1987: The Fourteenth Annual Conference on Computer Graphics and Interactive Techniques will be held from July 27-31, 1987. Topics included will be theories and applications in the areas of computer graphics and interactive techniques. Also discussed will be new and emerging technologies in which research is still in the early stages. For further information contact Siggraph '87 Conference Management, Smith Bucklin and Associates, Inc. Suite 600, Chicago, IL 60601 USA. (312) 644 6610. □

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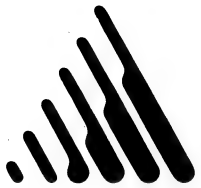

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1. **How long have you been using personal or microcomputers?** _____
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Rules & Conditions

1. Instructions on how to enter and prizes form part of these conditions of entry. **2.** Entries close last mail 31 August, 1987. Winners will be notified by mail and their names published in 'Your Computer' magazine October issue, 1987. **3.** This is a game of skill and chance plays no part in determining the winner. Each entry in categories A, B and C will be individually judged in accordance with the stipulated criteria and instructions. The judging will be done by a panel of industry experts selected by the promoter. The judges' decision will be final and no correspondence will be entered into. **4.** The promoter is Ashton Tate Pty Ltd, Unit 2, 80 Berry Street, North Sydney, 2060. **5.** Categories A and B can only be entered by owners of Framework II. Category C may only be entered by non-owners.

AMERICAN GRAFFITI

BY HOWARD KARTEN

PCOTY

CONSIDERED TOGETHER, the products honoured in this month's PCOTY issue tell a very interesting tale. In effect, they say that personal computing has taken a giant step, from the days when users were satisfied mostly with black-and-white displays, comparatively simple, straightforward applications, and non-mobile computers.

The Apple II GS and Amiga computers are excellent cases in point. The advances in sound and graphics they embody indicate how fast and how far computing has advanced — we've really gone beyond the age when micros were used mainly for spreadsheets and wordprocessing, with other applications primarily used for hacking or tinkering. The selection of Macintosh PageMaker is interesting, too, because in effect, it gives any user the ability to be a publisher — without having to rely on big bucks to get started.

Several aspects of the Compaq Deskpro 386 also deserve comment. There's no question that the 80386 chip is a major, highly significant development in electronics. It provides incredible potential computing power — the equivalent of a mainframe of only a few years ago. Seventeen vendors released 386-based machines at Comdex '87, and getting a 386-based machine on the market so soon after the announcement of the chip is a major accomplishment.

That Compaq has taken the lead in developing and marketing a 386-based machine is intriguing for several reasons. For example, an expression we're seeing more and more here is, 'You can recognise the pioneers by the arrows in their backs.' Compaq's first machine was an IBM clone; in effect, they've now cloned a machine which does not yet exist!

Another intriguing thing about the Compaq is that it's available before there is an operating system that makes full use of its potential. The 80386 chip's speed is really one of the least interesting things about it. Its features — virtual and real memory, buffers and registers, and so on — are far more interesting. Yet no operating system yet exists that takes full advantage of the 386. Because IBM has not yet been heard from, there's not even a standard yet.

What will that mean? No sane person disputes that IBM is a very savvy company (which is one reason why it doesn't try to pioneer products on the market). Historically, it has usually preferred to create its own standards, rather than accede to those already in use in the mareketplace. What will happen when IBM comes out with its operating system for the 80386? IBM has already put the world on notice that it intends to take moves to deny market share to clones.

The other Finalists are also intriguing. Computer hackers and hobbyists are an inventive bunch, and there are plenty of products that have been born in home offices, garages and other unprepossessing places. I wouldn't be at all surprised to see some tinker or entrepreneur using Turbo Prolog as the basis for an interesting AI application — one that might well take next year's Computer of the Year awards. Are there any readers who wouldn't plunk down, for example, A$100 or so for an AI product that diagnosed car problems.

NEWS

It's true, as reported above, that no IBM operating system exists that takes advantage of the 80386. The general consensus is that such an operating system will not exist for another two years at least (which means probably 30 months, at minimum, before there are any applications that take advantage of the 80386's full power). This is especially true since Intel announced that there are no plans to release a maths co-processor chip, probably to be called the 80387, to support the 80386, at least until sometime in 1988.

However, Phoenix Technologies Inc, the Norwood, Massachusetts firm that has emerged as the leading producer of IBM-compatible operating systems for clones, is working on one. As of this writing, the product was expected to be available by the end of March. Additionally, Digital Research of Monterey, California, announced in February that it would soon have one available that would provide multitasking and multiuser capabilities, and that would take full advantage of the Intel chip.

CD ROM

CD ROM as a new media for disseminating data faces a classic chicken-and-egg problem: despite the great promise CD ROM publishing seems to hold, it's been slow to catch on. A few commercial applications already exist, but CD ROM has hardly touched the home or small-business market. Neither the software nor the hardware have become affordable or available especially quickly. Trying to divine the source of the problem (hardware vs. software) is a futile exercise.

A major publishing event by Microsoft Corporations's CD ROM Division, however, hopes to speed up the pace. The Division recently issued a CD ROM, dubbed Microsoft Bookshelf, containing Bartlett's Familiar Quotations (1500+ pages, 22,500+ quotations); the World Almanac (900+ pages of very small type); the American Heritage Dictionary; the US postal code (ZIP code) directory; spelling checker; Roget's Thesaurus; and several other reference works. The data together take up less than half the 550 Mbytes available on the disk, which will sell for US$295. Bookshelf will be compatible with 14 of the leading wordprocessors and with IBM PC's, according to Microsoft.

The first retail CD ROM players will hit the market in the US Sears Business Systems Centres, a part of giant US retailer Sears, Roebuck & Co. They will sell Bookshelf, along with a CD ROM player, for US$1,100. The player will be manufactured by Hitachi of Japan.

What are Microsoft's chances of success with Bookshelf? Here are two facts to add some perspective: First, compact disc music players have come down in price much faster than anyone expected, because of the real benefits — unattainable in any other form — they provided, and because consumer demand led to more competition among manufacturers.

Second, the information Bookshelf offer is available elsewhere in a form that's less costly, easier to use, and shareable. Postal codes, for example, can be obtained via a phone call to any post office. In any case, we haven't heard of many offices or businesses that have a problem with unknown ZIP codes; nor can one curl up with Bookshelf as one can with, say, Bartlett's.

Other companies, such as the Dutch electronics giant Philips, are expected to come out with CD ROM units next year. Microsoft is generally known as a savvy, successful company whose products fill a critical need, but we can't help but wonder whether Microsoft hasn't come up this time with a technology in search of a real application.

We reported recently that Lotus Development Corp. was taking legal manoeuvres against 1-2-3 clones that duplicated the 'look and feel,' or the user interface, screen, and so on, of the venerable products. In late January, the US Copyright Office denied Lotus a copyright for its 'look and feel.' Lotus still has a copyright on the actual text of its product, of course.

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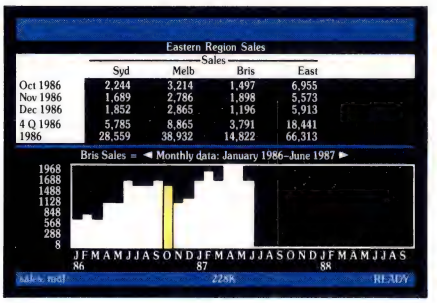

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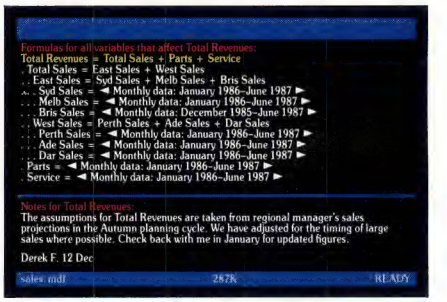

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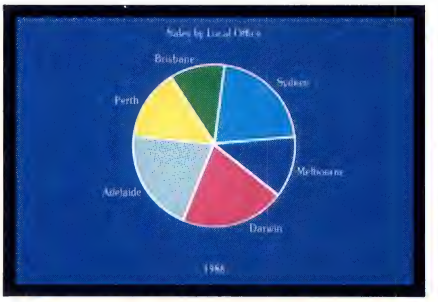
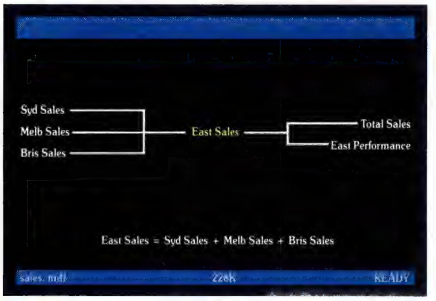


GRAPH VIEW

This will free you to think about business the way you do when you're not using a spreadsheet — with an open mind.



DIAGRAM

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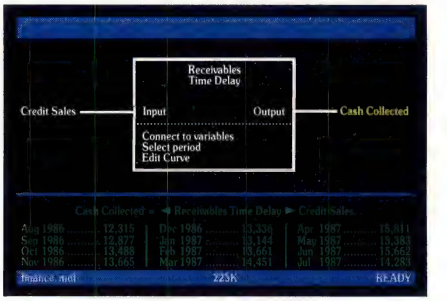

DIAGRAM AND TABLE

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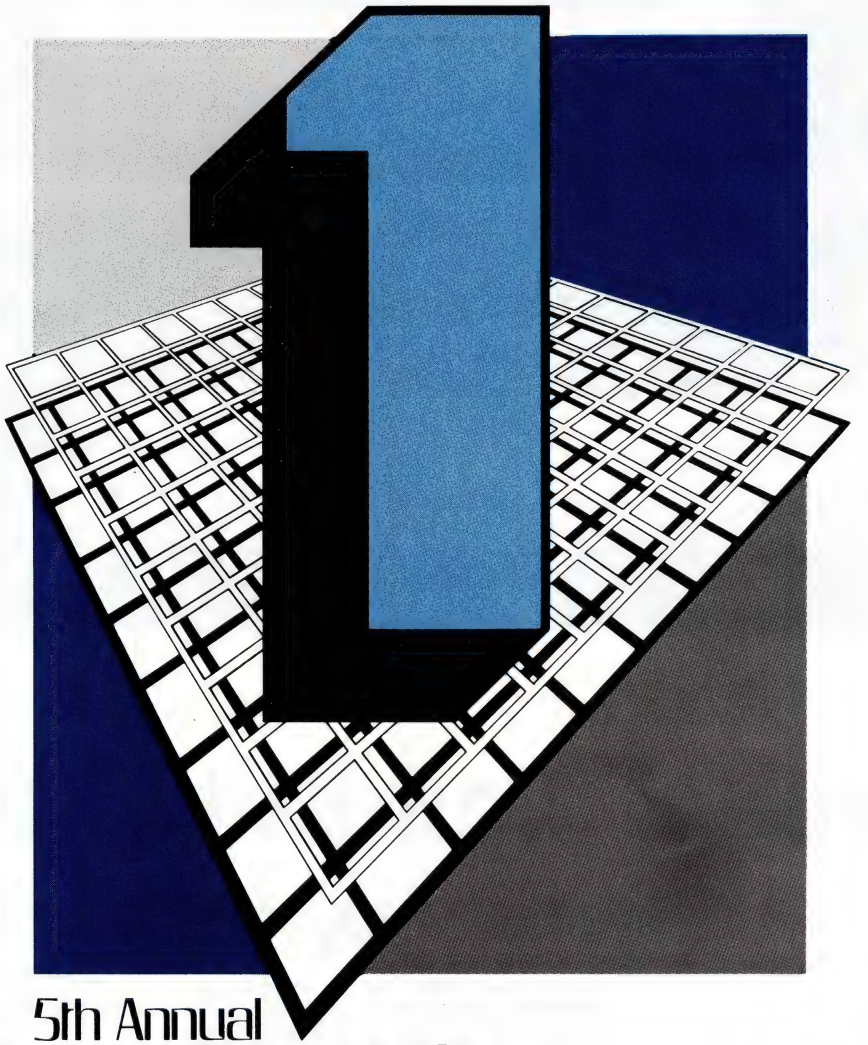


5th Annual

Personal Computer of the Year Awards

Your Computer's 5th Annual

Personal Computer of the Year Awards

JUDGING the Personal Computer of the Year Awards is no small task. The judges' deliberations are weighty, considered at length, and involve considerable testing of the various hardware and software products which make it through to the final stages. Let's start by recapping the major factors which the judges look for in winning products in the PC of the Year and Software Product of the Year categories:

First, there's innovation. This is probably the most important attribute: The Award is intended to celebrate the machine (or software package) which contributed the most to the 'state of the art' during the preceding year. Winning machines have traditionally left their mark on the industry and set standards which others have followed: For example, the second Award went to the Apple Lisa, a machine with a multi-tasking, windowing, mouse-driven operating system, elements of which have appeared in later products such as the Macintosh, Commodore's Amiga, GEM and Microsoft Windows.

Last year's winner was the IBM PC/AT; the vast majority of new PC's released during the last year have been compatible with the standard set by this machine. Another previous winner, the HP 110, set the standard design format for lap top port-

able computers with its clamshell design and liquid crystal display.

The judges take into account a number of other factors, among them design and engineering excellence, performance and value for money.

It is important to realise that the winner of the Award does not (necessarily) represent the best computer on the market. As mentioned before, there is no such thing anyway, since different computers are better at different things. The best computer for small business accounting will be different from the best computer for multi-user word processing. Any award that claims to have selected a 'best' machine is meaningless. Likewise, an award for the most 'popular' machine is somewhat redundant if the machine is the top selling, the resultant profits are a more meaningful reward for the successful vendor.

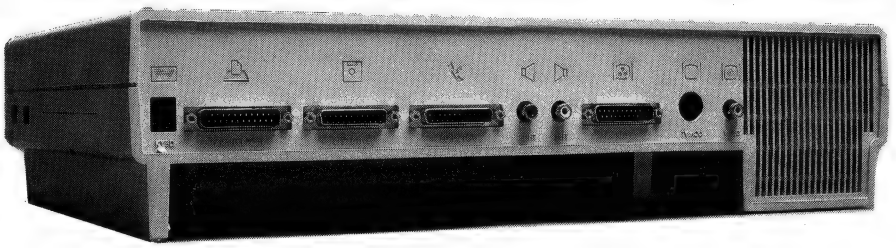
The judges usually start by eliminating the machines they feel are not going to take the top spot. This allows greater concentration of effort on the final decision. From that time on, it's a case of 'sampling the goods', examining each machine in turn to a greater or lesser extent, pursuing particular features, and debating each machine in turn until a decision is reached. Sometimes the judges reach consensus, on other occasions, a majority decision is accepted since the Judges all have fairly strong ideas of their own and, at times, are not going to change their minds no matter how long the arguments may go on.

PC Of The Year

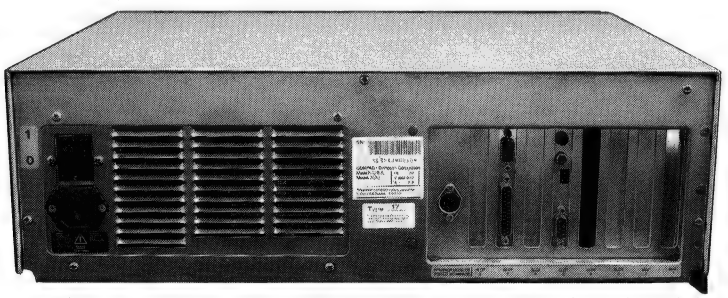
THE JUDGES' attention quickly focused on a few machines. The Wang Portable and the Chendai Lap were quickly dispensed with as well thought out machines, of undoubted good design and usefulness, but marred in the Wang's case by compatibility problems and short battery life. The Chendai showed poor benchmark performance coupled with an absence of solid innovation.

The Toshiba T3100 was left to represent the portables, with the desktops exemplified by the Compaq Deskpro 386, the Commodore Amiga and the Apple II GS. Gradually, the judges focused in on the Amiga and the Compaq 386. The T3100, while a nice, well-designed machine (this is being written on one), is just that — a triumph of design, rather than innovation. The circuitry is based closely on the design of the IBM AT, last year's winner, with the major new features being the plasma

The Wang Portable PC: It's surprising that this otherwise well-thought out machine lacks an integral floppy drive, although both 5¼ and 3½ inch drives are available as battery powered external devices. The Wang comes with its own built in printer with automatic paper feed.



The back of the Amiga shows quite an array of ports. From the left there is the keyboard port, followed by the Centronics parallel interface, the disk drive port, the serial interface, right and left speaker connectors for stereo, the RGB monitor connection, the television plug and the video socket. The grid on the right covers the fan.



The Compaq Deskpro 386 has seven expansion slots on an 8 MHz I/O bus. Three of these are 8-bit PC-type slots and the other four are AT-style 16-bit slots. Two of the slots are occupied by the Compaq Enhanced Colour Graphics Board and the Multipurpose Fixed Disk Controller.

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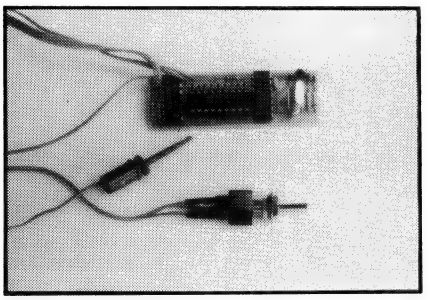

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For $40 we also offer the V-20 IC, NEC's fast chip for 8088 machines, to boost the turbo speed of your PC by a further 5 to 20 per cent — fitting instructions included. The V-20 has another attraction: it allows your PC to run 8080-based CP/M-80 software and read and write CP/M files under PC-Eighty, the amazing new program from FBN, designers of SmartKey. Add $140 to receive a copy of PC-Eighty.

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discharge display and the portable packaging.

The Apple II GS initially attracted a lot of interest. The idea of a 16-bit machine that could run new, powerful software while still protecting the user community's massive investment in existing 8-bit Apple software is an attractive one. The new display characteristics are attractive, rather like a colour Macintosh. Certainly the demonstration software was impressive, although the music was not quite as staggeringly brilliant as we had expected from the promotional literature's coverage of the Ensoniq chip.

However, when we set about running some of the supplied desktop software, we ran into some problems and had difficulty running some programs. In particular, the display colour registration was out and text sometimes difficult to read.

It will be interesting to see whether software developers do write new 16-bit software for this machine, or whether the bulk of users simply stick to the old 8-bit stuff. Certainly the II GS gives the user the best of both worlds.

For sheer innovation, therefore, we are left with the Commodore Amiga and the Compaq 386. This is where the going got tough, and the tough got going. Benchmarks were applied, software loaded up and tested, and the debate raged fiercely. The Amiga certainly represents a whole new direction in home/education computers, and in particular represents a marvelous opportunity for musicians, artists and those who dabble in video production.

Its graphics are superb, the musical effects (particularly as used by the Deluxe Music Construction Set) excellent and the whole thing well conceived. It does, however, have a habit of hanging now and again, and the disk drive is not the fastest especially when one considers that it has to load some very large programs.

Then there's the Compaq Deskpro 386. This machine is certainly innovative in that it is the first machine to use the eagerly-awaited Intel 80386 32-bit microprocessor. It's possessed of very high performance — indeed, there's nothing else around to touch it.

However, the major innovation factor in the Compaq is the different way its designers approached the problem of introducing the new technology. They didn't just design a new high-performance machine with a full 32-bit bus and new graphics standards which can take advantage of the 386's bit manipulation instructions. Compaq's design engineers recognised that what people wanted was a fast machine that could run existing software like Lotus 1-2-3 and dBase III Plus and run it faster. The extra performance would particularly help with running software like network file server code, and to satisfy these needs, compatibility with earlier standards is what's needed.

This, then, is the real innovation in the Compaq. It takes advantage of the 80386 processor through the use of a high speed 32-bit memory bus which has a bandwidth more than four times greater than the industry-standard 8 MHz AT-style machine, yet it is still able to take advantage of current-generation multi-function, communications and network cards, not to mention software. In due course, the Compaq will support new versions of MS-DOS, as well as completely new operating systems like PC/MOS and Unix.

On balance, therefore, the Award Panel gave the bouquet to Compaq in recognition of their achievement in pushing forward the capabilities of the technology. And, it's been done without making users' lives a misery by requiring the development of totally new software and hardware. The machine itself is superb — as well built and supported as we have come to expect from Compaq and it represents what is likely to become the new standard for advanced personal computers within a year at the outside.

Software Product of the Year

JUDGING THE Software Award is always difficult, because even more than is the case with hardware, we find ourselves comparing widely dissimilar products. However, as with the hardware Award, what we are principally looking for is a single quality innovation and by tightly concentrating on that point, we are able to reach a decision.

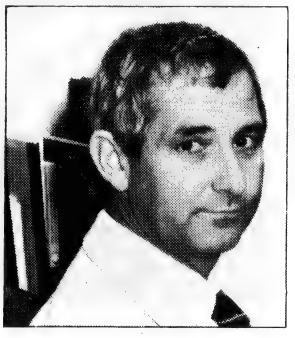
Again, the judges' procedure is to at-

The Award Panel

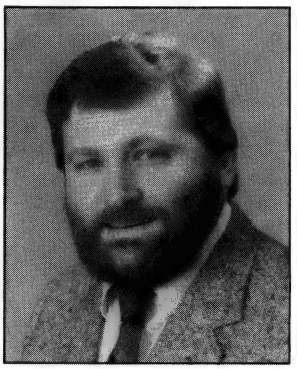
SELECTING THE Winners is no trivial undertaking. For that reason we set out to ensure our own personal foibles and preferences could not influence the decision. We did this by selecting a panel of Judges who are both experienced and independent of commercial pressures. Generally, people who have the requisite experience, tend to work for one of the companies in the industry and would obviously be unsuitable.

Between them, the members of the Panel have almost 50 years of experience with personal and microcomputers, and all of them have strong feelings about what makes *good* computers and software. And, taken together, they have had over 100 years of computer experience!

As in past years, the Panel comprised five members —



Dr Robert Graham is head of the Department of Finance at the New South Wales Institute of Technology, and is a leading expert on the use of personal computers in a corporate environment. He has been involved with personal computers since the late seventies, and lectures widely on personal computer software.



Paul Zucker is the former editor of the Australian fortnightly publication PC *World*. He is now devoting his time to writing on various aspects of the industry and undertaking independent product evaluations. Paul has been in the industry for more than six years and takes an active interest in speciality user groups. ▷

The Winners

tempt first of all to draw up a shorter-than-short list, and put most effort into selecting just the winner of the Award. However, it is more difficult in the case of software, so the following comments are not presented in any particular order.

As there is only one winner we started by sorting out the list. The first to go were the Harvard Presentation Graphics package distributed by Imagineering, System Builder from SB Tech, and Microsoft Access from Microsoft Australia. The fact that the three packages made it through to the finals shows that they certainly are well designed and useful — but we were still looking for that package which showed innovation.

Turbo Prolog, for example, is a highly innovative product; it's the first low-cost Prolog compiler available; the first Prolog to offer such a wide variety of low-level and machine access functions for graphics, sound and bit manipulation as well as windowing; it is the first Prolog to offer a complete software development environment of editor with interactive syntax checker. However, it is non-standard, and omits several important features of full Edinburgh Prolog, and this in particular caused the judges to hesitate and withhold the Award from this product.

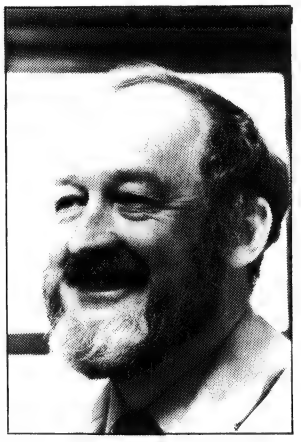
Also in the AI field is Texas Instruments' Personal Consultant package. This expert system shell is a massive system, well put together, well documented and supported by a matching Lisp system and even a dedicated AI workstation. However, despite the quality of implementation, despite its performance and attractiveness to those of us involved in expert system development, it is not the one and only shell and AI development system on the market, by a considerable margin. Nice try, but not enough to garner the Award.

Javelin, the financial analysis package which incorporates sophisticated model construction and maintenance concepts, also scored highly. Its understanding of time, its ability to build complex forecasting and budgeting models with adequate documentation, are unique features in the PC spreadsheet analysis software market. Nonetheless, many of its concepts have been seen before in mainframe financial analysis languages, and the design of the program limits it to a specific category of forecasting and budgeting problems, so it dipped out on the Award.

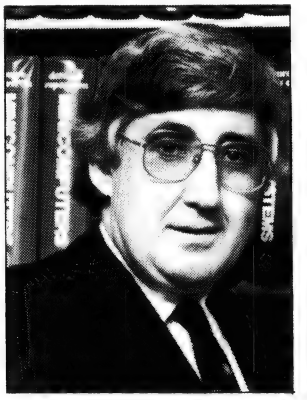
All the Award Panel are what would be considered 'power users', and so we are particularly interested in multi-tasking and windowing environments which allow us to be more productive. DESQview scored well in this area; all the judges felt that it was about as good an implementation of a multi-tasking operating environment under MS-DOS as one was likely to see, given current generation programs which are written on the assumption they will not be in a multi-tasking environment. QuarterDeck Software, the authors, have been particularly quick in updating the package to run in virtual 8086 mode on the Compaq 386, and this lets it perform superbly. Nonetheless, the idea and practice of multi-tasking is not new; what we are seeing here is a particularly good quality implementation, not an especially innovative one.

Now, for innovation, the panel gave the Award to Aldus Corporation for their desktop publishing program, PageMaker. This program, which only reached Australia's shores early last year, has rapidly become the standard against which others are measured. Indeed, Paul Brainerd, the President of Aldus, is the man who invented the term 'desktop publishing.' PageMaker's use of the mouse-driven menuing interface of the Macintosh (and, more recently, Microsoft Windows) is certainly innovative in bringing the power and, most importantly, flexibility of the computer to a group of the population who, a year ago, would never have dreamed of using a computer.

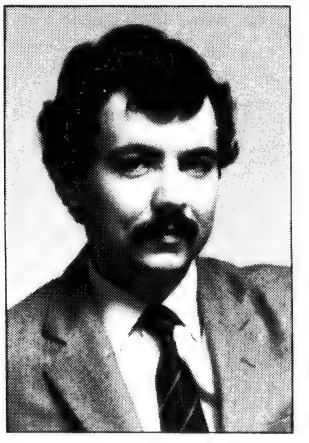
PageMaker has opened up a whole new category of computer users. That's innovation, and that's why PageMaker gets the Software Product of the Year Award.



Dr John Barrett is a lecturer in the School of Education at Macquarie University and writes on education topics for *Your Computer*. He first came into contact with computers at the University of Oregon in 1969 and has been working with micros for over five years.



Len Rust is the managing director in Australia of International Data Corporation, a major US marketing consultancy company specialising in the data processing and communications industries. Part of IDC's brief is to continuously monitor the microcomputer market in Australia, and for some years it has been releasing closely watched total industry sales figures and forecasts.



Les Bell, managing director of Les Bell and Associates and consulting editor to *Your Computer* magazine, has been writing and talking about, building, programming and using micros, since 1975. He lectures around the world on personal computers and related topics, and is widely acknowledged as an expert in the field.

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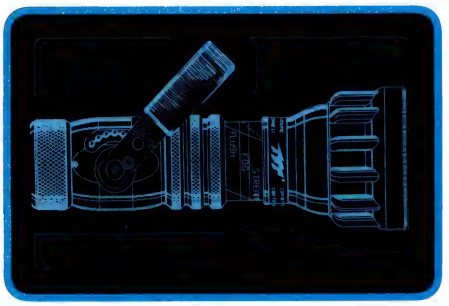

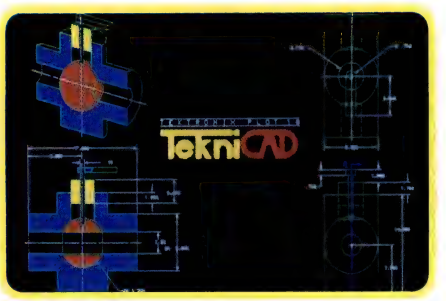

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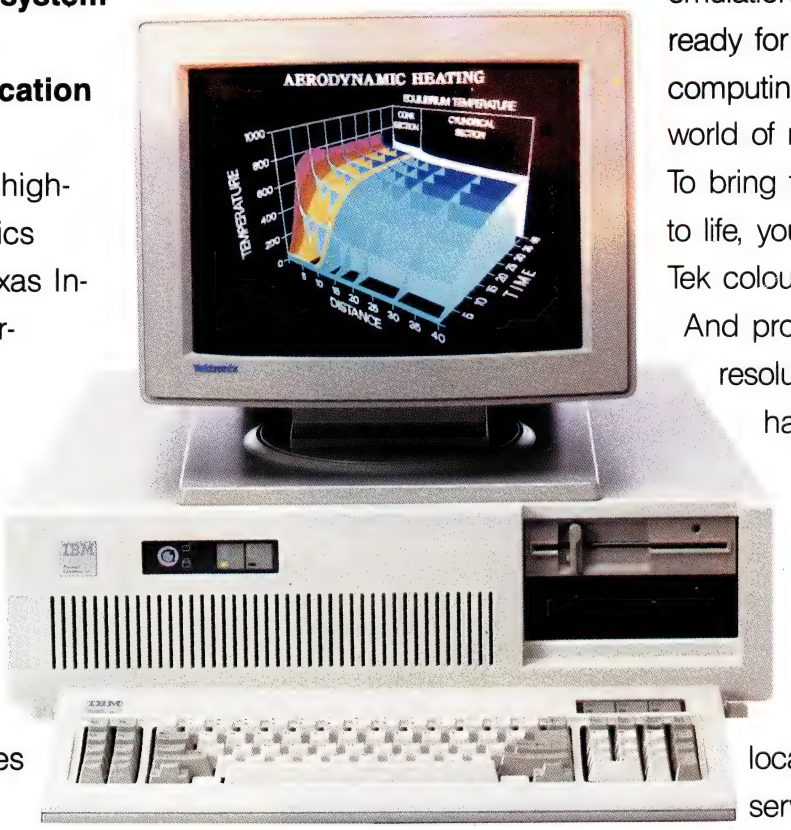

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The Graphics Leader

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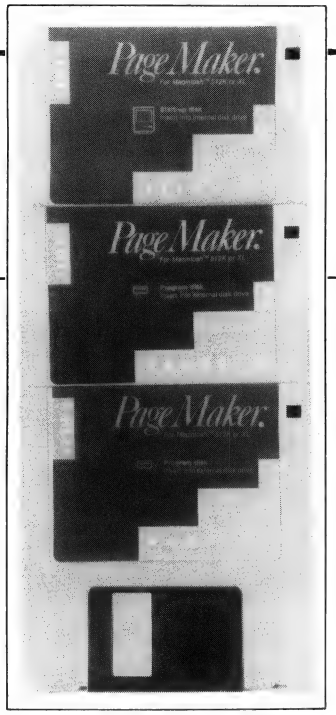
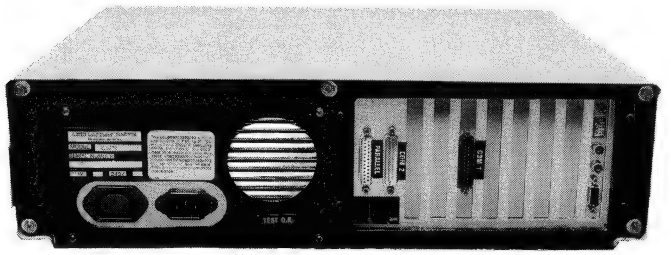
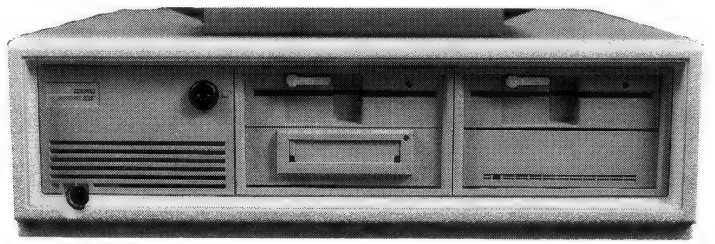
The Winners



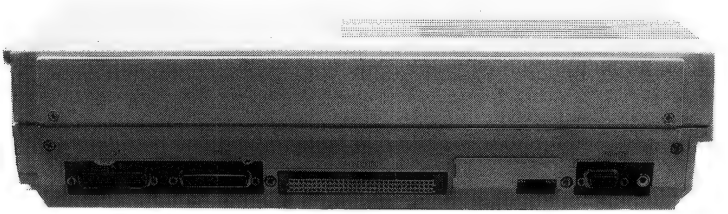
Software Product of the Year: *Some users would go so far as to say that the Mac is the accessory they use with PageMaker — and the new Macs should be even more suitable to this top-end product. Using 19-inch monitors, such as those available from MegaVision and InfoMagic, two full pages the size of the one you're reading can be displayed at full resolution.*



The back of the ECS 286 shows the thought that has gone into the design of this high performance PC: Fitted to the machine are an Enhanced Graphics Adaptor, video connector, a parallel port, and two serial ports.



The front of the Compaq Deskpro 386 comprises a key lock to the right of the logo, with a plug for the keyboard at the bottom left of the first section. The central compartment holds the 1.2 Mbyte A: drive on the top with the 40 Mbyte D: tape backup drive underneath. The right hand compartment features either a 1.2 Mbyte or 360 Kbyte drive in the B: drive at the top, with the 40 Mbyte C: fixed drive underneath.



Chendai have put a lot of thought into functionality and have included such features as parallel and serial ports, composite and RGB monitor ports, and a full expansion bus for connection to an external card chassis.

Australian Hardware Commendation

THIS CATEGORY was no easier to judge the the others. There are a number of Australian hardware manufacturers out there, competing furiously against low-priced offshore-based opposition, and building good products, too. However, there are a few that deserve special mention.

Offcom's Tosbox is a marvelous replacement for the dedicated telex machines, which in many organisations is a bottleneck in their communications architectures. Off-line editing of telexes ties up the machine for much longer than the few seconds required to actually send and receive messages. The Tosbox gets around that problem by providing an intelligent interface between other computers and the telex network. It matters now what you want to connect, though the benefits of the machine are obviously greatest in, for example, DEC Vax-based office automation networks which already have electronic mail and other office automation facilities.

The Tosbox is actually a PC which runs an implementation of Offcom's TOS (Telex Operating System), so it's difficult to say whether it really is a hardware product. Certainly, Offcom's major added value is in the software and interfacing, and is a good example of how an Australian company can leverage off existing hardware as an OEM.

Hypertec has a range of PC-compatible cards which provide the most commonly-requested performance upgrades, such as expanded memory and upgraded video. By starting out as a board manufacturer, Hypertec has been able to gradually build up a considerable array of technical and marketing skills without the massive investment and risk consequent upon becoming a manufacturer of a full computer. Nonetheless, it can only be a matter of time, surely . . . ?

Then we come to Earth Computer Systems, and their 80286-based XT-compatible machines which run at 12.5 MHz. Designing a machine to run at that speed is certainly an engineering feat; contrary to popular belief, getting a machine to run at 12.5 MHz is not simply a matter of buying high-speed versions of the processor and changing the clock crystal. Bus timing problems can appear which are difficult to track down and difficult to design out of the machine; indeed, many of the problems are the same as those faced by the

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AUSTRALIAN HARDWARE COMMENDATION

5th Annual

Personal Computer of the Year Awards

Australian Hardware Commendation: *The Earth Computer Systems* ECS 286 PC/XT *came up trumps with their own processor board, giving 'merely' an* XT *compatible on one hand, and on the other, a machine that is second only to the Compaq* 386 *in sheer processing power. No expense has been spared in design and development, and all aspects, including the hard disk speed, are matched to optimise performance.*

The Commodore Amiga is fitted with an Australian TV standard PAL video output and monitor, making it an ideal toy for the home video enthusiast. Even in low resolution mode, the colour graphics on the Amiga are astounding. Some of the sound and graphics packages available for this machine are so sophisticated that they are being used commercially in TV production.

designers of the Compaq 386.

Solving these problems was quite an achievement for the staff of ECS. Their machine works well, and has been designed so that other components do not limit the processor performance the hard disk on our review model, for example, had an average access time of around 25 ms. This is exactly the kind of machine you need as a file server on a network, for example, or as a DOS-based CAD/CAM machine, and these are the kinds of areas the machine is selling into. A lot of ECS machines are out there running Autocad.

Looking at the engineering problems involved in producing these three problems Tosbox, the Hypertec cards and the ECS machines the panel came to the conclusion that the ECS team had solved the bigger problems and come up with the more innovative product. To cap this off, we learned later of development work at ECS on new products which will further reinforce this, and will probably lead to dramatically increased sales and in particular exports.

Australian Software Commendation

MANY INDUSTRY observers have predicted that our greatest chance of being at the forefront in technology will be in the field of software. Geographical isolation is not as great a problem as it is with hardware, and we have the language of choice as our native tongue.

Even more so than with hardware, the range between the 'up-market' low volume product and the high volume general market product, is quite apparent with software. The three finalists this year could hardly have been more different.

Austec Cobol is an example of a product which has business application and, therefore quite a wide market. Not only does it enter an existing marketplace but it does so with a unique product for the PC programmer and developer. This is the sort of polished product that we always seem to assume must have come from the US.

Already, this locally written package, and associated products, have gained high praise and (more importantly) export orders from around the world.

XL from ISR is an even more specialised product than Austec Cobol but it represents the type of software which may be the bread and butter of tomorrow's programmers. Ask most people in the street how artificial intelligence can help them and they will be hard pressed to find an answer, but it's a sure bet that they will find themselves daily interacting with smart computers in the near future.

An expert system, such as XL, allows you to create, and can give us countless clones of an expert in any field. No doubt, in time to come computers will patiently assist students to learn, technicians to fault-find and doctors to diagnose. These are only some of the countless applications where artificial intelligence software allows a human expert to impart his skills, experience and reasoning to a machine. While not intended to replace the human expert, the expert system allows the knowledge to work 24 hours a day, seven days a week and in multiple places at once, as well.

Much has been reported about the Japanese striving for artificial intelligence yet this Australian developed system is not just an experimenter's plaything but a commercially viable product. It's already being used by industry in Japan as well as elsewhere in the world. ISR is winning valuable export dollars for Australia with this top class software product.

Supercom differs from the previous two products because it has the potential to sell not just thousands, but millions of copies world wide. We live in the age of communications and this product has the qualities which lead to success.

It works — so many PC software products work best as descriptions on the marketing department's handouts. They sometimes even possess qualities on paper which have never been part of the product. Supercom works effectively, without fuss and without failure.

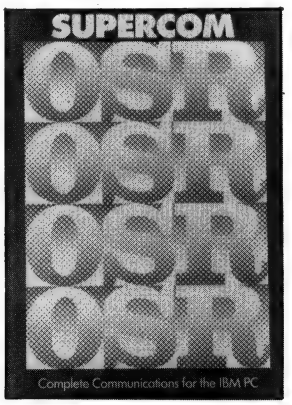
It has all of the asked for features — PC users are becoming quite sophisticated in their tastes and know just what they can expect, and just what they want, from a product. Gone are the days when vendors could hawk a poorly optioned package which was only one step above a simple home written Basic program.

Supercom has every feature that you could imagine, ranging from full Viatel support (including frame capture and playback), to automated operation under script. The 'photostat mode' even allows remote control of one PC by another for diagnosis, system development or whatever. Even speed hounds are catered for as this package will operate at data rates from 75 to 38,400 bps.

Price — at $199 Supercom is an affordable PC software product which is more than competitive with anything on the market, feature for feature.

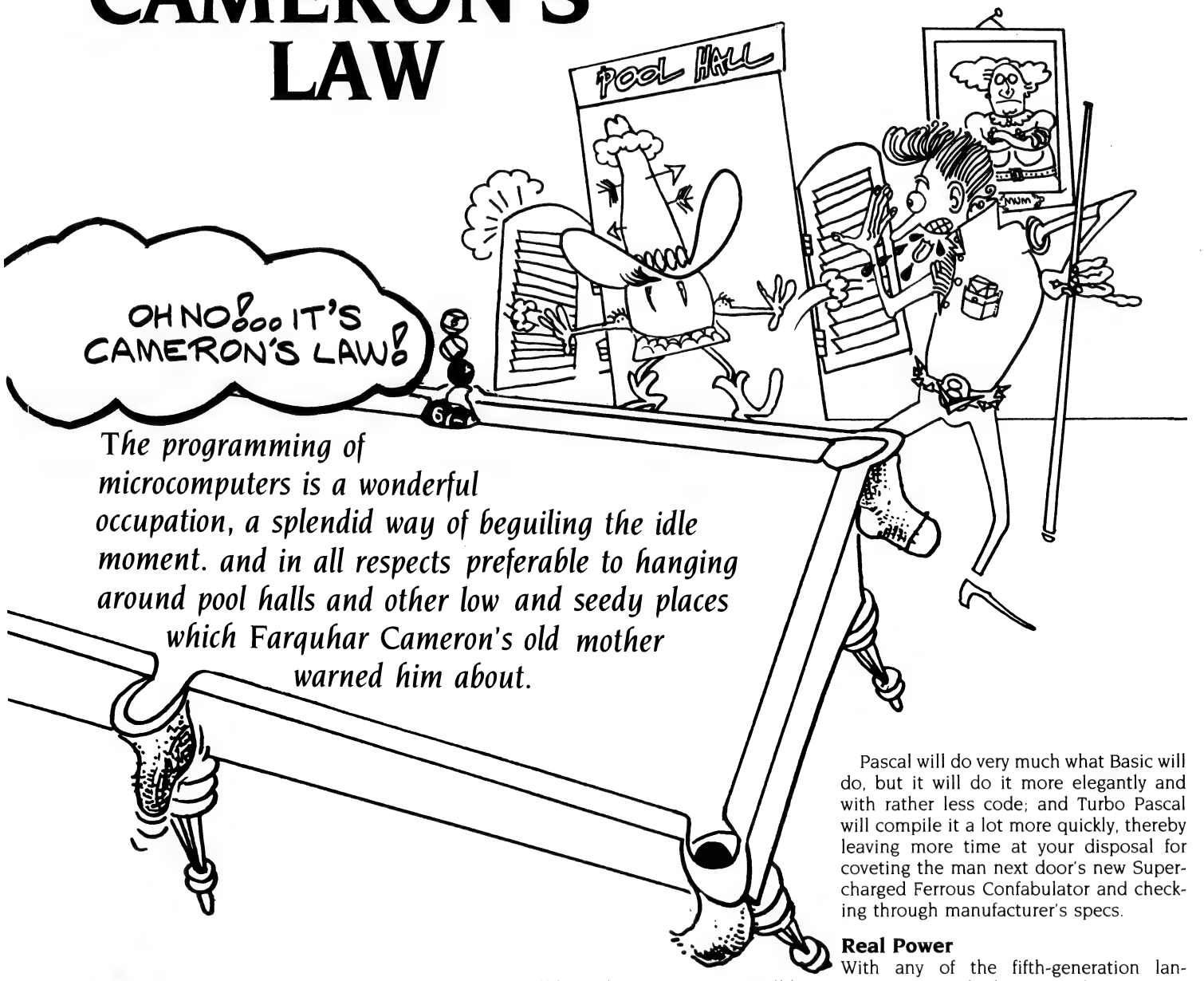
These features, as well as the high standard of presentation and support provided by the manufacturers OSR, make this the judges choice and winner of the Australian Software Commendation. □

```
trace off                ;see program execute
name viatel.cap          ;capture frames to new file, VIATEL.CAP
display viatel           ;set display mode to VIATEL
setloop 10               ;do ten times
:outer                   ;label
wait until 16:45:00      ;wait until 16:45
flush                    ;trash any characters in buffer
:lab1                    ;label to jump back to
dial viatel              ;dials viatel, sets global error flag
iferror lab1             ;loops if error flag was set by DIAL
wait for "ID"            ;waits for string "ID" from viatel
/ "~1~1~1~1~1~1~1~1~1~1"   ;send your ID number,1 sec delays are
wait for "PASS"          ;required by XICON modem,
/ "~1~1~1~1~"            ;send your password
capture 300              ;capture to disk until 3 sec time out
frame 42444              ;get frame 42444 (IBM products frame)
frame 747                ;get frame 747 (Qantas frame)
frame 90                 ;log off viatel
loop outer               ;goto :OUTER 10 times
quit                     ;quit to DOS
```



Australian Software Commendation: *Supercom II is a feature-packed communicator with speeds from 75 to an impressive 38,400 bits per second. As an example of the features available, the above Supercom program waits until 16:45, calls up Viatel, logs you onto the system, grabs frames 42444, 747 and 90, saves these to a disk file (Viatel.cap). Supercom then logs off Viatel (retrieving frame 90 logs off Viatel). The program then sleeps until the same time the next day. This is repeated for 10 days.*

CAMERON'S LAW



The programming of microcomputers is a wonderful occupation, a splendid way of beguiling the idle moment. and in all respects preferable to hanging around pool halls and other low and seedy places which Farquhar Cameron's old mother warned him about.

NOW, THERE IS NO lack of choice for the language shopper. Indeed not. To name but a very few, you can go for Basic in any one of its manifestations; you can go for Pascal, also in an assortment of shapes and sizes; you can go for one of the dBase languages, II, III or III+ (and if you have an historical bent, you can check out what happened to I); if you're really serious about it and you have a hell of a lot of time to kill, you can get stuck into C; or you can abandon the primitive procedural approach to programming altogether and hit one of the fifth-generation jobs, Lisp or Prolog.

They all have their merits. Basic will let you knock off quick-and-dirties to print the whole character set to screen, which is always useful, or write benchtests to work out how fast your pet is compared to the neighbour's and thereby assist you in reaching a balanced and informed decision as to whether an upgrade will run the benchtests faster. Any of the various dBases will do you a very nice line in customised relational databases — a listing of newly released computers, perhaps, showing their respective speeds, their price over a representative spread of shops and the real savings involved after petrol costs have been taken into account.

Pascal will do very much what Basic will do, but it will do it more elegantly and with rather less code; and Turbo Pascal will compile it a lot more quickly, thereby leaving more time at your disposal for coveting the man next door's new Supercharged Ferrous Confabulator and checking through manufacturer's specs.

Real Power

With any of the fifth-generation languages, you're looking at real power. You can enter the details of your ancestry even unto the beginning of all creation and your Lisp program will tell you whether your sister really is your sister and whether it follows that she is your aunty's niece. Or you can key in all the various characteristics of giraffes, wombats, tapeworms and iguanas and your Prolog program will indicate which of these animals your sample is. I'm not very sure what C does — I play a good deal of pool, so I've never had the time to get stuck into it — but I am reliably assured that it does it with great style, although it is by all accounts fiendishly difficult.

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And of course, once you've learned your language, written and debugged your program, you can build all manner of frills into it: there is no lack of toolbox applications of one sort and another which will allow you to incorporate windows and graphics, plaster the monitor with menus and help screens, and play the Death March from Saul at appropriate moments.

All of which is entirely wonderful.

But (and the perceptive reader may have been led to suspect from the general tone of the foregoing that there was a 'but' in the offing) in all conscience, do we really need all this? From the point of view of intellectual development, there is nothing wrong with this wild luxuriance of programming languages — as an ex-teacher, I am entirely in favour of the mental discipline entailed, be it in their devising, in their learning, or in their skillful marketing. But, from a utilitarian point of view, there seems to be some room for scepticism — is this abandoned efflorescence really necessary?

After all, there can be very few applications for which a commercial package is not already available. If you have a deep need to corner the market in dried plums, for example, there are powerful spreadsheet programs to help you plan your strategy, powerful database managers that will show just how many dried plums you've got at any given moment, online databases to tell you how many you still have to go and powerful word processors with mail-merge facilities wherewith to write gloating letters to dried plum retailers. If you're not satisfied with the commands on your word processor or your database or your spreadsheet, you can get a macro program to change them with, and if you don't like the macro program's commands, you can get another one to change them too.

Movie Databases

If your needs are more specialised, there is still no dearth of choice. If you're into movies, you can buy a movie database; if you're into cooking, there is a wide selection of cybernetic cook books to choose from; and if you're just insatiably bloody nosey, you can get an encyclopedia on compact disk. If you're a dentist, you can buy a dental surgery package. If you want to balance your cheque book or keep track of the stock in your restaurant, you can buy programs to do either. If you've just opened a mortuary, you can get software that will keep a tally of all the stiffs you're likely to be entrusted with. And if you're short of cash to invest in any of these, a few discreet enquiries will soon unearth a useful address in Singapore or Hong Kong, if not a source closer to home.

I'm not very sure what C does — I play a good deal of pool, so I've never had the time to get stuck into it — but I am reliably assured that it does it with great style, although it is by all accounts fiendishly difficult.

Nonetheless, there is clearly a substantial market for programming languages. Both Turbo Pascal and Turbo Prolog are best sellers, I understand, while the number of versions of Basic offers ample testimony to the commercial viability of writing programming languages.

One is ineluctably driven to wonder what on earth people do with them. Stubborn individualists we will have with us always, of course, and no doubt there are a few rugged stalwarts who adamantly refuse to have any truck with off-the-shelf software and are diligently engaged in the writing of their own financial modellers. Americans, to judge from the number of fifth-generation languages available in the US, are getting into spare-time taxonomy in a big way.

A certain number of people buy programming languages in order to learn to use them and write books about them so that other people can learn to use them, and some of the latter may even write better books. A few individuals use programming languages to write programs to sell to other individuals, which is quite reasonable and no doubt good for the economy. But that still leaves a powerful lot of language buyers unaccounted for: most people are demonstrably not stubborn individualists. Nor, it seems fair to say, are they professional software writers. And even if they were, I am not prepared to believe that professional software writers constitute the bulk of the market for programming languages — I'm quite sure the lads at Lotus don't pop down to the corner store and pick up the latest upgrade of OPS when they want to knock off a new release of 1-2-3.

Cameron's Law

To return to the point, however, the above considerations have led me to the formulation of Cameron's Law. Cameron's Law states that if there is a market, M, such that M comprises all microcomputer owners, and, if there is a number of microcomputer programming languages, L, then L will increase exponentially and will approach M at an alarming rate determined by a third variable, V, which is defined in terms of the number of pool halls still in business. And with microcomputers selling like nobody's business and with the traditional pool hall being supplanted by computer versions, the conclusion is inescapable that within a very short time L will equal if not exceed M. This will be very gratifying to software reviewers, of course, and entirely to the liking of my old mother, but whether it will in any other way be a good thing is, as I have tried to suggest, somewhat dubious.

What can be done about it? How are we to halt the onward march of Cameron's Law and avert linguistic catastrophe and all the ills associated therewith? For, mark my words, if things go on this way, we shall soon find ourselves in the computing equivalent of the Indian subcontinent, where banknotes are printed in 13 different languages (including Sanskrit, the natural language equivalent of assembly code) and where many people aren't sure what to speak from one day to the next. We shall find individuals attempting recursive chaining in Logo and our psychiatric hospitals will be packed with confused souls who have sought to use stack-groups in Cobol.

To my mind, there is only one answer: we must declare an immediate moratorium on the composition of any further microcomputer languages and dialects of the same until we have decided what to do with the ones we already have, condign punishments to be ordained for the incorrigible. And in the meantime, we must — arbitrarily if necessary — settle on one language and one language only for all applications, preferably a very difficult one (after all, the more difficult the standard language, the less rubbish there will be around the place). Myself, I would opt for C — my old mother always was most concerned about the moral dangers of pool halls. □

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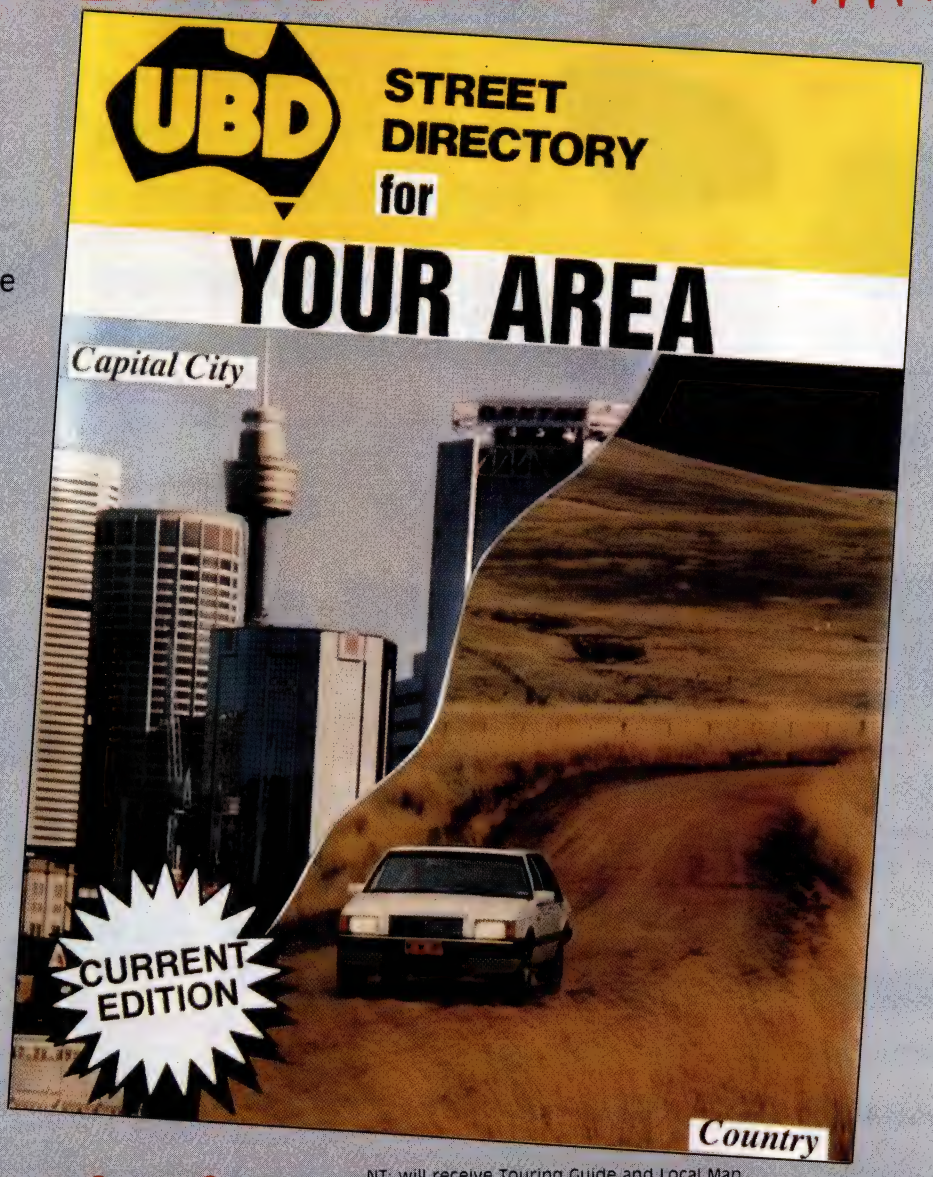

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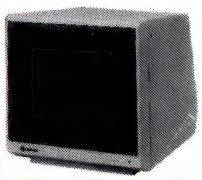

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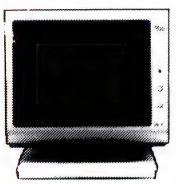

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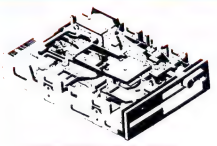

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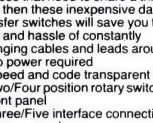

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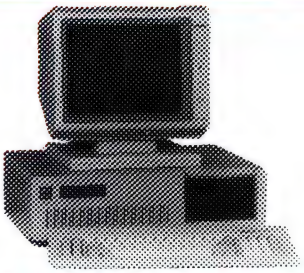

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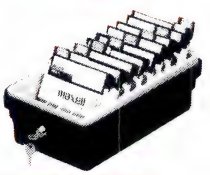

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PRINTERS

Part 1

In this two-part feature, we look at the different types of printers available and a selection of each type. Whether you're a hobbyist or a corporate image-builder, we'll help you find the machine that suits your needs. This month we cover the omnipresent dot matrix printer and that result of human curiosity and ingenuity, the ink jet printer; then, we finish with a sample of obsolescence: the thermal printer.

This month: Dot Matrix, Ink Jet and Thermal Printers

THE VARIETY OF printers (and printer types) available today can be mind-boggling to the uninitiated. The competition is fierce enough to confuse even those who have run the gauntlet and found a computer that suits their needs. When going through the trials and tribulations of finding a printer, keep in mind the demands you are likely to place on the printer. As you listen to the sales spiel in the showroom (or read through the brochures) on the latest, state-of-the-art mega-features, just keep asking yourself: How often will I use it and much will it cost? We can all *imagine* uses for a $20,000, four-colour laser printer, but even in the office, most of us only need a mid-range dot matrix printer, at best.

The Printer Market

In 1986, the world printer industry was worth a staggering US$3 billion — that makes it as big as IBM and DEC put together — and it is expected to grow to more than US$6.5 billion by 1990. Roughly, that works out to 20 million printers sold in '86 (10,050 in Australia) and new models were appearing at a rate of one every three days (Things appear to be hotting up: in 1985, a new model was released every *four* days.)

All in all, not bad for just a 'peripheral!'

A recent American survey of their domestic printer market as listed 43 brands of printers with almost 300 different models. In Australia we found that almost 200 models were available under 62 different brands — that's a classic case of overservicing the market. And, *that* helps explain why products that require expensive technical support, like printers, are so relatively expensive here, since the cost of the support has to be spread over the number of units sold.

Micro Storeboard, which keeps track of the local computer industry, found that in 1986, dot matrix printers commanded a

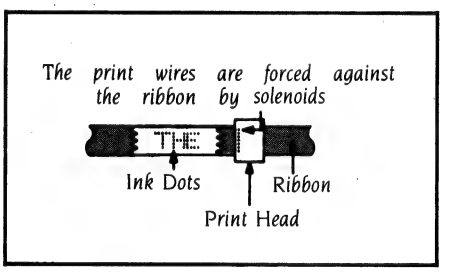

Figure 1. *The print head of a dot matrix printer holds a number of small solenoids, each of which is attached to a print wire. When the solenoid is activated, it fires its wire against the ribbon which is pushed against the paper leaving an ink dot. Characters consist of a number of these dots arranged in a 'matrix' (see Figure 3). The wires and solenoids, and their springs and guides, are pieces of precision engineering that are called upon to work hundred of times a minute — when buying a printer, this is an area where quality counts.*

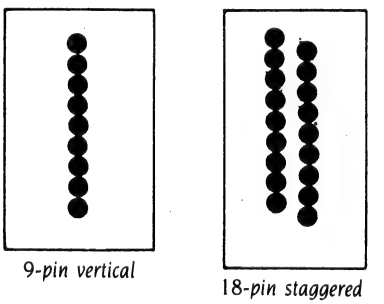

Figure 2. *Dot matrix printers are classified by the number of print wires, or pins, in the print head. Generally, the more pins, the higher the quality of the printing. Shown above is the standard vertical, 9-pin arrangement, and an 18-pin staggered configuration.*

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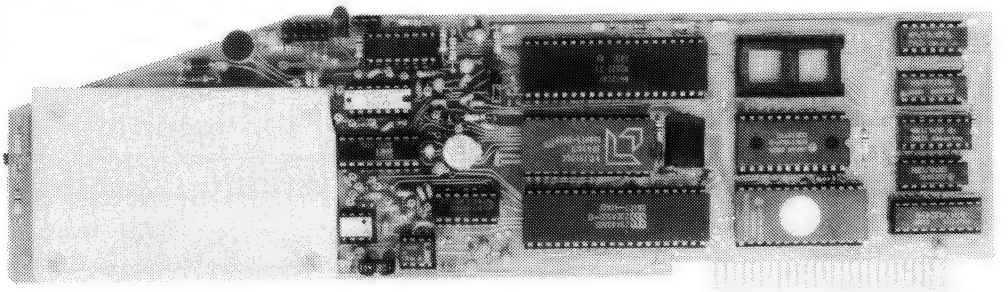

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Sending/receiving files is very simple:—
— Press "ESC" to display menu.
— Select "(S) END A FILE" option
— Answer the prompt "FILENAME?:"

The modem will search the disk for the file, make all the decisions (e.g. binary, basic, textfile, DOS 3.3 or ProDos) and transmit it in the correct format. <CR> transmits the file in memory. Similarly to receive a file select "(R) ECEIVE A FILE" option.

* AUTO ANSWER — AUTO DIAL. Senses true dial tone, ring tone, busy tone and acts intelligently, returning status messages. Characters can be included in the phone number to set baudrate, pause, "await dialtone" and multiple redial on busy. On answer, it selects the incoming baudrate by precision frequency measurement. This is much more reliable than the normal autosearch using carrier detect which is often confused by voice and phone tones. A reliable autosearch is a must for bulletin board operation.

* 300 Baud full duplex or 1200/75 and 75/1200 with fast automatic line turnaround. An upgrade kit to add V22 (1200/1200 baud) and V22 Bis (2400/2400 baud) will be available later.

*Main menu option "(V)IDEOTEXT" shows the VIATEL menu. It becomes a full graphics VIATEL terminal, automatically dialling and transmitting the user ID stored in the battery backed ram. When online, a keypress will immediately save pictures to memory. These can be reviewed later and selectively saved to disk or printed (requires a graphics printer card). Pictures can be loaded from disk and printed out. The modem can act as a videotext host and can be programmed to act on frame information. e.g. — use the clock to ring "MONEYWATCH" hurly and dial you at the office if your shares move outside a given range.

* TELESOFTWARE DOWNLOAD facility to purchase programs over VIATEL from suppliers such as MICROTEX 666 and TANGO.

* A full wordprocessor in EPROM for pre-composition of text before transmission. It can also be used to edit or print received files as well as for general wordprocessing.

* Onboard battery backed calendar clock can time and initiate calls or keep an activity log. ProDos uses it to time and date disk files and it is accessible from Basic.

* 2Kx8 battery powered CMOS RAM stores default parameters, phone numbers, ID, password, logon strings, search codes and setup parameters (e.g. baud rate, parity, printer ON) for each number, allowing single keystroke call establishment to specific areas of complex databases. Main menu option "(T)ELELIST" displays the list of 23 names and one is selected.

* Incorporates XON/XOFF and CHRISTENSEN error correcting protocol. Textfiles are not so fussy but error correction is a must when transferring program files. A debug function can display normally invisible control characters sent by the host.

* Can output directly to printer even when online at 1200 Baud — a fast printer is not required as the printer is spooled out of the receive buffer. A "FILTER" function is available to remove screen control characters from textfiles (these can drive a printer crazy). Special scroll routines print to 80 column screen and printer at 1200 Baud without any lost characters.

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* If you have previously purchased this modem and have not yet received an updated EPROM VERSION V2.18 and a manual, contact AUTOMATIC ICE CO. — there is no charge for these.

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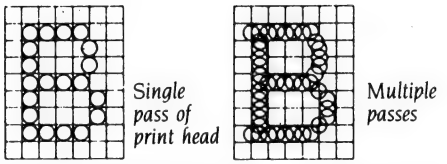

Figure 3. *Characters are formed as the appropriate wires are pushed against the ribbon and the print head moves across the paper. The quality of the print is determined, to a large degree, by the 'dot density' — the greater the density, the darker the character will appear. This can be accomplished either by multiple passes of the print head across the line (which dramatically reduces the printing speed), or by using more pins (with smaller diameters) in a staggered arrangement.*

phenomenal 91.5 per cent slice of the market; lasers, 3.9 per cent; daisy wheels, 1.7; ink jets 1.7; and thermal printers, 1.2 (No mention was made of plotters in the survey). This year should see laser printers increase their share as desktop publishing packages become more established — and the competition gets rougher. (The much-rumoured, four-colour, 30 page per minute, laser printer should hit the market in the third-quarter of this year with a price tag of $18-20,000.)

As listed by Micro Storeboard, the the most popular models of dot matrix printers in 1986 were the Epson LX86 with 20.5 per cent of the market; the NEC P7, 10.8 per cent; Apple Image Writer II, 7.9; Star Micronics NX10, 7.6; NEC P5 6.5; Epson FX105, 6.3; Star SR10, 5.6; NEC P6, 4.8; Epson GX80, 3.4; Brother 1509, 3.1; Brother 1109, 1.3; and others, 22.2 per cent.

Dot Matrix

Alias impact printers, these machines have been available since the early seventies when the Centronics 100 series was first released.

The print 'head' of a dot matrix printer holds (most commonly) 9 vertically-aligned pins that construct each character within a 'matrix.' As the head moves across the page, the appropriate pins are 'fired' against the ribbon which is pushed on to the paper. Multiple passes across the line can be used to form more solid-looking characters, which is the common method used to give the much-vaunted 'near letter quality' (NLQ). Heads are just about to become available with 32 pin placements — these will give a greater dot density which makes each character look darker and also offer greater graphics versatility; since only one pass at the line is necessary, machines with these heads can generally print higher-quality, faster.

The first operation of any printer is to receive instructions from the computer on how the text is to be distributed on the page, then the text follows. A feature of many printers these days is a builtin buffer (memory) which allows the printer to act as a storage base for the text. Since the computer can send text to the printer *much* faster than the printer can print it, slow printers can unnecessarily tie your computer up — the buffer lets you carry on computing.

The matrix machines may sound spectacular, and offer many outstanding features, often at a never-to-be-repeated special price, but you have to keep in mind just what your requirements are. If you are overworked and underbudgeted, there is probably a dot matrix machine that will suit your needs. And remember, if you are printing for your eyes only, the quality isn't so important, as long as the print is legible.

As mentioned above, dot matrix printers hold over 90 per cent of the market; whether or not they hold that share will depend on the ingenuity of the r&d departments.

Dot matrix technology shook the world by its printer cables when Centronics offered their line with its astounding versatility and speed, compared to the slow and noisy daisy wheel machines that were then the market leaders. Matrix printers are now reliable workhorses, providing fast printing and relatively good graphics output, combined with reliability.

At the low end of the matrix market, for those who only want something to print out a program for *Pocket Programs* or run off a copy of the recipe database, there are

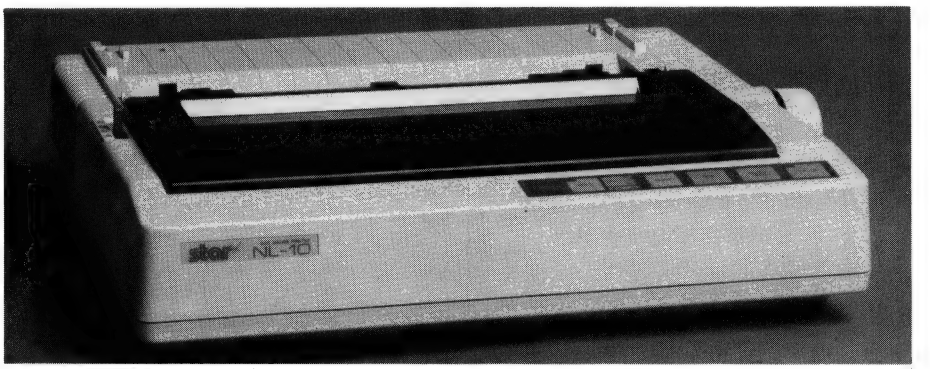

Figure 4. *The Star Micronics NL-10 is aimed at the budget-minded home-user; considering the price, it includes some nifty design features. One of these is the ability to place the print head anyplace on the page by using the control panel: this makes it possible to print multiple columns of text side-by-side or to caption illustrations.*

Figure 5. *The Apple ImageWriter II is completely compatible with any of the Apple range of computers. It can print in three different speeds and in colour (with an optional colour ribbon installed).*

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9-pin machines available for under $200 that would fill the need. But remember, printers are like most other things: you get what you pay for. It won't take long to wear out that $200 printer if your going to set it printing in bold for hour after hour, day after day. But, there are plenty of 9-pin machines available (still under $1000) that are workhorses and they are perfectly suitable if quality of print is not an overriding concern.

The more expensive 18- and 24-pin printers (they start from about $1000) can produce near letter-quality text in different fonts and generally work less hard at it then their 9-pin brothers. Those become interesting if print quality is important, say in an office where it will be used for correspondence as well as the more basic internal reports or simply printing hard copy for security. The best of these machines will produce letter-quality text that will fool all but the most fastidious observer into thinking the job was done on a daisy wheel or laser.

To help you understand printers and the sales talk you'll hear when shopping, we've taken a brief look at a variety of machines that cover the spectrum of what's currently available. The machines were chosen on that basis only and inclusion (or exclusion) of a particular printer is, in itself, not a comment on the printer. The prices quoted for each printer are approximate only — they are only intended as a guide to what is currently being offered for a particular price. So — while we haven't done your shopping for you, we hope we've made it easier. (If you're shopping for a computer too, don't forget Rose Vines' *We Can't All Own a Winner*, sub-titled 'A procrastinator's guide to buying a computer,' which appeared in our March '87 issue.)

The Star Micronics NL-10

The Star Micronics NL-10 is aimed at the budget-minded home-user's market; considering the price, it includes some nifty design features. The NL-10 is styled similarly to the standard-setting Epson FX series of compact printers — a well-proven design — with the additional feature of automatic paper loading, which the FX lacks. Paper loading is simply a matter of lining up the tractor-feed pins and watching the paper slide perfectly into place.

The paper guide, which works for both single sheets and for fanfold paper (although the method of operation is different for each), attaches securely to the printer body, despite the noticeable side play. Like many printers, it won't work if the cover isn't in place (a safety feature which ensures nothing gets stuck or drops in to the printing mechanism while it's running — and that mechanism gets *hot*). The cover is well-designed and drops easily into place even without hinges — if it's not in place, a red LED flashes on the control panel.

The manual is well-written with ample, clear illustrations. A card, provided separately from the manual, gives instructions on which buttons on the touch-sensitive are pushed to call up various features. (At first glance, it seemed as if you needed to be able to play concert piano to work the panel, but the commands all proved to be simple, and only need two fingers.) These features include margin settings, a forward and reverse micro line-feed which is *very* handy if you're trying to line up pre-printed forms, and mode settings for top-of-the-form, and left and right margins. Features like these are usually seen only on printers costing twice the price of the NL-10.

Unlike many printers designed for home use, this machine has ports to accommodate various parallel and serial systems. Surprisingly, there's a printer interface cartridge supplied. (Different cartridges are used to interface the printer to different types of systems — these minimise the time-consuming and troublesome installation procedures that are often needed with printers.) And a further surprise, installation of the interface is a snap — it slid easily into a slot on the back of the machine; with a snap and the tightening of a single screw, the cartridge was tightly in place. The printer was now ready for action and proved to be completely IBM compatible.

Print quality is good in draft mode, and the sharp, business style near letter quality (NLQ) mode was attractive. There is no option for NLQ proportional print, but you can't have everything for this price.

The forward and reverse modes proved useful for printing several columns of text side by side or printing a graph and then inserting captions and legends. Using the control panel, the print head can be moved to any place on the page.

The control panel can be used to change modes regardless of what print commands may be in the document being printed. It's possible to select bolding,

Figure 6. *The sleek, low-profile 9-pin Genicom 3210 features an unusual rotary selector (seen to the right of the touch-sensitive control switches) that's used for setting fonts, page length, modes and characters per inch.*

Beware if you are buying a printer on the basis of speed: there is no set standard between manufacturers for testing, print speeds. The only way to compare the speed of different printers is with your own test document, which should be representative of the job the printer's intended to be used for.

draft mode (with 80, 96 or 136 character per line), and NLQ mode (80 characters per line) this way.

The Star gives a healthy 72 characters per second (cps) in draft mode but a relatively slow 18 cps in NLQ. But even when it was working at its hardest only ten feet away, it was still possible to continue writing. (A figure of 80 decibels is quoted for the machine working in draft mode. Generally, printers average 72 dB.) ~$750

Apple ImageWriter II

The first thing any one notices about the Apple ImageWriter II when taking it out of the box is its weight — it scales in at a hefty 25 kg. Its lines however are sleek and smooth, with Apple logos jumping out of an otherwise streamlined box. Set up is easy, as the machine is designed to couple with one of the range of Apple or Apple Macintosh computers.

When you open the smoke-coloured printer cover, there is a straight forward matrix layout underneath. The ribbon cassette clicks in and out of its mount easily. An LED on the control panel informs you if the cover is not positioned properly (and that's probably the reason it's not printing after you've been waiting for five minutes).

As Apple say in their manual, the IW II can print *up to* 250 cps in draft mode. At least that's honest as the machine slowed down considerably when text was sent through which had several font changes. The front panel provides switch-selectable modes for draft, a 'correspondence' mode that prints up to 180 cps, and a NLQ mode with 45 cps.

The buttons on the front panel are unforgiving to those users who have big clumsy fingers, although operation is straight forward enough and well-documented in the manual. The manual proved to be very informative overall, but some of the information is scattered and takes some finding.

When the IW II was powered up and set

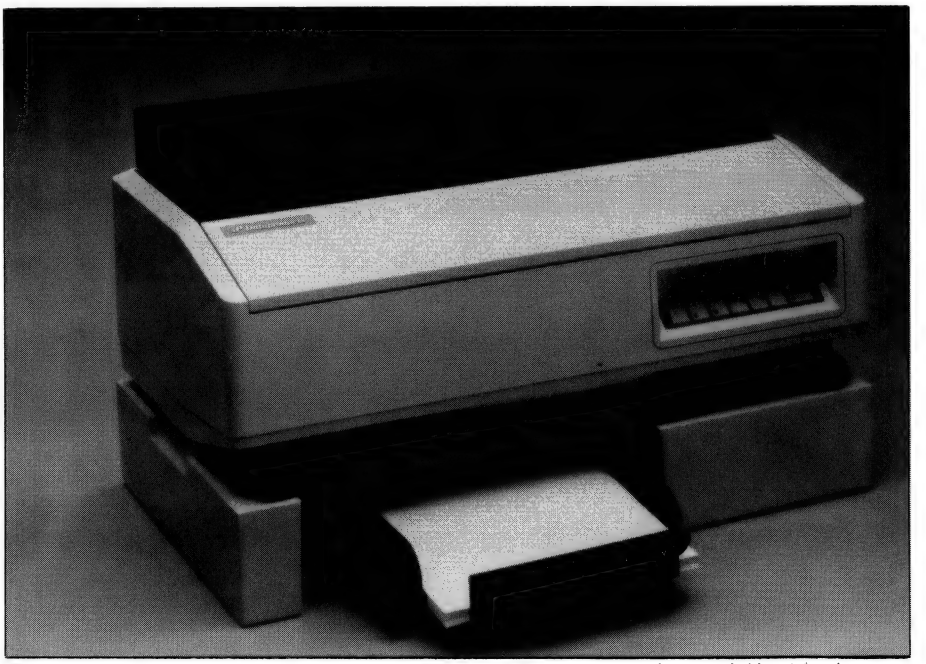


Figure 7. *The Dataproducts 8070 Plus is an 18-pin, 200 cps text cruncher, available with colour. Beneath the printer, is the optional paper feeder.*

Figure 8. *An example of what you can print with $20,000 — in the next few years we should see affordable printers matching the colour, quality and resolution of the AWA CHC-65 thermal printer, a truly 'professional' printer.*

to work, it proved itself comparatively quiet, with a decibel rating in the mid-60s. The output from the printer was very clear and readable, although slant characters such as an upper case 'A' or 'W' showed a telltale wobble.

With graphics output from a Macintosh Plus, the ImageWriter lived up to its name and produced dark, well-defined graphics with no hiccups, and produced them fast. The printer accepts single form feed or pin feed with the easy detachment of the back panel. ~$1200

The AWA MP 1300 AI

The MP 1300 AI is a basic 9-pin, dot matrix printer with an 80-column wide carriage and optional colour printing — and it does exactly what it's supposed to do.

Installation is simple, unless you have the optional colour feature. In that case, you must jump across two manuals, which is awkward and unnecessary. The main manual, though is very informative and includes clear instructions, descriptions and many examples on how to use the printer's functions, including examples of colour printing. A feature from the bottom of the box that other companies could look to introduce is a booklet titled *Printer Features for Beginners*.

Figure 9. *The Tektronix Tek 4696 ink jet printer produces vivid graphics with a resolution of 120 dpi and takes about 3 minutes to print an A4 sheet with graphics like that shown above.*

As standard equipment, there is a unidirectional tractor-feed unit for continuous stationery as well as an automatically loading single-sheet feed.

The MP 1300 AI doesn't dawdle with a draft speed of 119 cps and a NLQ of 41 cps. Print quality is acceptable, but the 9 pin-head is a limitations for those who want as-close-as-you-can-get-to letter quality from a matrix printer. In colour graphics mode, it prints reasonably well,

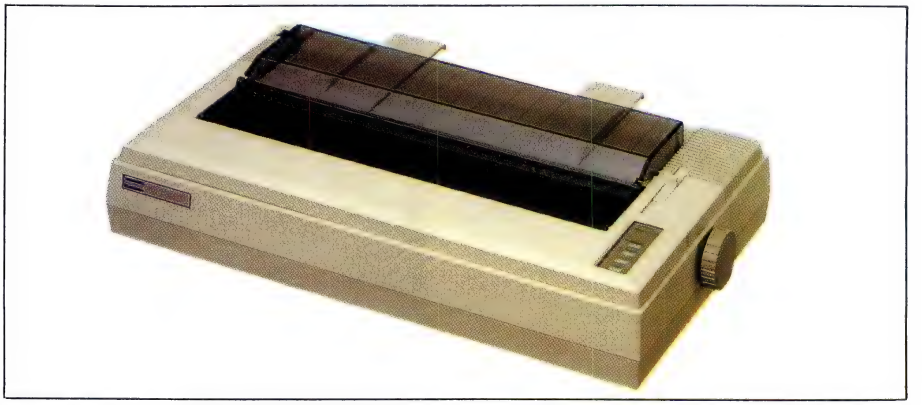
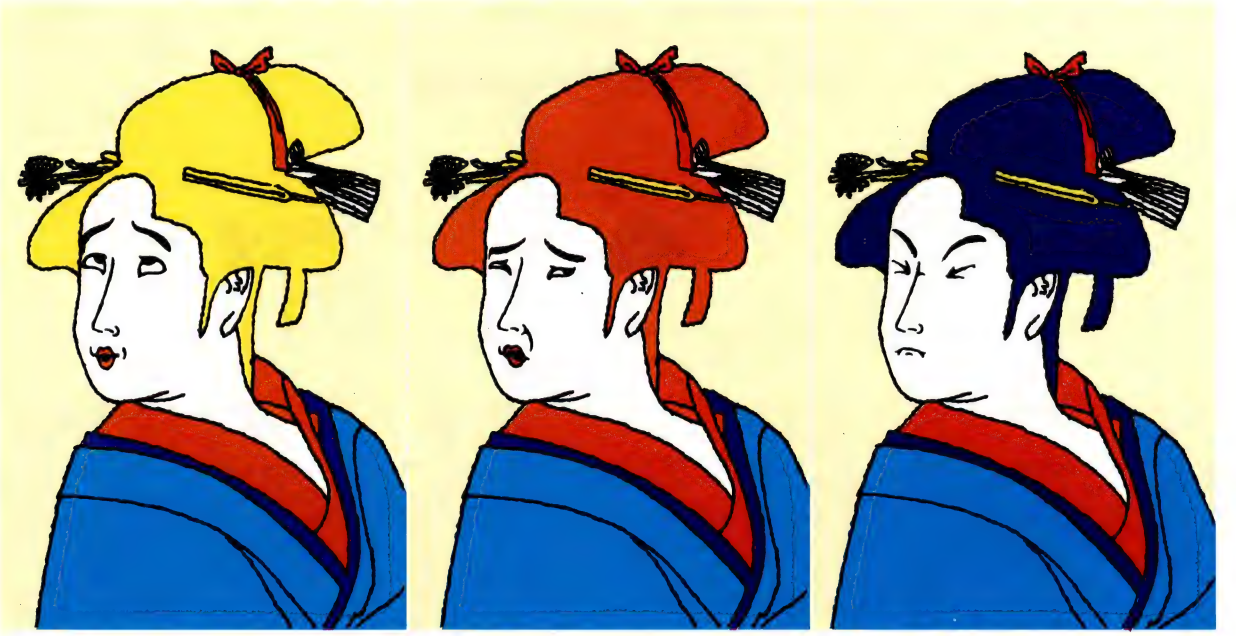


Figure 10. *The 136-column Fujitsu DX2200 is a 9-pin colour printer. Although it uses a four-colour ribbon, like many printers, it can actually print seven colours in standard configuration.*

The DL 2400/2600 print quality graphics easily.



The hard part is choosing the colours.

The Fujitsu DL 2400/2600 offer you high resolution printing for crisp, clear images in eight colours, programmed internally to make colour changes easy.

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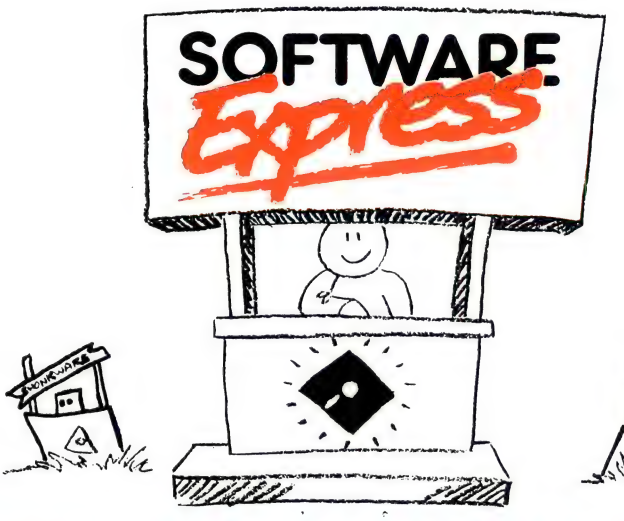

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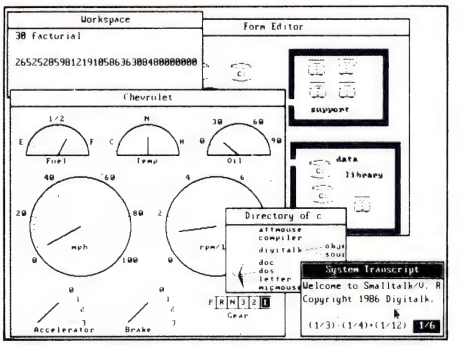

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Figure 11. *The Epson EX-1000 is an impressive 9-pin machine that comes close to producing the quality expected from 24-pin heads.*

and not too slow. It emulates the Epson printer family (which means that any computer worth buying, will probably support it) and IBM's 5152 Graphics Printer and Proprinter.

AWA has ensured that the MP 1300 AI is as 'compatible' as possible by giving it both IBM's high- and low-order character set. Low-order characters (ASCII codes 0 to 127) are letters, numbers and symbols on the keyboard; high order characters (ASCII 128 to 255) include line and box drawing characters that can be used for *non*graphics drawing. ~$1300

Epson EX-1000

The Epson EX-1000 proved to be an impressive 9-pin machine which looked as if it was trying to emulate the quality of 24-pin machines, and it comes close. Epson printers are the standard-setters in the industry, simply because, like IBM in the computer market, they are the biggest. For that reason, as mentioned above, most printers that can emulate an Epson model, can probably be driven by just about any computer. As a matter of fact, IBM market a slightly modified Epson under their own name.

The EX-1000 is marketed as a high speed, high quality machine — and it is, compared to others about the same price. When set running in draft mode, it moved along at over 120 cps (it's rated at 300). NLQ speed is another story, but the quality of the print can't be faulted. While it could hardly be operated in a church during prayer time, it was amongst the quietest of the printers we've seen — except when it's first turned on: the print head jumps to attention with a sequence of dance steps, rattles a bit, and then slides into startup position.

The front panel presents a refreshing rose-coloured display of eight buttons. Using these, a document can be printed in draft type, Roman and NLQ mode's sans serif style; any of these fonts can be printed at 10 or 12 cpi, or in proportional pitch; and any of those combinations can be condensed. The easy selection of styles can make life a lot easier if you want to print letters one minute and spreadsheets the next — operating in condensed mode at 12 cpi, most spreadsheets fit comfortably on a 132-column page.

Around the back of the machine are two banks of eight DIP switches. In addition to the normal use for DIP switches (setting baud rate, foreign language character sets, parity and so forth) they are used to select italic characters (*italics* are an Epson speciality), the IBM graphic set, Epson's Standard Code for Printers and IBM printer emulation.

There is a relatively inexpensive colour option with the EX-1000. Colours are added by installing a little motor under the ribbon cartridge; the motor pushes the ribbon up and down while the whole print head section moves normally across the page. The motor is easy to install (one screw) and the instructions supplied are very clear — a 10 minute job.

Another point in Epson's favour are their manuals — Epson have been selling printers for so long that they've got the documentation down to a fine art. ~$1300

Brother M-1509

The Brother M-1509 is a 9-pin dot matrix printer manufactured by the company which made its name a good one in the daisy wheel business (and sewing machines, too). Their endeavours in the dot matrix market have given us a printer which incorporates good design with a worthwhile array of features. For a wide carriage printer, it has many built in compact features, including size.

The look of the machine is a change from what is expected: a fan grill on the front of the printer is worked into a grey patch on the facing panel — engineered to break up the look of the standard box.

The paper feed mechanism is an elaborate design. While it works and is certainly versatile, it's complexity could be a source of problems as the machine starts to age. Continuous form printing requires installing a pin wheel unit that looks like a target (unfortunately the mechanism adds another two inches to the back of the printer). Two detachable sheet guides help position single sheets.

While the paper feeding mechanism is impressive, the M-1509 lacks in the software management department. The front switch panel has a membrane button to select paper load and to choose between the cut sheet feeder, forms, or single sheets But: the printer cannot sense which mode has been selected until you manually indicate your preference. Worse still, it doesn't remember your selection in any sort of nonvolatile memory, which means your selections are lost when the printer is turned off.

A good design feature is the location of the serial and parallel ports to the side of the printer which allows unobstructed paper feed. Detracting from that is the location of the DIP switches — on the circuit board beneath a removable cover.

The printer supports both IBM 5152 Graphics and Epson FX series control sequences. Speed is not the greatest virtue of the M-1509, but if you need quiet then it may pay you to look at this printer which also produces good quality NLQ double

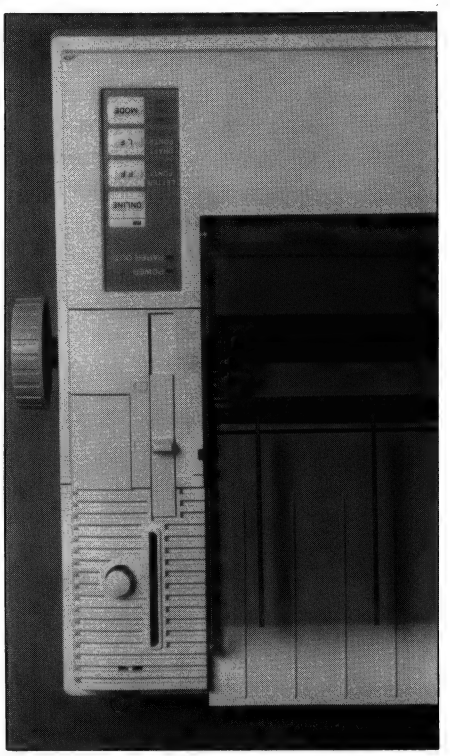

Figure 12. *With new Fujitsu DX3400, due to be released here in June with a price around $1700, a wide range of fonts can be downloaded from special ROM cards. The card slots into the printer at top right in the picture; the eject button is to the left.*

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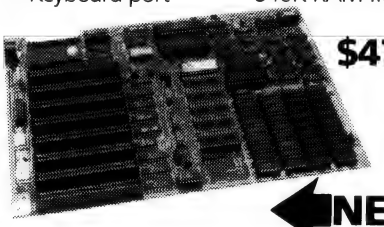

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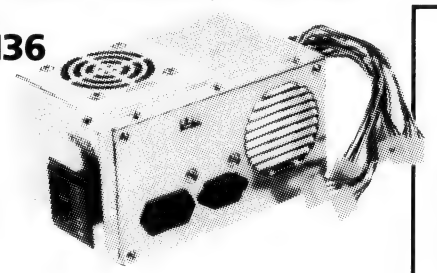

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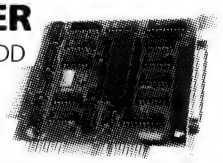

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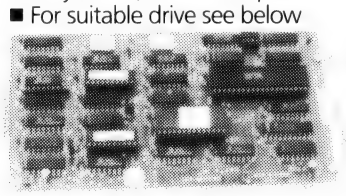

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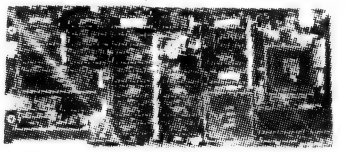

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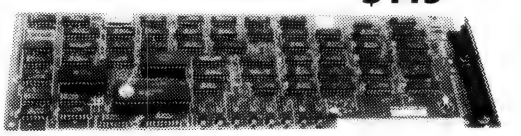

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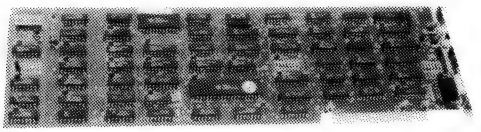

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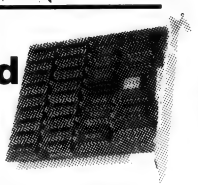

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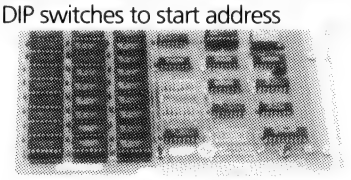

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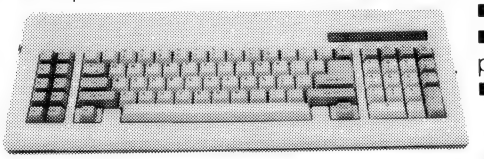

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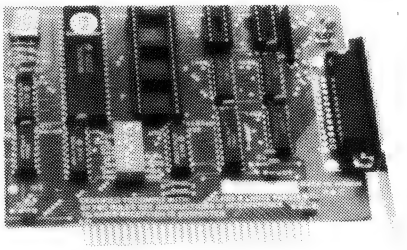

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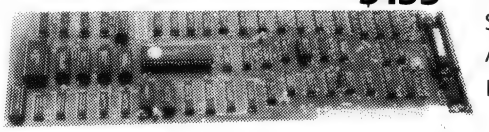

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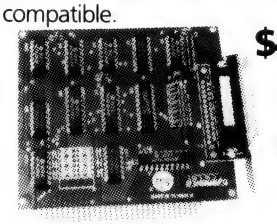

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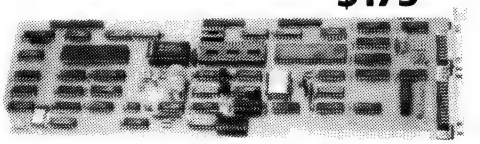

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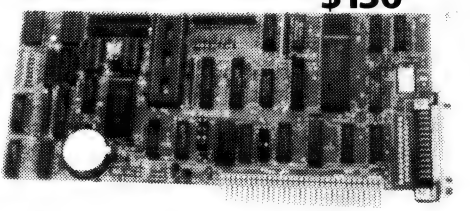

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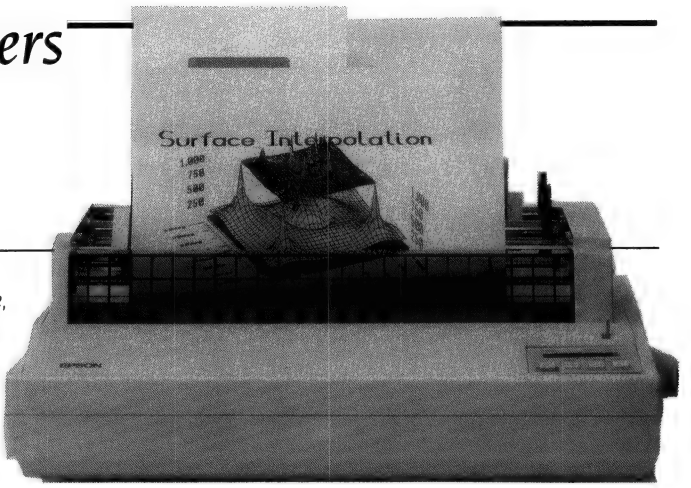

Figure 13. *The Epson LQ-2500 is a wide-carriage, 24-pin machine that offers 5 fonts as standard: Courier, Prestige, Roman, sans serif and Script.*

strike type. The draft mode is not exceptionally good, though: the diagonals on characters like 'k' and 'x' were a little faint. ~$1300

The Fujitsu DX2200

When you look at your needs, and find that you *do* need colour for some reason, but printers like Fujitsu's DL2600 are outside the budget, what then? Well, there are a variety of 9-pin colour printers such as the Fujitsu DX2200 in the mid-price range.

The DX2200 uses a four-colour ribbon but produces seven colours using a second pass of the print head to blend a second colour with the first. Using the supported escape-code sequences and a bit of trial and error programming, it's possible to produce a variety of colours other than the standard seven.

The printer is easy to set up and the switch settings are quite straightforward. When the self-test trigger is fired, the DX2200 not only prints out the usual row after row of keyboard characters, but also lists the current switch settings. That's very handy if you're trying to figure out which settings to change to accomplish the task at hand — simply compare the printout with the tables in the manual.

Most printing features, like pitch and colour, can be selected using the front control panel. An interesting feature of the DX2200 is its ability to change to NLQ mode using the controls without stopping the printer. As well as forward and backward paper feed, it's possible to feed the paper right out of the printer.

Print speed is average: Although Fujitsu rate the printer at over 200 cps, the DX2200 actually prints at closer to 100 in draft mode. In NLQ mode, like most printers, it crawled along at around 30 cps. Noise levels seem lower than with many other dot matrix printers; while Fujitsu rate the DX200 at under 55 dB, that seems too low — it's probably closer to 70.

The print quality is certainly acceptable, but when compared with other machines it could be sharper. ~$2000

Epson LQ-2500

At the top of the range from standard-setting Epson is the feature-packed LQ (letter quality?) 2500. This wide-carriage, 24-pin machine comes with a set of five very attractive fonts: Courier, Prestige, Roman, Roman sans serif, and Script — with it, you can printout the best looking spreadsheets on the block.

For paper feeding, Epson have included their new *push*-feed tractor that makes an easy job of loading continuous stationery.

On the front panel of the LQ-2500 Epson have instituted their own replacement for DIP switches with a system called SelecType. This system's strength lies in its predefined macros that, at the touch of a button, set the printer up for graphics, wide-carriage printing, condensed type, NLQ, or draft printing; the macros can be user-defined, too. A large LCD window indicates the current SelecType function.

It's common with 24-pin machines that they make a high-pitched 'shriek' when printing — and this one's no exception; it puts out about 80 dB when moving along at 100 cps in draft mode (of course, it's quieter in NLQ, but then it's printing at around 50 cps.

And, there's a colour option similar to that offered for the Epson EX-1000, discussed above. ~$2000

The Fujitsu DL2600

Now we start moving out of the home user league. The 24-pin Fujitsu DL2600 printer is feature-packed, offering respectable speed, good print quality for both text and graphics, successful emulation of an assortment of other printers, cartridge fonts, and a comprehensive switch-operated menu system that is used to reset defaults. The settings are held in the unit's Complementary Metal Oxide Semiconductor (CMOS) memory. All that, and you can have colour printing, too.

The printers NLQ speed is an acceptable 56 cps when doing 10 characters per inch (cpi); at 12 cpi, these machines are rated at over 200 cps, but actually print at around 180. (Beware if you are buying a printer on the basis of speed: there is no set standard between manufacturers for testing, or even quoting print speeds. The only way to compare the speed of different printers is with your own test document, which should be representative of the job the printer's intended to be used for. Manufacturer's ratings for cps should be taken as a comparative guide only.)

The 24-pin head gives results almost up to the standard of a daisy wheel — soon your only choice may be a matrix printer or a laser, since daisy wheel sales are certainly feeling the impact of this new generation of matrix printers. And, the 32-pin machines have yet to really show their stuff.

The printer comes with 24 Kbyte of downloadable buffer which should be ample for most files — that means you can get on with your work while the printer does its job.

The paper feeding mechanism could be a problem: the intake pile is on the same level as the output. This is a common cause of paper jams, though to it's credit, the DL2600 tested didn't jam. The change from continuous feed stationery to form feed was so easy, it seemed there should have been more to do.

Inserting the ribbons is a bit tricky and to make it trickier, the operation is different for inserting colour or black ribbons. The life span of the ribbons is different as well, with the black ribbon said to last for up to 7 million characters — about 5000 pages — while the colour ribbon lasts 1.5 million. As the man from Fujitsu pointed out, ribbons that combine black and colour almost always need to be replaced because the black portion has worn out. Doing it their way, only the comparatively inexpensive black ribbon needs to be changed.

For those who want colour (how many of us really need it?), the Fujitsu DL2600 prints them very bright and very clear. The four-colour ribbon can print in any of seven different colours. The graphics mode of this machine can handle the complex Epson JX-80 colour codes — these codes can be taken as a measure of the 'power' of colour printers, akin to testing a computer's IBM-compatibility by running Microsoft's Flight Simulator.

You can buy the DL2600 without the colour mode and in this version, it appears that you actually get a faster print speed. This would certainly be a preferable choice for most users.

There are no DIP switches on this ma-

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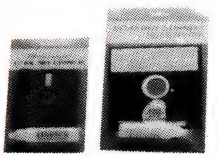

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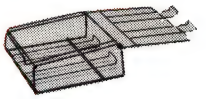

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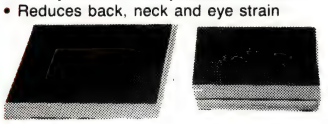

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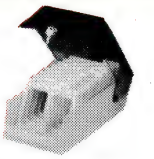

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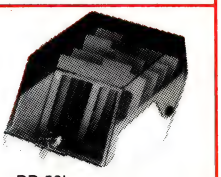

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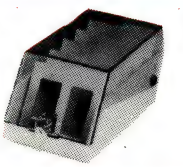

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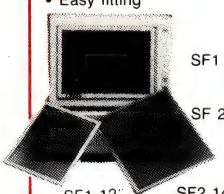

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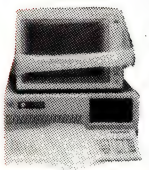

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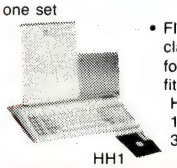

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chine: every print mode, character style, character spacing, line-spacing, language, emulation, interface and protocol decision can be selected from the control panel. Next to the control panel, located on the right hand side of the machine, is a very handy LCD which leads you through function modes and selections like a mother. Another likable feature of the DL2600 was that the power button is on the front, unlike many machines which insist on hiding the on/off switch on the side, or even worse, around the back somewhere.

The DL2600 uses font cartridges which gives great flexibility to printing styles. The cartridges allow the user access to standard and customised fonts as well as the ability to use different fonts on the same page — if they've got software or programming support, of course. ~$2700

The Genicom 3210

Usually printers come as odd-shaped boxes with a bit sticking out of the top or side, but the Genicom 3210 offers a sleek, low profile with a flat top — almost perfect for stacking things on, if you're like the rest of us and use any flat space around for 'temporary' storage — in a sturdy case. The 3210 has been designed as a hard worker: It comes with a heavy duty print head with each of the 9 pins having a rated working life of 300 *million* characters; the printer itself is rated at 6000 hours 'mean time between failures' which is very impressive because that's with a 100 per cent duty cycle, while most printers are rated at a 25 per cent duty cycle ('duty cycle' refers to the amount of time the machine is actually working when it's turned on).

It comes with a fast paper feed which makes a big difference to printing time if you are working with long documents. For reference, the paper can feed ('slew' as it's called in the business) at 18 cm per second, while most other machines manage only half that. But, or a printer at this price, that doesn't compensate for the relatively slow printing speeds: about 150 cps in draft mode and about 35 cps in NLQ.

Changing the ribbon on the Genicom 3210 is a bit troublesome considering that this task is can be accomplished for most printers with an unsnap of the old ribbon cartridge and a snap of the new one: The ribbon must be looped around a set of roller guides with a half-twist in just the right spot.

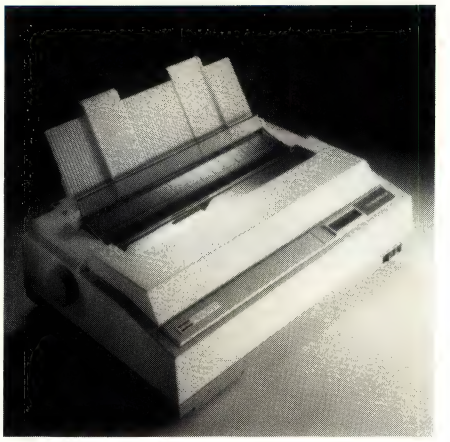

Figure 14. *The Fujitsu DL2600, shown with the optional single sheet feeder. On the right hand side of the front panel is a 14-character LCD status display, next to the control panel. The power switch is conveniently located on the front.*

But, if you make good use of the 32 DIP switches which are used to set the serial and parallel interfaces, you'll soon get practice replacing the ribbon — the switches are located underneath.

The front panel controls are touch-sensitive except for an unusual rotary selector switch that's used for setting fonts, page length, modes, and characters per inch.

For a printer designed to be working flat out for long periods, the Genicom has a small buffer — only 2 Kbytes, which means that the host terminal is going to tied up for most of the print time.

Even accepting this machine as a workhorse (and it is!), it's still noisy — in draft mode, it's almost impossible to talk on the telephone with the printer in the same room. ~$4000

The Ink Jet Family

Word started seeping out several years ago that there was this remarkable new printing technology looming on the horizon: ink jet printing. Rumour had it that is was super-quiet and super-efficient. Now we are beginning to see the first generation of these new machines in the market.

According to Dataquest, over the next four years the ink jet portion of the world market is going to increase from a 1986 total of 4 per cent to a respectable 16 per cent — that's a growth rate of over 70 per cent per annum. With this in mind, a number of companies are beginning to take the technology seriously, whereas in the past ink jets had been dismissed as messy and not having a chance against the well-established dot matrixs and rapidly-developing lasers.

So what is so special about ink jet printers? If you've been getting the twitches from sitting near a dot matrix machine and its irritating sound, then you'll appreciate the fact that ink jets are quieter (they squirt, not hammer), and are almost as efficient.

The technology is still developing (everybody seems to have a top-secret prototype ink jet machine they don't want to talk about at the moment) and expect some breakthroughs to be announced

Figure 15. *Epson's SelecType feature on the EX-1000 is used to control printing modes at the printer, rather than through the software. Three different fonts can be chosen —*

```
Draft printing is faster than ever before.
NLQ Roman is clear and typewriter-like.
NLQ Sans Serif is crisp and distinctive.
```

and they can be printed in three different widths —

```
        Pica: ABCDEFGHIJKLMnopqrstuvwxyz
       Elite: ABCDEFGHIJKLMnopqrstuvwxyz
Proportional: ABCDEFGHIJKLMnopqrstuvwxyz
```

or, they can be condensed —

```
Condensed pica gives more characters on a line.
Condensed elite gives you even more.
```

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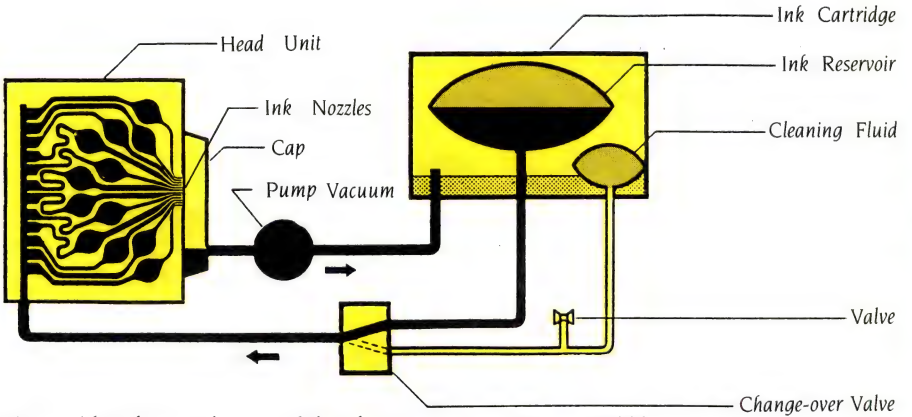

Figure 16 *Schematic diagram of the inking system in an Epson IX-800.*

later this year, but — all of the machines currently on the market work the same as a dot matrix printer, except the wires have been replaced with jets of ink. Ink jet quality is based on the number of nozzles, rather than wires — currently 9- and 24-nozzle heads are available, with the latter giving the higher quality, naturally. With matrix printers, the pins hammer the intervening ribbon onto the paper (which causes much of the noise), ink jets don't come in contact with the paper — they shoot the 'dots' of ink through minute nozzles on the head. This lack of direct contact gives much smoother and quieter operation.

As with matrix printers, the 9-nozzle models are the low end of the range and the 24-nozzle models are at the quality end. Many companies are beginning to come out with their own versions of the ink jet theme, and the following is only a sample of what is available on the Australian market this year.

The AWA 150 Ink Jet *Portable!*

When AWA announced they would be releasing a *portable* ink jet printer, the general reaction in the market was gaping jaws and wide eyes. We thought the description of its size that AWA gave us over the phone must be exaggerating the smallness. When the man from AWA walked in with it tucked under his arm, we believed!

Without exaggeration, the AWA 150 is small; it measures 4.75 cm high, by 27 wide, by 16.25 deep — that's smaller than a ream of photocopy paper — and weights in at less than 2 kilograms with its supply of five C-size batteries installed. (AWA advise us that later production models — we saw an early release version — will be fitted with re-chargeable nickel-cadmium batteries.) The batteries are ingeniously placed inside the platten, there's a plug for recharging on the side of the printer.

When we started printing, we found that the printing head would cross the paper and the paper would feed, but no ink would shoot out — but we soon discovered that all that was needed was a mains power adaptor. (The adaptor will be supplied as part of the printer when they go on sale.)

The batteries are not intended as the principle source of power supply, though — using them, the 150 can run for 50 minutes of continuous printing and they'll last for 12 hours with the printer on standby — they're strictly for the 'field.'

Unlike other ink jet printers we've seen, the 150 will print on ordinary 80 gsm photocopy paper, but the best results are still to be had with specially treated ink jet paper. As a matter of fact, most ink jets will print on just about any paper, including cardboard; the limitation isn't with the ink jet technology, rather with the platten set-up which determines the thickness of what can be fed through the printer.

The print quality does not compare all that well with lasers, daisy wheels, or even most newer dot matrix printers — but then again how many of them can almost fit in your overcoat pocket and be used on the bumpy roads of the out back? It's simply a matter of 'horses for courses' — if you need a truly portable printer and aren't particularly fussed about quality then you'd do well to start your search with this machine.

Actually, ink jet machines tend to be smaller and lighter than dot matrix printers, because, as a very recent development, they've been able to full advantage of the work that has gone into making printers more compact. Then there's the simple fact that a dot matrix or a daisy wheel printer must be heavy enough that it doesn't vibrate itself off the table while hammering away

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One of the many technical surprises we found with the 150, was that the ink bottle and ink jet head have been combined into one unit which just clicks into the place like a ribbon cartridge on a dot matrix machine. This means the head is replaced every time you recharge the ink (this eliminates a fiddley and messy cleaning job that would otherwise be required from time to time). According to AWA, each bottle of ink should print about the same number of pages as a conventional ribbon.

The 150 comes with a script mode and NLQ and is generally compatible with the Epson character set, but its printing speed but doesn't burn up the paper — the '150' in the name derives from the rated 150 cps, but this appears to something of an overstatement. Then again, as designed, it's a portable and is not really meant to chew up the text. The paper feeds through a slot positioned at the bottom of the back of the printer; it's self loading — just push the paper in.

We put the AWA 150 through its paces until the printer head stopped on the left side of the platten in standby position. On the front panel an LED flashed telling us it was out of power — the batteries had gone flat. Even though the printing had stopped, the printer still had enough power to run the paper out.

Overall, the AWA 150 looks like an excellent companion to the growing number of portable computers on the market. By the time you read this it should be on sale — watch for it. ~$1000

The Epson IX-800

As there are not many ink jet printers around yet, it always causes a stir in the office when one's delivered. We were all impressed with the the Epson IX-800's neat and compact look, and it doesn't weigh that much — about 6 kg.

Setting up only takes a few minutes, except for the hassle of setting the dip switches at the back of the machine (at least they were in the open). Like most ink jet printers, the Epson uses an ink cartridge — it just pushes into place in a slot on the top of the machine. Aside from the difference of ink supply, the Epson works the same way as the AWA machine.

If you're looking at ink jet printers it's worth noting the these features (which the IX-800 has) — A manually operated stirring lever on the side of the printer keeps the ink in the cartridge homogeneous so that it doesn't clump and clog the printer head. Also, when the printer is not in use, the head sits under a cover which not only helps keep it clean, but also prevents the ink from drying and building up in the nozzles.

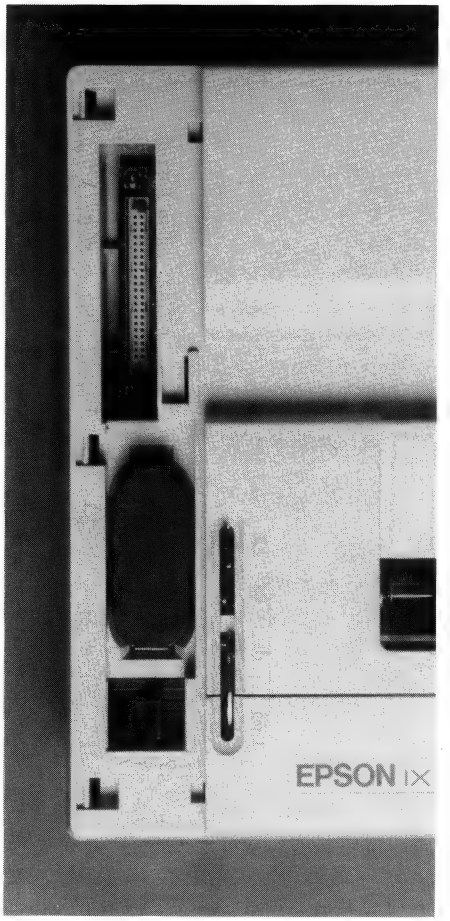

Figure 17 *The ink cartridges for the Epson IX-800 slot in under the cover that can be seen below the expansion port. Below that is the manually operated stirring lever, used to keep the ink particles from settling and clogging the printing head.*

When the IX-800 was turned on, we were somewhat startled by the grinding sound that the head cleaner makes on the ink jet spout. When the printer was started, it performed beautifully with a relatively quiet printing sound. Of course, when it was turned off there came that grinding sound again — it takes some getting used to. For comparison, ink jet machines all seem to be rated around 55 dB, while dot matrixs, as we saw above, average about 72 dB.

The IX-800 happily prints with bursts up to 146 cps (it's rated at 240) in draft mode. The NLQ mode produced at a considerably slower 38 cps, but that's still good for a 9 nozzle (equivalent to the 9 pin matrix) ink jet.

The IX-800 has Epson's SelecType feature which allows changing from draft to NLQ at the control panel, and is also used to chose the font, character set and graphics set. And, there's a reasonably-sized 8 Kbyte print buffer.

One disappointing aspect was that the ink disliked some paper. Using standard bond computer paper resulted in unsightly smudges when the paper was run out, although the ink dried quickly after that. Being fair, we tested draft mode on photocopy paper and were suitably impressed by the clarity of the type, although you could see all the individual dots and the type still smudged a little when picked up. NLQ mode, on the same paper, gave a very acceptable printing job, but the smudges got worse because of the heavier printing.

While putting the printer through a self-test, we discovered another problem when we fed a second sheet into the printer — the second page came out with a smudge of ink along the top which would definitely not be suitable for correspondence. After two more sheets had been fed through the printer, the smudge didn't come back.

Epson's 24-nozzle SQ-2500 ink jet is the top of their ink jet range. The very brief look we had at this machine showed that the smudging problem was almost eliminated by the 2500's quicker drying time (a necessity, with it's rated speed of 540 cps) — a definite improvement that should be incorporated into the 800, if Epson are serious about selling the machine for office use.

Tests done on paper types to be used in the IX-800 and the SQ-2500 showed that the IX worked best on Rank Xerox, Xerox Series 10, Snowlight, NTT Copy, and Masterprint A photocopy papers, while the SQ printed best on Crown Copy, NTT Copy, Royal Copy, Rank Xerox, Xerox Series 10, friar Bond, Snowlight, and Masterprint A. All of which very simply says: If you're thinking of buying an ink jet printer,take along a sample of the paper you're already using and try it for suitability. ~$1000

The Tektronix Tek 4696

If you haven't heard of Tektronix printers before, don't think yourself ignorant — the Tektronix Tek 4696 is at the high end of he ink jet printer market. While those at the other end of the market are trying to

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Figure 18. *One of the many technical surprises we found with the* AWA 150 *ink jet printer, was that the ink bottle and ink jet head have been combined into one unit. This eliminates the need for cleaning the head since it is replaced every time the ink is replenished. The small size of the machine is readily apparent from the roll of film sitting in front of it (incidentally, both the printer and the film are Kodak products.)*

entice buyers away from the standard matrix and daisy wheel printers, the Tek 4696 is aimed at serious colour users.

The Tek 4696 produces *good* quality colour graphics in what appears to be an unlimited supply of colours, with a 120 dot per square inch resolution. When the machine produces a full vibrant colour page with graphic designs, you can justifiably be impressed. These masterpieces can be produced at the rate of about 3 square millimetres a second, which translates into less than 3 minutes for an A4-sized drawing; transparencies typically take about twice as long to allow for drying on the unabsorbent surface of the film. In text mode, the machine outputs at about 35 cps.

The printer comes with a standard roll of ink jet paper; ink jet cartridges: two each of magenta, yellow, cyan and black plus two cartridges of 'true' black; a maintenance manual; lubricant; paper holder and power cord and other accessories. Quite a collection of paraphernalia, but it's all necessary (and worthwhile) to produce the results. The box itself weighs in at over 13 kg, so it's not meant to be thrown around the office.

The reproduction, although clear, bright and colourful, does have rough edges when producing circles, but that's a minor fault, considering the quality of the printing otherwise. When laser printers produce colour graphics, they will be unbeatable, but the market the Tek 4696 and similar printers are aimed at is relatively secure for such applications as sectional or strata maps, colour product design charts and elaborate bar and pie charts.

The 4696 wasn't designed for the home, rather it's directed at those who need intricate colour work in business. The limitations of what can be printed are more a function of the resolution of the computer and the software, than the printer.~$3600

Thermal Printers

Thermal means relating to, caused by, or generating heat or increasing temperature. So who would put the generation of heat and printing together? Well, a Japanese company called Brother, for one — they've been marketing an electronic typewriter with a thermal printer built in for a few years now, the EP 44. (Recently they've brought out the WP 600, which was used extensively by journalists during the America's Cup races in Perth — it acts as a typewriter with about 16 Kbytes of memory that can be printed out, or, as they did in Perth, hooked up to an acoustic coupler and sent any place in the world.)

A large part of the first batch of thermal paper we ever saw was used to 'test' the effect of running fingernails across it — the heat generated by the friction of a fingernail running across the paper was enough to mark the heat-sensitive paper.

Operating in generally the same way as matrix printers, thermal printers comprise a 'jewel' or 'face head' with a set of pins; unlike matrix or ink jet printers, though, the pins are heated before they're pushed against the ribbon. With this method, the pins don't have to hammered against the paper to produce a dot, they only have to make contact and let the paper and heat do the rest — all of which makes for fairly quiet printing.

Most thermal printers come with a ribbon that is blacked on one side, so they can be used as a dot matrix type printer, too, although the quality of type suffers. The biggest shortcoming of thermal printing is the cost of the special paper: Using even the least expensive thermal paper, which reduces the quality of the printing, each page still costs about 15 cents. That, coupled with the fact that the printing speeds are not at all remarkable, the thermal revolution seemed doomed even before it began. Well, maybe not quite . . .

The AWA CHC-65

Recently we were introduced to the AWA CHC-65 thermal colour printer. With a print resolution of 8 dots per millimeter (200 dots per inch) and seven colours per dot coupled with a 'dithering' (blending) technique, there is an almost unlimited combination of colours possible.

Like the traditional thermal printer, the CHC-65 requires specially treated paper to get the best results, but it will take normal continuous stationery. Considering the number of colours that can be printed, the CHC-65 moves along at a very respectable 1200 lines per minute. The machine comes standard with seven colours: red, green, blue, magenta, cyan, yellow and black.

The output from the the CHC-65 can give an impression of three dimensions by the use of subtle shading. The pictures produced have a waxed feel (a by-product of the thermal process) and even close scrutiny can't fault the quality.

This machine is intended for the highest quality colour work that can be done on a 'printer' — say, for use in an advertising agency. The quality of the output is of the standard that, hopefully we'll be seeing in a few years time with more affordable types of printers. ~$19,500

Part 2

In the June issue, we'll look at laser printers and their natural place in the growing world of desktop publishing; for those who dream of colourful graphics, we've got plotters; and if 'near' isn't good enough for you, we'll look at 'true' letter quality daisy wheel printers. □

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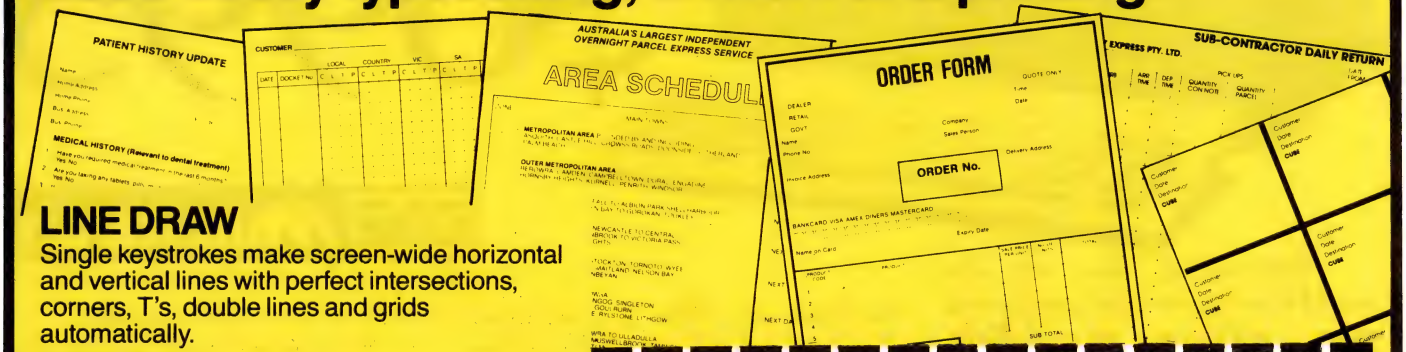

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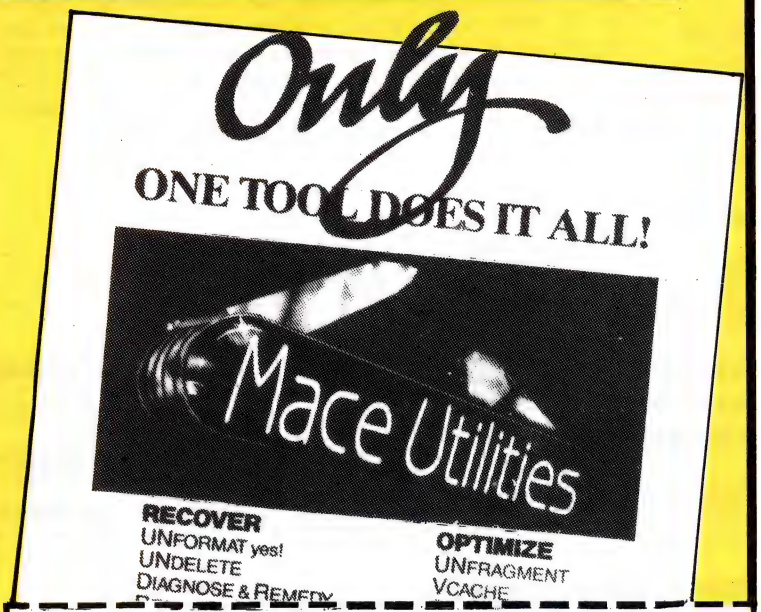

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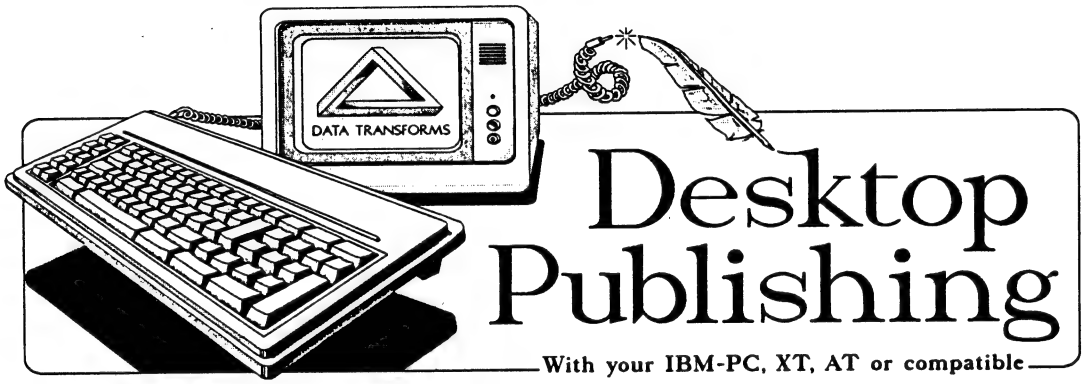

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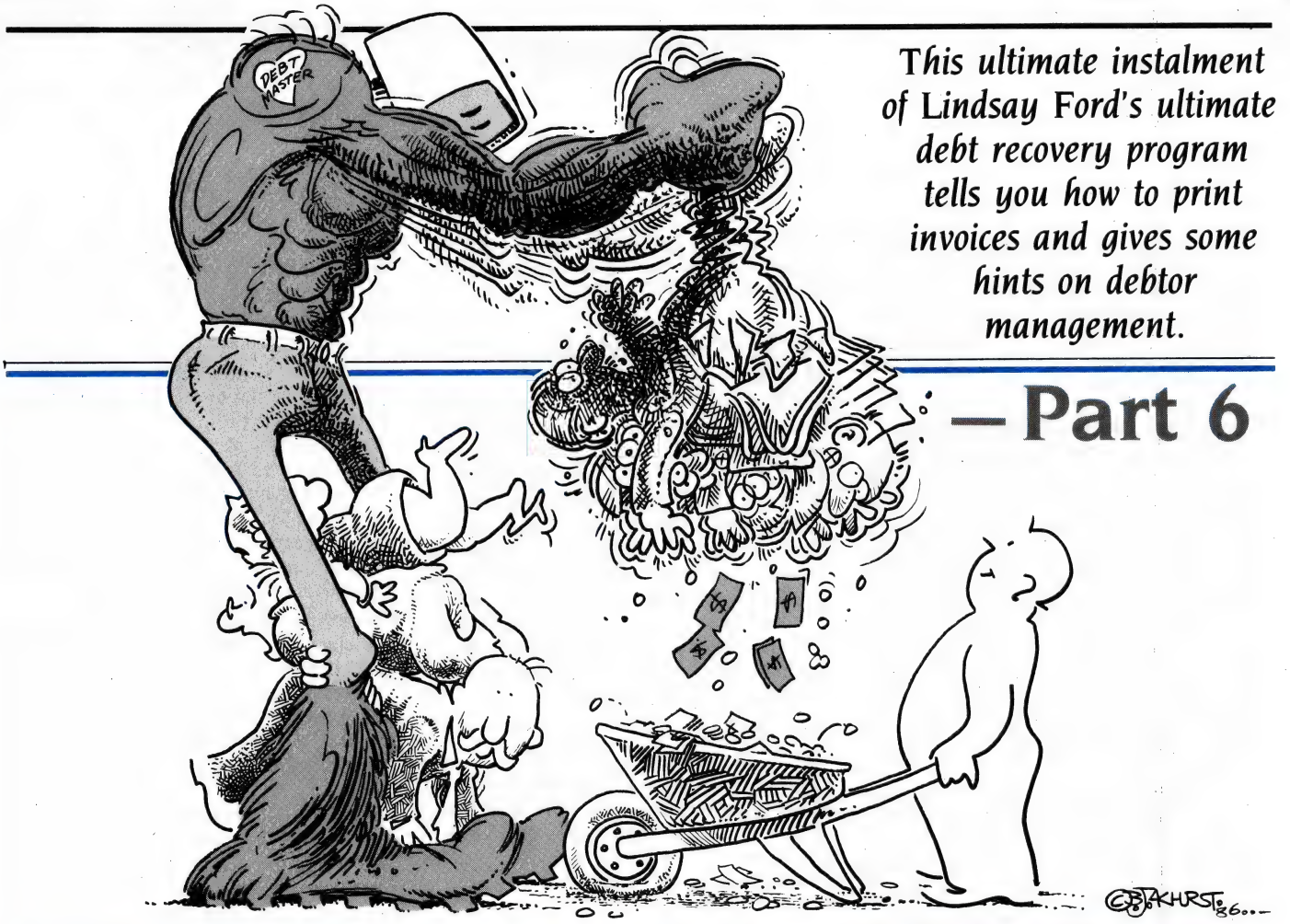

This ultimate instalment of Lindsay Ford's ultimate debt recovery program tells you how to print invoices and gives some hints on debtor management.

— Part 6

DEBTMASTER

DEBTMASTER WAS originally designed to supplement a manual invoicing system with the accounts hand-written or typed and the program then taking care of the follow-up. Although this suited me, you may find it more convenient to use the program for both purposes. In that case, enter the program below (call it TYP.MWB) and you will have the option of printing an invoice when *new* client details are entered. If you decide not to include TYP then this option will not be available.

Typing an Account

The program is a simple wordprocessor that lets you enter up to 16 lines of text (50 characters per line) on a bill that is printed after a NEW CLIENT entry. If you select it with 'T' (after a NEW entry), then you will be met by a page of text that explains how it works. This explanation is entirely devoted to the text to be inserted in the invoice as the other information it contains (Name, Address, Balance and so on) is inserted automatically.

If at this stage you press 'A' the program will return to the Menu. Pressing any other key takes you into the Wordprocessor, the screen will clear, left and right text margins will be displayed and the cursor will be positioned at the top of the screen inside the left text margin. You can now start typing the invoice details, but don't bother with a 'Re: . . . ' or account balance as these are inserted as the account is printed.

The program lets you use several control/key combinations to make typing easier. (Note that CTRL and the specified key need to be pressed at the same time.) The combinations are as follows —

CTRL W: Cursor up one line
CTRL Z: Cursor down one line
CTRL A: Cursor left one space
CTRL D: Cursor right one space
CTRL I: Display control/key combinations
DEL: Delete character under cursor
ESC: Finish typing
RETURN: Erase any text to right of cursor and take cursor down one line.

The Wordprocessor is fixed in 'insert mode', so if you move the cursor into some text and begin typing, the characters will be inserted at the cursor position, the original text being shifted to the right. The length of a line cannot exceed 50 characters, so once this is reached no further text can be inserted and you will either have to delete any unwanted text or move to the next line down. Unfortunately the BASIC language (in which DebtMaster is written) is too slow for the 'word wrap' feature of Wordstar and similar wordprocessors to be included.

Once you've finished typing (and you've pressed ESC) the usual DebtMaster heading will re-appear (overwriting the top and bottom few lines of text) and the text margins will vanish. You will now be asked to press 'A' to abort or any other key when the printer is ready. If you choose 'A' then you will return to the Menu (you cannot later return to type this invoice). If you pressed some other key then the printer will print out the invoice. No fan-feed/sin-

gle sheet option is included as invoices cannot exceed a single page. When the invoice is done you will be given the option of re-printing it (this is useful, say, if you misaligned the paper or the ribbon ran out). If you answer 'N' to this you will return to the Menu.

Successful Debtor Management

Legislation has now been introduced in some States to protect debtors from 'harsh' recovery action by those to whom they owe money (for example, the Victorian Judgement Debt Recovery Act). This is fine if you're the debtor, but it makes it very difficult for people in business to recover money that is legitimately owed to them. In my experience such laws are often used by dishonest people to avoid their obligations, meaning that it is critical for those in business to use effective debtor control procedures at every stage of a transaction.

In a general article like this I can't give advice on debt management that applies to every business, every transaction or every State, but I have set out below some general rules that will help to improve your performance. These are only a guide, not a guarantee! If you want to ensure the maximum possible recovery rate then it is essential to have a full debtor management strategy designed by your own solicitors. The fees for this are quite modest (you can get a quote in advance) and at least you'll have the peace of mind of knowing that your accounting procedures are as tight as they can be. Show your solicitors this article so they can tailor their advice to suit DebtMaster.

The Ten Commandments of Debtor Management

Get it in writing: If possible, get a signed order from customers for the goods or services you supply. Several times a week I hear the old story that 'Joe Bloggs is too good a customer for me to bother him with written orders.' This usually comes from a client to whom Bloggs owes several thousand dollars that he is refusing to pay. At the very least, record the conversation with Bloggs in your diary immediately after taking his order and confirm it in writing the same day. An example of a confirmation letter would be -

Dear Bloggs,
RE: YOUR ORDER OF 24/11/86
This is to confirm the telephone order you made today for 200 barbed-wire brassieres at $66.40 a piece (Catalogue No. 19654) for delivery in 14 days. As advised, these goods remain our property until the account is settled.

The last sentence helps you to get around the Goods Act. This provides that the ownership of the goods (cars, records, tea- pots and so on) passes to the customer upon delivery unless the contract stipulates to the contrary. So unless you tell Bloggs prior to confirming his order that the goods remain your property until the account is paid, title passes to him upon delivery. This means that if Bloggs refuses to pay (or goes broke) you can only claim back the price of the goods, not the goods themselves.

Confirm verbal quotes: If verbal orders are dynamite, verbal quotes rate with the hydrogen bomb! The courts are clogged with cases in which A says that he quoted B $2,000 for the supply of 1,000 widgets and B says that the quote was really for 2,000 widgets or for 1,000 widgets and 200 gadgets. If you must give a verbal quote then record it in your diary immediately and confirm it in writing the same day.

Confirm variations: If an order is varied by the customer then enter it in your diary and confirm it in writing immediately. If you wonder at the wisdom of this then talk to a builder (variations are notorious in this industry). I once had a case where an engineer blew over $100,000 because he acted on a verbal variation made by an officer of a State Government instrumentality! The officer later quit the public service and could not be found. The site architect refused to pay for the variations as it was not submitted in writing as required by the contract. The moral of this story is simple: *you must never deviate from a written contract or order unless you have written authorization to do so.*

Beware of Companies: Bloggs arrives in his Mercedes and places an order for 100 fusion reactors in the name of 'J. R. Bloggs Pty Ltd.' You supply the reactors, but your

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account doesn't get paid. Your solicitors then do a company search and inform you that the company has two paid up shares, giving it net assets of $2. Of course you can sue the company, but the $2 is about 0.1 per cent of the court costs you will incur in the process! The problem is that in the absence of very special circumstances (which you'll need a lawyer and heaps of money to work out) you can't sue Bloggs. So Bloggs keeps his Mercedes and your reactors and you've become both wiser and poorer.

If you must deal with companies then make sure you have a Guarantee signed by the person in charge. This is not a complicated document and it gives some recourse against people who try to defraud you by hiding behind two dollar companies.' The following is an example guarantee —

DEED OF GUARANTEE

I JOSEPH RASPUTIN BLOGGS of (ADDRESS) guarantee that I will be personally responsible to pay (YOUR BUSINESS OF PERSONAL NAME and ADDRESS) for any debt incurred to him/it by J. R. BLOGGS PTY. LTD.
Dated this XX day of 1987
(Bloggs signs here)
. . . . . .
(Witness signs here)
. . . . . .

The witness' signature (preferably with the same pen as the guarantor) and date are critical as otherwise the guarantee is invalid. See your solicitors if you want a guarantee that fully complies with the laws of your State and note that most States require Guarantees to carry $10 in duty stamps before they are enforceable. This is not important at the time a guarantee is signed, but it is if the debtor defaults on payment. In that case the stamp duty must be paid before a summons can be issued against the guarantor.

Beware of the chronic debtor: Keep an eye out for the person whose payments gradually become less and less frequent. This is the profile of the *chronic debtor* — he starts off with the best of intentions, but as his business begins to fail his payments fall behind and his excuses improve. Of course you'll get paid 'as soon as the deal with BHP comes through,' but meanwhile would you just do a few more thousand dollars worth of work as otherwise the deal may fall through. You'll be tempted as you can see yourself losing the account if you don't give him the extra

```
00001 REM ------- TYP --------
00002 POKE 140,1: GOSUB 42: CURS 0: CLEAR: STRS(8000):
      DIM A1(16),A2(10),A3(9),B(9): K3$=CHR(94): FOR X=1 TO 16:
      A1$(X)="": NEXT X: REM Convert A1 array to strings
00003 OPEN "I",6,"BASE.DBT": IN#6ON: OUT#0: OUT#0FF: FOR X=1 TO 9:
      INPUT B(X), A3$(X): NEXT X: IN#0: OUT#0: CLOSE 6: P=B(9): REM
      Get Base. P=Printer type
00004 OPEN "I",6,"TEMP.$$$": IN#6ON: OUT#0: OUT#0OFF: FOR X=1 TO 10:
      INPUT A2$(X): NEXT X: IN#0: OUT#0: CLOSE 6: REM Get Temporary
      file containing client details (saved by NEW.MWB)
00005 GOSUB 46: GOSUB 43: CURS 2,4: PRINT "This section of the@
      program lets you type in up to 16 lines of"
00006 PRINT " text on the invoice.@@The screen will clear and left@
      and right@@margins will appear. These keys have special@
      functions;"
00007 X=0: GOSUB 47: PRINT \\"@@@The symbol ''"; K3$; "'' means@
      press <CTRL> and the <KEY> together."
00008 K0$="<A> to Abort or ": GOSUB 53: IF X=65 OR X=97 THEN 40: REM
      Get key (separates pages). Abort if <A> or <a>

WORDPROCESSOR
K1$=Text to left of cursor, K2$=Text at and to right of Cursor

00009 GOSUB 56: H=8: V=1: K1$="": K2$="": CURS 7,1: PRINT " ";: REM
      Clear screen, display margins and set cursor top left
00010 GOSUB 54: F0=FRE($): K0$=CHR(X): L=LEN(K1$+K2$): IF X<32 OR
      X=127 THEN 14: REM Skip if a command key

Text keys

00011 IF L=50 THEN 10 ELSE LET K1$=K1$+K0$: REM Don't add character
      to string (K1$) if it's over 50 characters long
00012 GOSUB 13: H=H+1: GOTO 10: REM Display string, increment horiz.
      (H) and loop to next key

00013 CURS H+1,V: PRINT K2$; " ";: CURS H,V: PRINT K0$;: RETURN: REM
      Subroutine to print K2$ (String to right of cursor) and K0$
      (Key just pressed). Low in program to enhance speed.

Command Keys

00014 IF (X=1 OR X=8) AND H>8 THEN LET H=H-1: GOSUB 13: X=LEN(K1$):
      K0$=K1$(;X): K1$=K1$(;1,X-1): K2$=K0$+K2$: GOTO 10: REM If ^A
      or <DEL> and not at start of text (H=8) then shift left
00015 IF X=4 AND H-8<L THEN LET K0$=K2$(;1,1): K1$=K1$+K0$:
      K2$=K2$(;2): GOTO 12: REM If ^D and not at end of line then
      shift right
00016 IF X=127 AND K2$<>"" THEN LET K2$=K2$(;2): CURS H,V: PRINT K2$;
      " ";: CURS H+1,V: PRINT CHR(8);: GOTO 10: REM If <DEL> and
      there is some text to right of cursor then delete character
00017 IF X=13 THEN PRINT SPC(LEN(K2$));: H=8: A1$(V)=K1$: K1$="":
      K2$="": GOTO 22: REM If <RETURN> then erase text to right of
      cursor and drop a line
00018 IF X=9 THEN GOSUB 47: A1$(V)=K1$+K2$: K0$="": GOSUB 53:
      GOSUB 56: CURS H+1,V: PRINT CHR(8);: GOTO 10: REM If ^I then
      display command key information
00019 IF X=23 AND V>1 OR X=27 THEN 21: REM If ^W and not on top line
      (ie: V=1) then move cursor up one line
00020 IF X<>26 OR V=16 THEN 10: REM If ^Z and not on bottom line
      (V=16) then move cursor down one line, else loop to key

00021 A1$(V)=K1$+K2$: IF X=27 THEN 27: REM Set string array element
      to text. Exit if <ESC> key.
00022 IF X=23 THEN LET V=V-1 ELSE LET V=V+1: REM Next few lines
      implement ^W, ^Z and <RETURN>
00023 IF V>16 THEN LET V=16
00024 K2$=A1$(V): K1$="": IF X=13 OR K2$="" THEN CURS 7,V: PRINT
      " ";: K1$="": H=8: GOTO 10
00025 X=LEN(K2$): IF X+8<H THEN LET H=X+8 ELSE LET X=H-7
00026 K1$=K2$(;1,X-1): K2$=K2$(;X): CURS H+1,V: PRINT CHR(8);: GOTO 10

PRINT SECTION (Should be self-explanatory)
```

credit. Needless to say, if you're silly enough to go along with him then be prepared to lose your money!

Check large accounts: If you're asked to do work for someone whose account may exceed (say) $1,000, then check his credit reference with a credit reporting company (look them up in the Yellow Pages). There are many bankrupts and other dodgy debtors who prey on small business by taking goods or work for which they never intend to pay. If you find that your customer is an undischarged bankrupt then avoid him like the plague (even if he offers cash in advance). If he has a bad credit reference then deal with him with caution (or refer him to your opposition!)

Don't mix business and pleasure: Watch out for relatives and friends! You can be sure they're expecting a freebie and if you haven't spelled out your terms (preferably in writing) before you start then all you'll get out of it is a fight!

Cover your outgoings: If the goods or services you provide involve an expenditure on materials, duty or the like, then insist that the customer pays these charges in advance. It is better to be a little generous in your calculations and deduct any surplus from the final account than to find that you're out of pocket if a debtor defaults.

Watch out for excuses: Dodgy debtors specialise in plausible excuses about why they can't pay your account right away, but 'don't worry — you'll get a cheque next month.' *Crap*! Insist on part-payment (even $50) immediately to avoid the debtor stringing you along for months and then denying liability for the account.

Recovery agencies and solicitors: Many companies specialise in debt recovery, yet all they do is send out reminder letters in the same way as DebtMaster. If the customer pays you'll incur a charge, otherwise the company will ask you to refer the account to it's solicitors (in which case the legal fees are yours). Debt recovery companies are good value if your accounts are small (say under $200), but if they are larger then you would be better to refer them to your own solicitors.

Remember that debt recovery is to lawyers what wiping bottoms is to nurses: if that's all you send them then don't be surprised if they're not too enthusiastic about it! But if your solicitors accept your conveyancing and company work and reject your debt collections, then take all your work to another firm!

```
ØØØ27 GOSUB 43: PRINT "Press <A> to Abort or any key when printer@
      ready *"; CHR(8);: GOSUB 54: IF X=65 OR X=97 THEN 2
ØØØ28 OUT#Ø: OUT#ØOFF: OUT#PON: Z=Ø: FOR X=6 TO 9: KØ$=A3$(X):
      IF KØ$<>"" THEN PRINT SPC(B(7)+3Ø-LEN(KØ$)/2); KØ$: Z=Z+1
ØØØ29 NEXT X: IF B(6)>Ø THEN FOR X=1 TO B(6): PRINT: NEXT X
ØØØ3Ø FOR X=3 TO 6: IF A2$(X)<>"" THEN PRINT SPC(B(7)); A2$(X)
ØØØ31 NEXT X: PRINT SPC(B(7)+48); A2$(2): IF A2$(9)<>"" THEN PRINT
      SPC(B(7)+48); "Ref: "; A2$(9)
ØØØ32 PRINT\\\\\ SPC(B(7)+5); "Dear Sir/Madam,"\
ØØØ33 FOR X=7 TO 8: KØ$=A2$(X): IF KØ$<>"" THEN PRINT
      SPC(B(7)+28-LEN(KØ$)/2); KØ$
ØØØ34 NEXT X: PRINT: FOR X=1 TO 15: KØ$=A1$(X): K1$=A1$(X+1): IF
      KØ$<>"" OR K1$<>"" THEN PRINT SPC(B(7)+4); KØ$
ØØØ35 NEXT X: IF A1$(16)<>"" THEN PRINT SPC(B(7)+4); A1$(16)
ØØØ36 PRINT\ SPC(B(7)+43); [A1Ø 45]
ØØØ37 PRINT SPC(B(7)+32); "Balance Due $"; A2$(1Ø)\ SPC(B(7)+43);
      [A1Ø 45]
ØØØ38 IN#Ø: OUT#Ø: GOSUB 45: PRINT "Print Account again (Y/N)? *";
      CHR(8);
ØØØ39 GOSUB 54: IF X=89 OR X=121 THEN 27 ELSE IF X<>78 AND X<>11Ø
      THEN 39

END

ØØØ4Ø GOSUB 42: ON ERROR GOTO 41: KILL "TEMP.$$$"
ØØØ41 ON ERROR GOTO Ø: RUN "DEBT"

SUBROUTINES

ØØØ42 GOSUB 45: CURS 3Ø,16: PRINT "-Wait-";: CURS Ø: RETURN

ØØØ43 CURS 1,1: PRINT [A63 32]: CURS 1,1: PRINT " Dreamcards":
      CURS 57,1: PRINT "(c)1986"\ [A64 45][A64 32]: CURS 27,3: PRINT
      "<<< TYPE >>>"
ØØØ44 CURS 27,1: INVERSE: PRINT " DebtMaster ": NORMAL: CURS 1,15:
      PRINT [A64 45];: FOR X=4 TO 14: CURS 6,X: PRINT " ":
      CURS 59,X: PRINT " ": NEXT X
ØØØ45 CURS 1,16: PRINT [A63 32];: CURS 1,16: RETURN

ØØØ46 FOR X=3 TO 14: CURS 1,X: PRINT [A63 32]: NEXT X: RETURN

Print Instructions panel
ØØØ47 IF X=9 THEN INVERSE
ØØØ48 CURS 1Ø,8: PRINT "@@<"; K3$; "W> = Cursor Up@@@@@@@@<"; K3$;
      "Z> = Cursor Down@@";
ØØØ49 CURS 1Ø,9: PRINT "@@<"; K3$; "A> = Cursor Left@@@@@@<"; K3$;
      "D> = Cursor Right "
ØØØ5Ø CURS 1Ø,1Ø: PRINT "@@<"; K3$; "I> = Instructions@@@@<ESC>@
      = Finish text@@"
ØØØ51 CURS 1Ø,11: PRINT " <DEL> = Delete@@@@@@@<RETURN> = New Line";
      SPC(5)
ØØØ52 NORMAL: RETURN

ØØØ53 GOSUB 45: PRINT "Press "; KØ$; "any key to continue *"; CHR(8);

ØØØ54 X=ASC(KEY$)
ØØØ55 X=ASC(KEY$): IF X=124 OR X=128 THEN 55 ELSE RETURN

Clear Screen and print text and left and right text margins
ØØØ56 CLS: FOR X=1 TO 16: CURS 6,X: PRINT CHR(124);: CURS 8,X: PRINT
      A1$(X);: CURS 59,X: PRINT CHR(124);: NEXT X: RETURN
```

Graphics too!

That ends the series on DebtMaster — except for the bonus next month on how to graph your business' results.

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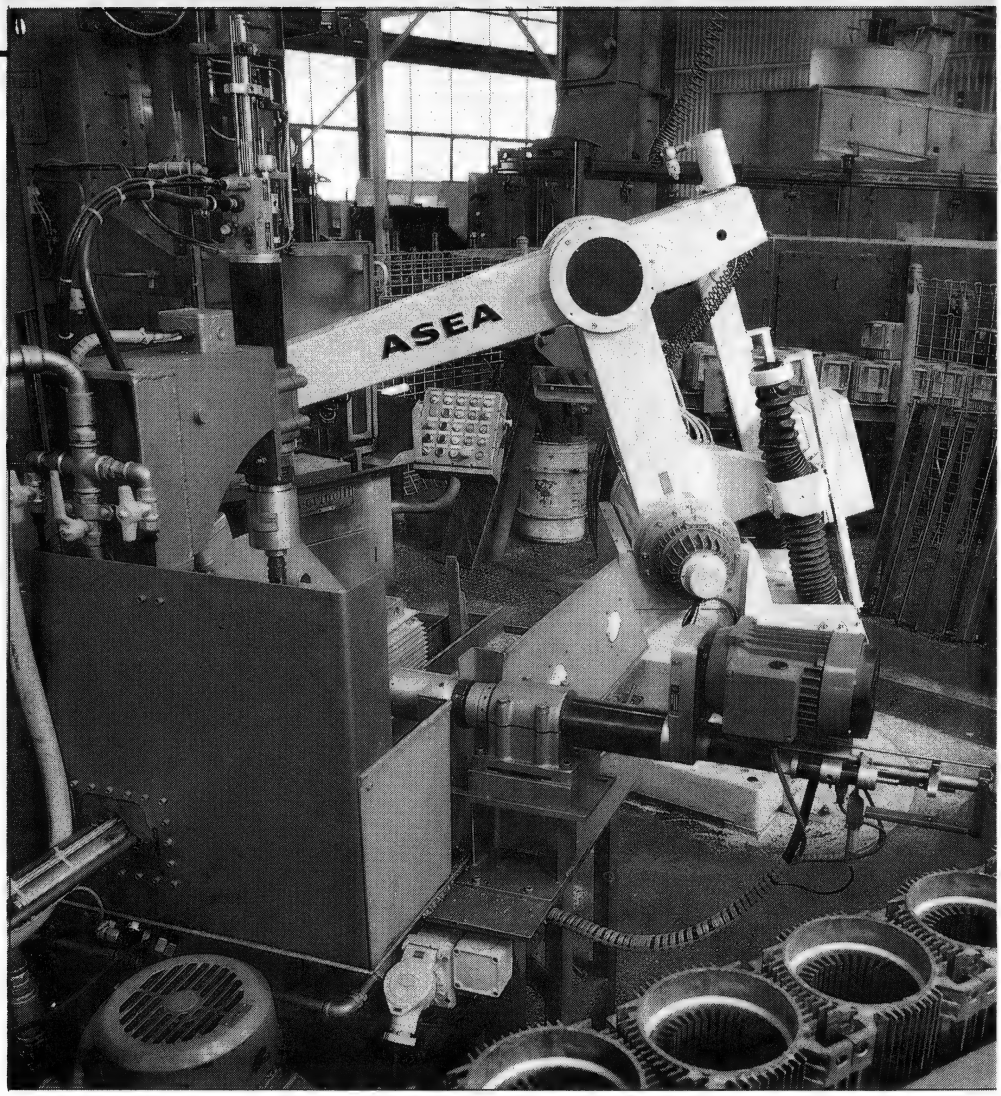
ROBOTS

Eighty years after Nicola Tesla first envisioned programmable robots, they are only just taking their place in industrial society. Tim Hartnell examines why it's taken so long (and then shows how to control your own robot).



This is an ASEA IR*b*-60 *industrial robot hard at work. The robot sequentially loads and unloads three machines during the finishing process of the stator body for electric motors. The process involves a combined drilling/tapping machine, and two branching operations. This installation, together with one involved in the automatic die-casting of motor parts, is installed at* ASEA*'s electric motor factory at Tottenham, in Victoria.*

ROBOTS ARE THE final frontier for artificial intelligence. When man crosses that frontier, he may finally replace himself with a metal replica. The word 'robot' comes from the Czech word meaning serf, or worker. Karel Capek gave us the word in his play RUR, which took London by storm in 1921. In RUR (an acronym for Rosser's Programmable Robots), robots win a war against mere men and joyfully anticipate inhabiting the heaven of a purely socialistic state. In many other stories, the robots spend most of their time standing around patiently, just looking for ways to be helpful to human beings.

Despite the fact that we are all familiar with the idea of robots, such as the Laural and Hardy pair from the movie *Star Wars*, robot reality is a long way from the likes of R2D2 or C3PO.

The robots which are working for us around the world today, more closely resemble intelligent hands, arms and hammers, than sleekly-fashioned metal men.

It is interesting that the mythology of robots has run so far ahead of the reality. From the malevolent Daleks in Dr Who's timeless land, to the obedient creatures of Asimov's 'Three Laws of Robotics,' we have each built a solid, internal image of what the robot might one day become.

The predictions that 'mechanical men' would one day walk the earth, have long been a staple of imaginative fiction. Even the non-fiction thinkers have been attracted by the idea. More than 80 years ago, Nikola Tesla, the slightly erratic electronics genius, was experimenting with radio controlled devices. He visualised programmable robot-like machines, which would operate without the intervention of a human being.

A robot would be, he said, 'no mere mechanical contrivance, comprising levers, screws, wheels, clutches and nothing more, but a machine embodying a higher principle which will enable it to perform its duties as though it had intelligence, experience, reason, judgement, a mind . . . It will be able, independent of any operator . . . to perform, in response to external influences affecting its sensitive organs, a great variety of acts and operations as if it had intelligence. It will be able to follow a course laid out or obey orders given far in advance; it will be capable of distinguishing between what it ought and what it ought not to do, and of . . . recording impressions which will definitely affect its subsequent actions' (Quoted from *In Search of Nikola Tesla* by David Peat).

Even with the primitive robots we now have, we are beginning to approach Tesla's ideal, although we've still got a fair way to go to the 'positronic' brains of Asimov's robots.

In order to see the robot as it really is today, and as it might become, it is useful to dump the twittering 'droids of the Empire to one side, and look at what is actually happening in the industrial world. Joseph Engelberger, founder of Unimation ▷

Londoner Tony Dyson has created many of the robots and androids that have made 'mechanical men' familiar to much of the world through films and advertising. The most famous of his 'stars,' R2D2 (shown undergoing a routine service),is to be the centrepiece of a robot and android museum, currently under preparation. Other Dyson creations seen above are Ultra (the R2D2 clone behind Dyson), who is to be used in advertising promotions; a mannequin (the female figure) who will be the first independently moving android for use in fashion shows. The angular figure on the right was inspired by actor John Cleese, who will do the robot's voice-over in a series of TV commercials. Dyson's company, Droid Factory Ltd, are currently developing Stunt-Droids that will replace humans in dangerous stunt work for TV and films.

Inc., (and author of *Robotics in Practice*), was one of the first to put aside the wishes of science fiction and look at genuine possibilities.

He realised that several technologies were converging, and that it had become possible to develop economical and efficient machines that would be able to take on a great deal of man's work, and be able to do it quicker, and with less error. 'It was . . . the rising cost of labour in the post-war years and the difficulty, in a booming labour market, of finding employees prepared to do unpleasant, boring or repetitive jobs which gave the early robots a toehold in the workplace,' Engelberger said.

As Aleksander and Burnett pointed out in their book *Reinventing Man*, 'Once they had proved themselves, other advantages became obvious: robots do not go on strike or demand pay rises; they will work, uncomplainingly, round the clock for shift after shift; and they make no complaints about the jobs they are asked to do.'

Just Gears and Cogs

Industrial robots really got off the ground in the late 1950's and early '60's, when crude mechanical devices were put to work on conveyer belts. Most of their tasks consisting of picking up a part from one place, and putting it somewhere else — just the kind of job which drives human beings to distraction. But these were not *thinking* machines. They were, for the most part, just gears and cogs, so the only way you could give them new skills would be to rebuild the machine.

From these crude, one task, pick-up-and-place devices, articulated hands and arms were developed. They were empowered with *brains* which could be programmed. The programming was, however, pretty rudimentary, as was much of the computer programming of the time.

I remember when I was at school in Melbourne being taken on an excursion to see a real computer! It was running the show for the State Bank, and we marvelled at the bread-board-like 'programs.' These programs were hardwired electrician's nightmares, featuring a maze of yellow and red covered wires connecting squillions of resistors and condensors and the like. 'To change the program, all we have to do is unsolder all these bits of wire, and then resolder them in a new pattern,' our guide told us wide-eyed schoolboys. The early arms and hands were like that — hardwired — with their reprogramming a laborious and time-consuming task.

Despite the obvious disadvantages of a hardwired device, these machines probably deserved — in a way their gears and cogs forebearers did not — the name 'robot.' And their intelligence, rudimentary as it might seem from today's lofty standpoint, gave these robots considerably more flexibility than their pick-and-place predecessors. Instead of rough 'fingers' which could just grab and later let go, a computer-controlled robot could have suction cap, or magnetic, fingertips — to carry tiny bits of metal, or giant sheets of glass, without undue problems.

Robots were developed for such fields as car assembly, to do tasks like painting parts of car bodies with liquids which gave off noxious fumes, or of working cheek by jowl with massive stamping devices which would have posed unacceptable safety hazards if humans were involved. But despite their growing intelligence, and their demonstrable advantage in many industrial applications, robots did not exactly sweep us all out into the ranks of the unemployed.

Until a decade ago, robots barely got out of the starting blocks. Why not? Can you remember what computers were like barely more than a decade ago? Before the Texas TI-994, before the ZX80, before the Commodore PET? They were monsters.

Computers were also very expensive. An intelligent robot was, at that stage, essentially a dumb machine connected by an electronic umbilical to a big, fat, heavy, expensive brain. Despite this almost crippling disadvantage, a few impressive,

huge, robot installations were built, such as the automatic Fiat car assembly plant in Turin.

But only a company with the resources of a an industrial giant like Fiat had enough computer power to spare to give 'intelligence' to a whole factory of metal labourers.

You see, the principle way in which computers were sold at that time — as they were too expensive to buy on a 'one machine per job' basis — was as multi-purpose mainframes. One of these monsters would control the air-conditioning, work out the payroll, keep Mr Keating (or his counterpart of the day) happy, and so on. All a dumb robot could hope to do was to plug his cord into a hole in the side of the mainframe.

It would have been impossibly expensive to employ robots on a 'one brain per machine' basis. Naturally enough, this meant that robots did not advance very much into the industrial scene. The mainframes were already going hell for leather cooking the books, and they didn't have many brain cells to spare for controlling dumb hammers, tongs and arms.

Just as the whole world, was shaken to the soles of its footy boots by the development of the silicon chip in the early 1970s, so was the robot world. Before the chip, the brains were the expensive bit of a computer. In the following years, the intelligent hardware cost shrank considerably. Instead of having to drudge around the factory trailing a long lead back to mother, robots could now dance and skip at will, with their brains firmly bolted in their heads, hips, thighs, or wherever. This gave robots a big push, and they at last started to come into their own.

The cost of brainpower has continued to drop. We now have 'robotic kittens' which will respond to sounds, and 'robotic bears' which will parrot your speech and make you feel loved, as well as many more serious applications in use in factories around the Western world. And the brainpower available to these descendants of Capek's mechanical men is, to a large extent, unlimited.

'In the mid-1980s, it is fair to say, the industrial robot has available to it as much brain power as it can use,' said one observer, adding that 'it is important to qualify this statement by noting that the brain power is of a particular kind which imposes rather severe limitations.' (*Reinventing Man*)

Vision

Assuming robots' brains get better, what else stands in the way of man replacing himself with metal replicas? One of the main stumbling blocks is that of vision — or of lack of it. Until a robot can be said to see with reasonable adequacy, its range of applications will be limited.

Many current industrial robot vision systems make use of a television camera producing a picture with a resolution of 512 by 512, with a gray scale of 256 tones from white to black. Adequate resolution for many applications, however, has been found with a 64 by 64 picture, offering only 16 greys.

To understand the value of adequate vision to industrial robot applications, list the things which blind robots cannot do: They cannot sort items passing by on a conveyor belt without either touching or weighing them. Similarly, they cannot differentiate otherwise identical items by their appearance (sorting apples or eggs by colour, for example). Blind robots cannot look into a heap of miscellaneous parts to find the one they need, and they have trouble assembling the various parts of a product when all the parts are not in the exact alignment they expect.

The limitations currently imposed on robots are highlighted by the lack of flexibility arising from blindness. The history of robot development is just beginning. Unfortunately, we have a long way to go before R2D2 will turn on the light, make you a cup of coffee, wish you good morning, press your jeans, and help you get dressed.

If you want to study the history and development of robots a little further, books to read include *Reinventing Man — The Robot becomes Reality* (Igor Aleksander and Piers Burnett, published by Kogan Page); *Artificial Vision for Robots* (edited by Igor Aleksander, Kogan Page); *Machines Who Think* (Pamela McCorduck, W H Freeman & Co.); *Artificial Intelligence — How Machines Think* (F David Peat, Simon and Schuster) and *The Thinking Computer — Mind Inside Matter* (Bertram Raphael, W H Freeman and Co.)

In the meantime, to give you a faint flavour of the world of robotics, we have a program which you can run on your computer, which allows you to control the movement of a 'robot' on a grid. □

```
10 REM      ROBOT CONTROL
20 REM ************************
30 REM (c) Tim Hartnell, 1987
40 REM Interface Publications
50 REM ************************
60 N$="GO FORWARD"
70 Z=0:REM NUMBER OF STEPS
80 A=INT(RND(1)*9+1)
90 B=INT(RND(1)*9+1)
100 C=INT(RND(1)*9+1)
110 D=INT(RND(1)*9+1)
120 TURN=INT(RND(1)*4)+1:REM 1=N, 2=E, 3=S, 4=W
130 REM ************************
140 REM       MAIN LOOP
150 REM ************************
160 CLS
170 IF A=C AND B=D THEN 520:REM FOUND IT
180 IF Z>0 THEN PRINT "AFTER STEP"Z
190 PRINT "I AM AT"A;B;" HEADING FOR"C;D
200 PRINT "I AM FACING ";
210 IF TURN=1 THEN PRINT "NORTH"
220 IF TURN=2 THEN PRINT "EAST"
230 IF TURN=3 THEN PRINT "SOUTH"
240 IF TURN=4 THEN PRINT "WEST"
250 PRINT "WHAT IS YOUR ORDER, MASTER?"
260 INPUT B$
270 IF B$="QUIT" THEN PRINT "OK, I'M STOPPING AFTER"Z"STEPS":END
280 Z=Z+1
290 IF B$="" THEN B$=N$
300 N$=B$
310 IF LEFT$(B$,1)="T" THEN GOSUB 440:GOTO 160
```

```
320 K$=MID$(B$,4,1)
330 FT=-1:IF K$="F" THEN FT=1
340 IF TURN=1 THEN A=A-1*FT
350 IF TURN=2 THEN B=B-1*FT
360 IF TURN=3 THEN A=A+1*FT
370 IF TURN=4 THEN B=B+1*FT
380 IF A<1 THEN A=1
390 IF A>9 THEN A=9
400 IF B<1 THEN B=1
410 IF B>9 THEN B=9
420 GOTO 160
430 REM ************************
440 REM          TURN
450 REM ************************
460 IF MID$(B$,6,1)="R" THEN TURN=TURN+1:GOTO 480
470 TURN=TURN-1
480 IF TURN=5 THEN TURN=1
490 IF TURN=0 THEN TURN=4
500 RETURN
510 REM ************************
520 REM       FOUND IT!
530 REM ************************
540 PRINT "WELL DONE, MASTER, IT TOOK"
550 PRINT Z"STEPS TO GET ME TO IT"
560 END
570 REM ************************
580 REM     AVAILABLE COMMANDS
590 REM ************************
600 REM        TURN RIGHT or TURN R
610 REM        TURN LEFT  or TURN L
620 REM        GO FORWARD or GO F
630 REM        GO BACK    or GO B
640 REM        QUIT
650 REM  Or just press <RETURN> to
660 REM   repeat previous command
```

North

1,1	2,1	3,1	4,1	5,1	6,1	7,1	8,1	9,1
1,2	2,2	3,2	4,2	5,2	6,2	7,2	8,2	9,2
1,3	2,3	3,3	4,3	5,3	6,3	7,3	8,3	9,3
1,4	2,4	3,4	4,4	5,4	6,4	7,4	8,4	9,4
1,5	2,5	3,5	4,5	5,5	6,5	7,5	8,5	9,5
1,6	2,6	3,6	4,6	5,6	6,6	7,6	8,6	9,6
1,7	2,7	3,7	4,7	5,7	6,7	7,7	8,7	9,7
1,8	2,8	3,8	4,8	5,8	6,8	7,8	8,8	9,8
1,9	2,9	3,9	4,9	5,9	6,9	7,9	8,9	9,9

West *East*

South

The grid on which the robot moves.

Robot Control — The Program

In this short program, you control a 'robot' which is moves on a 9 by 9 grid, as shown in the diagram. As the program begins, the robot reports its position (I AM AT 5 4) and the position of its goal (HEADING FOR 9 3). The goal, and the starting position, are randomly determined at each run (see lines 80 through to 110). The robot also tells you which way it is heading (I AM FACING NORTH). The starting direction is also randomly determined (see line 120). If the variable TURN equals 1, the robot is heading north, 2 is east, 3 is south and 4 is west.

You control the robot, when it asks you what you want it to do (with the question WHAT IS YOUR ORDER, MASTER?) using the following commands —

TURN RIGHT
TURN LEFT
GO FORWARD
GO BACK
QUIT

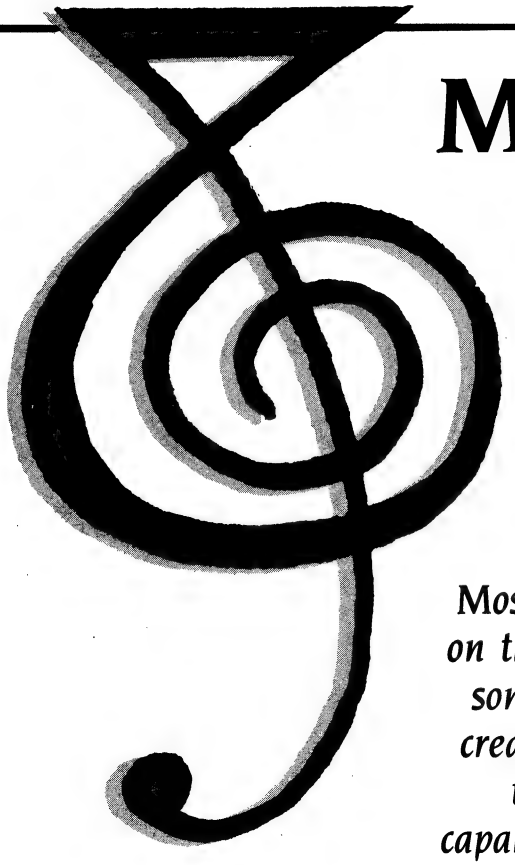
These can be abbreviated to the first word (TURN or GO) and just one letter, so TURN R, TURN L, GO F and GO B are all acceptable.

If you want to just repeat an order, just press the RETURN key, without entering a new command. This means, for example, if the robot is moving forward (with a GO FORWARD) command, you can keep it moving in that direction on subsequent moves just by pressing the RETURN key over and over again. If you want the robot to move through 360 degrees, you can follow a TURN LEFT or TURN RIGHT command with three presses of the RETURN key.

Remember, the robot reports both its position on the grid, and its heading, after each move. You should find it easy, once you've run the program a few times — and referred to the printed grid — to visualise just where the robot is, and how to make it home in on the goal. When the robot makes it to the goal, the program stops with the statement WELL DONE, MASTER, IT TOOK ME n STEPS TO GET TO IT.

To make it as simple as possible to get this program running on any computer, it does not include a visual readout as to where the robot is at any one time.

This can be added with a subroutine (called by a GOSUB added as line 245) which plots a grid of, say, full stops, with the robot's position shown as an R and the goal as a G. □



Microcomputers, Music and Midi

— The Programmable Sound Generator

Most personal computers on the market incorporate sonic circuitry that can create music right out of the 'box.' But, the capabilities of these devices vary from simple sound-effect generators, useful for little more than zaps, bleeps and explosions, to much more sophisticated systems, said to rival the capabilities of certain popular keyboard synthesisers . . .

BEFORE THE ADVENT of personal microcomputers, virtually all computing machines were as silent as the grave. But, perhaps in reply to their colleague's annual Snoopy calendar printouts, some mainframe hackers soon discovered various sequences of characters which, when sent out to a line printer, would create pitched tones — and even play Christmas carols! When micros first appeared on the scene, their internal sound-producing capabilities were not that much better — reserved mainly for error honks and programming experiments. But now things are changing . . .

The Apple II

While the standard Apple II computer doesn't support a specific syntax for music making, it does contain a built in speaker. The speaker can be turned on and off, very rapidly ('tweaked'), via a 1-bit D/A converter, directly under the control of a short machine language routine.

Calling such a routine several times in succession and updating the 8-bit values (0-255), which represent frequency and duration, enables a sequence of tones to be played on the speaker. Arranging this sequence of tones gives a melody.

Even though there are only two levels of output (on and off) on the Apple, the time between pulses can be precisely controlled. This enables the speakers to make a variety of sounds, music, and even speech. The technique is rather time-consuming for any 8-bit microprocessor — hence the large assortment of external music systems for the Apple II. (Such systems assist the CPU by adding secondary logic or maths co-processors as plug-in cards.)

Not long after that burst of music systems hit the market, several IC manufacturers began producing hardware incorporating built-in timers that could generate the required on-off signals at varying speeds. The hardware could then be programmed to produce square-wave pulses at various frequencies. The processor was left free for other tasks, or for controlling additional sound parameters such as amplitude shaping.

The combination of these timer-based digital oscillators with some degree of amplitude control, is the basis of several programmable sound generators (PSGs) such as General Instruments' AY-3-8910, and Texas Instruments' SN76489. These chips provide the internal sound-generating hardware for just about everything from the VIC-20 to the Atari ST's.

The Apples, the IBM PC's and most of their compatibles can zap and bleep, and they can even produce the odd (out of tune) note or two! The simple sound facilities on these machines may not be very sophisticated, but they become much more useful with software control.

The IBM PC

In recent years, the IBM PC's original SOUND and PLAY commands have become firmly established in Microsoft Basic. The SOUND statement generally defines the characteristics of single notes, while PLAY usually enables the programmer to enter strings of notes or even define substrings — useful for building up complicated patterns of sounds or musical sequences.

The 8-Bit Atari's

The Atari 8-bit range of computers contain custom-designed, four-channel, Pokey chips which are exceptionally easy to program. The SOUND statement defines four parameters: channel, frequency, distortion and amplitude. The distortion parameter is useful for varying the mixture of white noise and tonal sound independently for each channel.

The Atari ST's

The internal sound hardware on Atari's ST-range of computers incorporate the Yamaha YM2419 which has three independent tonal channels and a voice source channel which can be used in conjunction with the other three. That's not much of an improvement over the 8-bit machines, though the ST's built-in MIDI communications ports open up a whole range of possibilities. (I'll cover these possibilities in a later article.)

The BBC Micro

The BBC Micro uses the Texas Instruments PSG and does an excellent job in controlling it via software. Despite the BBC's rather unwieldy Basic sound commands, each of the four channels (1 white noise channel plus 3 tonal) can be individually defined in minute detail. This is accomplished via a comprehensive ENVELOPE command, which in conjunction with the SOUND statement, can control up to 14 parameter specifications.

These parameters are used to define the attack, decay, sustain and release (ADSR) characteristics for each note — refer to the accompanying box for an explanation of ADSR characteristics. They are also used to produce frequency modulation (envelope shaping) throughout the duration of the note. The shape of the resulting waveform can be dynamically controlled in real time. With only a little experimentation, some quite extraordinary sound patches can be created.

The Commodore 64 and 128

Perhaps the best example of the programmable synthesiser-on-a-chip concept is Commodore's custom-designed 6581 Sound Interface Device (SID). In essence, the SID chip is a hybrid digital/analogue device comprising for each voice —

1) 16-bit pitch resolution over a 9-octave range;
2) a choice of 4 distinct waveforms (noise, sawtooth, triangle and variable pulse);
3) a programmable ADSR-envelope generator;
4) and more: external signal processing facility, master volume control, and programmable low, band-pass, high or notch-reject filtering, for example.

And there are options for producing many kinds of standard synthesising functions including: pulse-width, ring and frequency modulation and other modulating effects such as vibrato, portamento, and glissando; hard-sync effects; multiple retriggering; sample-and-hold; and more . . .

But there's a problem. Although the C-64's sound (and graphics) are really quite superb for an 8-bit micro, this legendary machine is painfully obtuse when it comes to programming. There are no sound commands whatsoever in its resident Basic, and the programmer must resort to PEEKing and POKEing memory locations whilst keeping track of as many as 29 internal sound registers. (By comparison, the BBC's sound chip makes do with just 8 registers).

The Commodore 128 uses exactly the same SID hardware as the C-64, but it provides powerful music commands in its enhanced Basic: PLAY, SOUND, VOL, TEMPO, ENVELOPE, and filter.

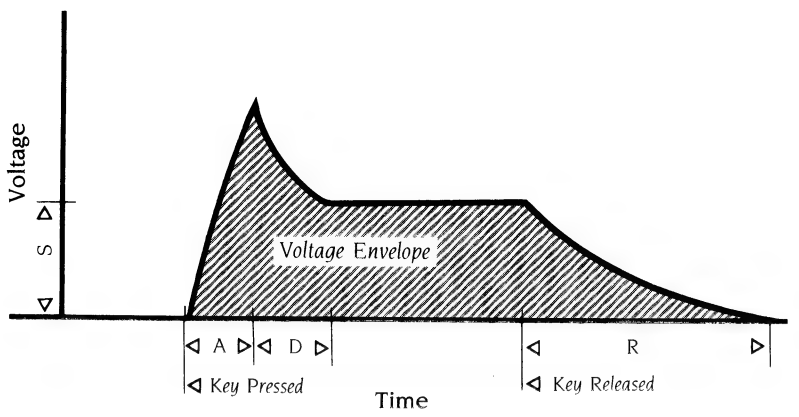
Taken together, these commands are sufficiently versatile to be considered a mini music-language. The PLAY command, for example, can be used to manipulate and concentrate strings of notes.

In addition to playing notes, the C-128 programmer can insert rests, change octaves, choose from any of ten different instrument voices, and adjust filters. It can even create multi-voice music . . . relatively painlessly.

But . . .

Only a few short years ago, it seemed as if most PC designers simply plonked a token PSG chip somewhere on the mother board along with some pretty zippy-looking graphics hardware. This method certainly has its advantage for the computer music tinkerer — minimal expense. Also, microprocessor intervention is kept to a minimum and considerably less memory is re-

Attack, Sustain, Delay and Release Phases



ADSR

Shown above is a schematic diagram of the Attack, Decay, Sustain and Release (ADSR) phases of a musical note. Attack (A in the diagram) is the initial phase of a sound; the sound then starts to Decay (D), remains Sustained (S) for a time, and then dies away as the sound is Released (R).

The steepness of the attack and the timing of the other phases of the sound, give different kinds of sounds: a steep Attack curve gives a percussive sound, while a shallower curve produces a mellower sound. The phases can be controlled, either by a synthesiser or a computer, to produce particular sounds.

These 'particular sounds' are described by the Voltage Envelope, which is defined by its ADSR characteristics. The characteristics of the sound are determined with an ADSR 'envelope shaper.'

The shaper produces a wave whose rise-time (or 'angle of attack,' as graphed against time), depends on the Attack control setting. When the wave reaches the setting's maximum, the Voltage drops at a rate set by the Decay control, until it reaches the level set by Sustain. There it stays until the key is released. It then dies away according to the Release setting.

A second (and simpler) type of envelope shaper, only has settings for Attack, Delay and Sustain — the Release time is determined by the Decay time. □

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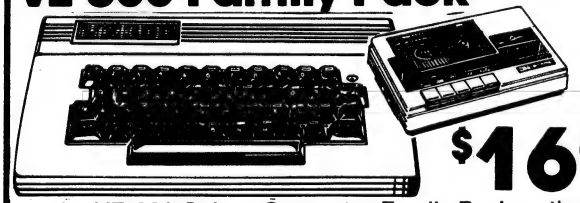

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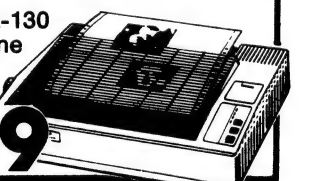

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quired for storing and manipulating audio (and visual) data.

But more demanding electronic musicians, for whom price is less of an object, generally agree that there are considerable disadvantages with systems that use this approach. All of them have a limited number of sound channels, and most operate with crude sound parameter resolution. Consequently, music created on these systems always has a distinct 'computer-like' sound.

The Apple IIGS

The 65C816-driven Apple IIGS runs most Apple II software (and runs it faster) and it offers the Macintosh's user-interface tools, all in a worthy combination — but its sound capability places it in a class of its own.

The heart of this computer's internal sound system is Ensoniq's 15-voice digital oscillator chip (DOC). (Ensoniq use the same chip in their range of digital sampling synthesisers costing around $3000.)

Perhaps the best example of the programmable synthesiser-on-a-chip concept is Commodore's custom-designed 6581 Sound Interface Device (SID).

In the IIGS, the DOC directly accesses its own special 64 Kbyte bank of memory. This is a dedicated section of RAM where segments of wave-table information can be stored. Since the sound firmware automatically takes care of shunting data as needed into this section of RAM, it's possible to generate a virtually limitless range of (exceptional) sounds. These sounds are limited only by the available system memory. So, in theory, a stored waveform *could* be multi-megabytes wide.

A general logic unit (GLU) incorporated in the sound hardware enables sound generation to proceed independently of the main processor. That means speech, synthetic sound, and sampled sounds can all be driven in the background while other programs are running. And, in addition to gain and filtering control, channel-select logic signals from the DOC can be intercepted by plug-in cards and used to implement 8 independent audio channels. They can even utilise the DOC's A/O converter for sampling (digitising) environmental sounds.

Next

Next month we'll take a look at how some of the 68000-driven machines (like the Macintosh and the Amiga) handle sound generation. Then we'll investigate how various bolt-on hardware enhancements can transform even your sluggish standard 8-bit micro into a supercharged musical composition system. □

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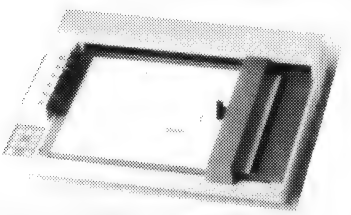

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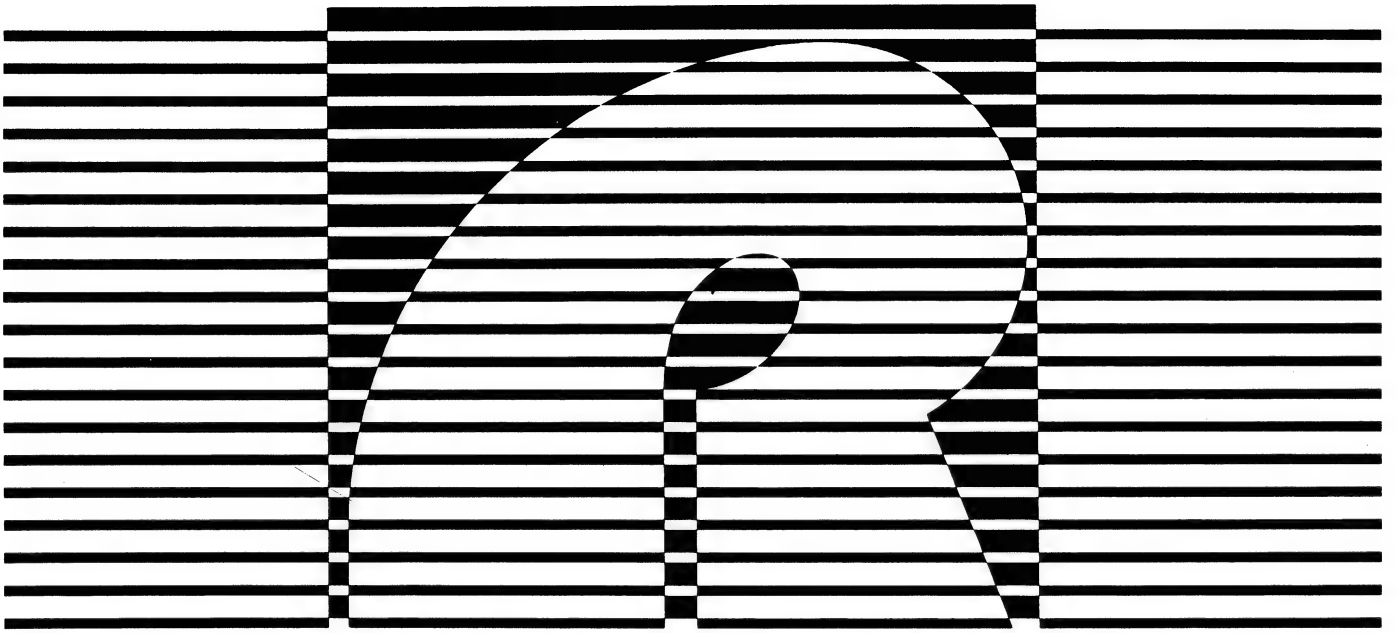

R:BASE SYSTEM V

— *Heavyweight Data Management*

A multi-user, corporate data management system must be* BIG — *hippopotamic, in fact. And that's what Peter Hill found upon evaluating this industrial strength database system for industrial strength data management (at an industrial strength price).

HOW WOULD I describe the flavour of R:Base System V? BIG! Everything about this database management system, a development from R:Base 4000 and R:Base 5000, is in the hippopotamic mould, from the size of its executable files to its appetite for data. The statistics in Table 1. might help shape your concept of this suite of programs.

As indicated by the Opening Menu shown in Figure 1, R:Base System V is indeed a full system of programs: at the core of that system is R:Base itself. Almost anything which can be performed by the total system (other than alien data import/export) can be performed as a command line from the R:Base prompt.

Furthermore, these R:Base commands can be entered in Prompt-By-Example mode (see Figure 2 for a Prompt-By-Example menu, and Figure 3 for a typical session of command building with Prompt-By-Example). This mode builds the command as the user selects from a set of Lotus-like menus, and then parses and attempts to execute the specified command. On-line, context-sensitive help is readily available — this holds true throughout the whole system. Considering the size and capacity of R:Base, the speed of loading and overlay access is quite acceptable.

However, R:Base itself is only the kernel of the system. The other elements of the system are –

Application EXPRESS: an application development module which automates the generation of program code;

Definition EXPRESS: a module to guide the user through the process of defining or modifying the definition of a database. (Refer to the boxed item *What's a Database?*);

Forms EXPRESS: a screen forms definition module; and

Reports EXPRESS: a report definition module.

Additionally there are three other appendages: Filegateway allows the import and export of ASCII, Lotus 1-2-3, Symphony, Multiplan and Visicalc files, and import from PFS and dBASE II and III. RBEdit is provided as a rather specialised command file editor and CodeLock performs encryption of command files.

Each of these modules is available from a selection menu if the program is invoked with the command RBSystem.

R:Base is a pleasure to use at all levels. At the novice level, the menus are well chosen and the purpose of each option is clear. Progressively, as each section becomes familiar, it is possible to disable

```
Minimum Memory Required     : 512 kB (640 kB in multi-user mode)
Disk Space Required         : 4 MB of hard disk (for full system)
Time to install             : In excess of 20 minutes.
Characters on command line  : up to 5000.
Tables in a database        : up to 80.
(see the text box, 'What's a Database?'),
Number of rows (entries)    : up to disk space.
Columns per database        : up to 800.
Recommended retail price    : $1450.
Number of users on network  : unlimited.
```

Table 1. *Everything about R:Base System V is in the hippopotamic mould — as amply demonstrated by the table.*

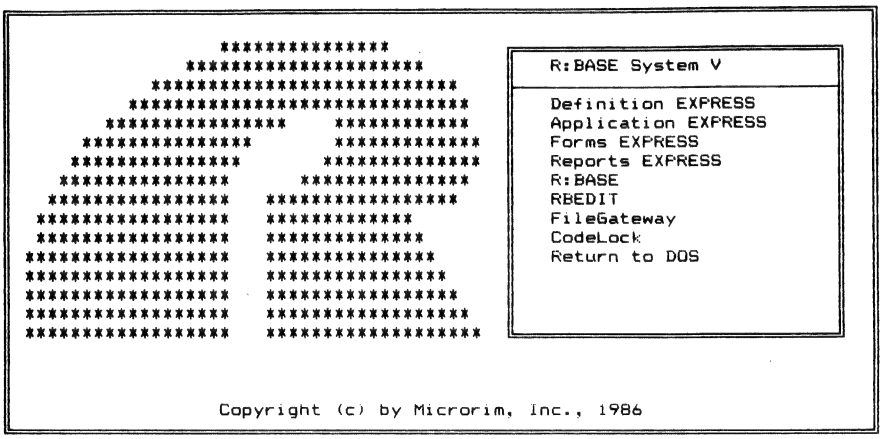

Figure 1. R:*Base System V's opening menu.*

the menus and hand-holding parts of the software until the help provided is sparse. This contrasts well with software which insists that you either learn all aspects from the manual before summoning the courage to actually fire it up, or the kindergarten approach that's irritating in its helpfulness.

The expert user can choose to start each of the modules individually from DOS, and even to avoid the initial welcoming screen display. As I became used to the system, I progressively decreased the level of help automatically provided, but it was re-assuring to be able to call help at short notice by pressing the F10 key or moving into Prompt-By-Example mode.

Like all such products, R:Base System V has strengths, weaknesses and peculiarities. The most outstanding examples of these also shed some light on the design of this database manager, so I'll examine them in some detail as the review progresses.

Strengths

There are so many exceptionally well-crafted aspects of R:Base System V that seems improper to select just a few, but that's never stopped me before, so . . . .

Passwords: The allocation of passwords to tables is an intrinsic part of the database itself, rather than an afterthought, and works just as it ought. With multi-user applications in mind, this is an essential function, and the ability to set a password for each of the Read and Modify tasks is appreciated.

Help: There is almost always on-line, context-sensitive help available, and it is usually adequate to avoid a side trip to the documentation, which brings us to . . .

Documentation: whilst the amount of documentation (ten separate booklets!) is a bit overwhelming at first, it is consistently well written and concise.

Database structure: The integrated view of a database on which R:Base System V is based is intuitive and the relationship between parts of the whole picture is more obvious than some data management products. In addition to the VIEWS approach of constructing a pseudo database, it is possible to permanently create data comprising the relation between various tables through the commands INTERSECT, UNION, JOIN and so on.

Module Consistency: Once you are familiar with the operation of the menus in R:Base System V, you can operate virtually any module in the same manner. This approach means easy familiarisation with the total system, and it should keep training time for new users to a minimum.

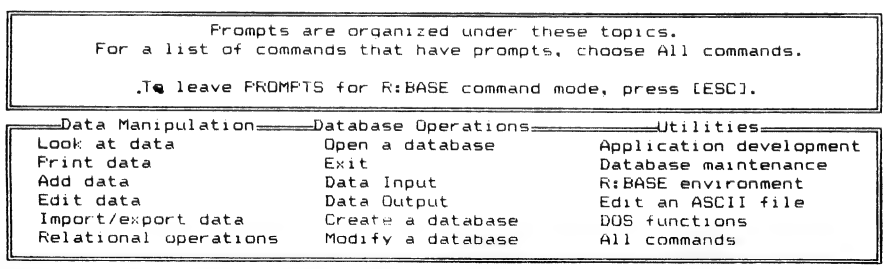

Figure 2. R:*Base Prompt-by-Example menu.*

Copy Protection: R:Base System V is not copy protected. During evaluation I managed to create an endless loop and consequently (by re-booting the system) damaged some of the program files. If this had happened on a copy protected system I would *at least* have lost one installation count, but with R:Base System V it was a straightforward task of reloading the program files from diskette.

Supermath: A rich vocabulary of 70 pre-defined functions for mathematics, trigonometry, string handling and logical functions is available. The depth of these functions is remarkable, comparing well with the @functions provided in Lotus 1-2-3 Release 2. And, if you find the need for hyperbolic cosines in your database management, it's there!

Macros: As well as a complete programming language and an applications generator, R:Base System V allows the user to attach keystroke definitions to the ALT and CTRL keys up to a total of 512 characters and also to 'record' and 'playback' keystrokes in an EXEC file up to around 64 kB of capture. Between the many operational options there is a method to suit every user and each level of skill.

DOS access: All modules provide sufficient access to DOS (with R:Base also providing ZIP to allow external operations) to avoid the need to exit to DOS to perform mundane housekeeping tasks.

Integration: R:Base System V does not pretend to be an integrated package. It is amongst the best of the database managers, and is satisfied with that. In order to compete with the increasingly competent integrated packages on the market, there is a need to be able to feed data to and from spreadsheet, graphics and word processing packages.

As noted above, Filegateway allows import and export of data from and to a variety of standard business packages directly (in the case of Lotus 1-2-3 and Symphony) and indirectly by writing ASCII files. The Filegateway module is straightforward in operation and works quickly and effectively. It includes the ability to decide what to do about deleted and non-conforming data, and a number of options for ASCII file de-limitation. In common with many packages which include a translator, it

What's a Database?

THIS IS NOT a tutorial on database basics — that subject was covered admirably by Rose Vines in the January 1987 edition of YC. Rather it is an explanatory note on Microrim's version of what a database is *vis-a-vis* the opinion of some other software vendors.

In the opinion of Microrim (as expressed in R:Base System V), a database comprises:

Tables: A table holds data in rows corresponding to certain definitions called columns,

Rules: A rule is just that: it might restrict entry to a table or all tables where certain conditions are not met. For example, you can establish a rule that an item number cannot be replicated, that a manufacturer's name must be given or that a certain input must be at least equal to the sum of two other columns,

Passwords: Passwords can be defined for both Read and Modify status,

Views: A view is just that: a view of the database. These are essentially pseudo-tables which gather information from real tables. A subset of the operations possible on tables is defined for a view (for example, it is impossible to BROWSE a view).

Reports and Forms: Both report formats and forms are intimately linked with the definition of the database and are hence considered part of the database.

The upshot of this concept of a database is that the relations between the various data (the Tables), the verification aspects (the Rules), their availability (via Passwords), their linking (via Views), and their screen/printer representation (Reports and Forms), is much more transparent and intuitive to the user than the situation where (using R:Base terminology) each Table is a database requiring some element of artificial linking. Of all the positive aspects of R:Base System V, this is the strongest, since a natural approach to database definition leads to intuitive data handling. □

does not allow direct export to its competitor's products.

At another level, I have used R:Base System V with SideKick resident most of the time (excluding speed tests) on a 640 kB machine without any compatibility problems. The memory-resident program Graph-In-The-Box can just be squeezed in, and it operated in a satisfactory manner.

Application EXPRESS strengths: Application EXPRESS makes an appearance in both the 'Strengths' and 'Weaknesses' sections of this review. Figure 4 shows an example of a menu developed under Application EXPRESS for the maintenance of a large library developed during the evaluation of this product. As you can see, the appearance of the menu is professional, and the menu is supported by help screens accessed with F10. The time to develop this application (complete with submenus and help screens) was minimal, and the code generated by Application EXPRESS was robust and well constructed. Some reservations about this module are detailed later: it is nevertheless unusual to be able to generate such a professional application in such a short time.

Contains: This function is used to search a database for fields which 'contain' a specified string of text. If your profession involves substantial textual content (say, a legal practice) this feature might be sufficient in itself to justify the use of R:Base in preference to its competitors. Whilst it is possible to emulate this function in other database languages, the emulation is rarely as fast and comprehensive as the built-in function.

Reporting: During the *Great Database Search* (YC *Oct. and Nov.* '85, *and Jan.* '86), R:Base 4000 fell short in its reporting capabilities. The situation now is that R:Base System V has extensive reporting capabilities, including the ability to define expressions as part of a report and the capability to produce a report up to 255 columns wide. The Report EXPRESS module is as powerful as any of the other modules of the package. Given the structure of an R:Base System V database, this is an impressive achievement.

```
SELECT TITLE SUB1 SUB2 COST FROM libris SORTED BY AUTHOR WHERE ...

Choose an operator to combine conditions - Choose (Done) when done
 AND  OR  AND NOT   OR NOT    (Done)
```

	Column	Operator	Value
	PUBDATE	GT	1972
AND NOT	AUTHOR	EQ	jones

Figure 3. *Building a command in Prompt-by-Example mode.*

Weaknesses

R:Base is quite a mature product, having evolved from R:Base 4000 and R:Base 5000, but it is not beyond criticism. None of the flaws presented here are fatal, but each one ought to be addressed in a product in this price bracket targetted at corporate use.

RBEdit: This program editor is barely adequate for the task. It gives every appearance of having been written hastily and developed until it was judged 'good enough.' The editor is limited to 80 characters across by 800 lines, which is not an undue set of limitations for the type of file it is editing, but it's distinguished more by the features it doesn't have than the ones it does.

There is no search function, let alone search and replace (and someone on the R:Base team must know how to search and replace!); there is no insert mode (which will be a pain to many like me who regularly use it); the block copy procedure is exceptionally clumsy; there are no pop-up menus or immediate help; and there are no other advanced features other than the capability to repeat a character.

This situation might be barely tolerable if you could use another editor in lieu of RBEdit, but there are certain circumstances where this is not possible — for example, editing an EXEC file which replays keystrokes. All this comes about through the desire to be able to run RBEdit on top of R:Base in limited spare memory, but it's no excuse in a program-

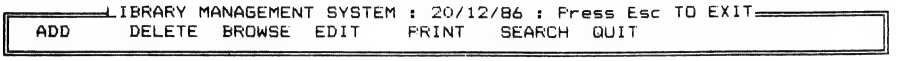

Figure 4. A *menu developed under* Applications Express.

ming environment of this size and at this price, for the fact that RBEdit is clumsy and lacks certain features: there are many programming editors which sport advanced features whilst still occupying minimal space.

Menus: Whilst menus are a feature of R:Base System V, they are occasionally inconsistent in operation — some allow 'standard (read Lotus 1-2-3 style) operation whilst others require a selection number or actual movement via the cursor keys: this is a rare but annoying inconsistency in an otherwise highly consistent user interface.

Application EXPRESS flaws: This module is a laudable attempt to generate program code without the tears. It guides you by the hand through some quite complex processes, and provides a reasonable subset of the commands available in R:Base for selection by menu. It is, however, a code generator rather than an application expert system. As such, it can be as artificially stupid as the person using the keyboard. For example, it is quite acceptable to Application EXPRESS to define an application for which ESC does not escape to the main menu. This is fine as long as you don't forget to specify an exit option on the main menu. Specifying a system like this is a certified way of turning your computer into a single function machine — having started the application, there is no escape.

Furthermore, Application EXPRESS can sometimes generate code which does *not* perform the task that the user had in mind. The most common expression of this flaw is a sequence of 1) select a menu item from the main menu, 2) the screen clears, and 3) the main menu re-appears.

The solution to the latter problem is a high degree of planning and attention from the user, but this is not the light in which Application EXPRESS is presented to the purchaser.

Apparent Speed: R:Base System V actually performs all of its data management functions with excellent speed: for a comparison with dBASE III Plus, refer to the accompanying boxed item. However, prospective purchasers (especially developers considering using it as a development packaging tool) ought to be aware that it does not give the *appearance* of being particularly fast.

In common with other multi-user packages, R:Base System V has to perform such tasks as writing to the screen in what IBM refers to as 'a well-behaved manner,' that is, normal DOS function calls have to be used rather than writing to video memory or directly manipulating hardware. The result is that text trickles down the screen rather than jumping up as is the case in single user packages such as Lotus 1-2-3.

Compounding this is the fact that, as is the case in dBASE III Plus, the user's command files are read and interpreted from disk rather than compiled. This would hardly warrant criticism except that insufficient care has been taken to re-assure the user that all is well: instead of long periods of blank screens a simple 'Processing' or 'Wait' indicator on the screen would relieve the suspicion that your task has gone off into the land of lost programs.

Experienced users can modify the R:Base prompts, so that Prompt-By-Example works as an application; these menus execute faster than menus generated in Application EXPRESS and hence suit the application developer who is willing to explore the syntax of the R:Base prompt files better than the casual user.

Network Support

It's given in the manuals that R:Base System V supports these networks: the 3COM Ether Series, the IBM PC Network, and the Ungermann-Bass Net/One. I have not attempted to verify its performance on any such system, but can only add that the elements required for proper multi-user operation are present — password protection, table locking and row verification.

In Perspective

R:Base System V, at a recommended retail of $1450 plus tax, is not cheap for the single user. To develop a small and trivial database under this system (such as a list of names, addresses and telephone numbers) would be a waste of time, money, disk space and effort: such an application could be managed with PC-FILE or any other basic list manager. R:Base System V is unquestionably BIG, and as soon as you start to think BIG you are in to R:Base System V territory.

System V is a complete system for networks; there are no additional fees for multiple users beyond some arbitrary number, and additional documentation to support network stations is available at the reasonable charge of US$100. Where the package shines brightly is in applications of some complexity. If the key features of a system are *a*) a number of sources of information which need to be inter-related, or *b*) a multi-user system, with differing tasks for each user, or *c*) a system which is likely to need continual modification and might grow into one or both of the above, then the System (and it is much more than a program) is highly recommended.

At the time of writing, CLOUT (Conversational Language Optional Utility) had not yet been released for R:Base System V. This query language parser has previously attracted favourable reviews, and would certainly enhance the use of this program on a network. It would no doubt simultaneously 'enhance' the already hefty price. In the US, a RUN-TIME version of R:Base System V has been released, and is expected in Australia in due course.

In a multi-user environment, R:Base System V can be a very attractive proposition. If we take as an example a telephone order 'bank' at a mail order company, the cost of R:Base System V for five networked users will amount to only $300 each. Given that R:Base System V offers a good software development environment, with stable support from its authors (Microrim) and its Australian distributors (Microsoft), this product deserves serious consideration for complex multi-user operations.

Product Details

Product:	R:Base System V
Manufacturer:	Microrim Inc
Review Copy From:	Microsoft Pty Ltd 1/17 Rodborough Rd, French's Forest 2086 NSW (02) 452 5088
Price:	$1450 plus tax

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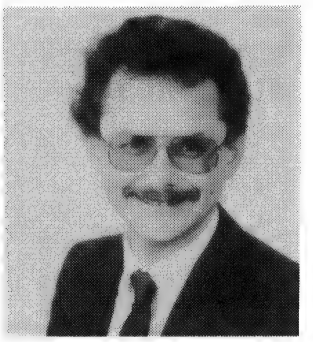

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R:Base System V

R:Base System V *vs* dBASE III Plus

THE TEMPTATION TO compare these two products is irresistible. The most telling comparison between them is the fact that they are essentially competing for the same (corporate) dollar. In neither case is the cost trivial; and the actual cost of learning either package is also considerable.

R:Base System V supports or in some way emulates most of the functions provided in dBASE III Plus, but in some areas it does it in a significantly different manner. The comparison of limitations that follows and the accompanying 'benchmark' comparison table, reconcile the differing approach and syntax, and compare like functions (but only in the areas which are really significant to system development).

The limitations of each —
Number of data files simultaneously open:

dBase 10,
R:Base 80;
Size of MEMO/NOTE field:
dBase 5000,
R:Base 4092 bytes;
Characters on a command line:
dBase 254,
R:Base 5000;
Largest number:
dBase 10^{99},
R:Base 10^{307};
Smallest number:
dBase 10^{-307},
R:Base 10^{-307};
Numeric accuracy:
dBase 15,
R:Base 15 digits; and
Fields per data file:
dBase 128,
R:Base 80 (800 per database).

As you can see, in this comparison each product has its strong points. It would be foolish to get excited about the ability to place 5000 characters on a single command line (as in R:Base), since it is rarely necessary and can be handled otherwise in dBASE. However a number of applications do come up against the dBASE limitation of ten open files at one time, especially when using files with MEMO fields which count as two. In this area, the R:Base support for 80 files in a database which are effectively simultaneously open is welcome.

The operational speed tests were performed using a data base which exceeded 230 kB of disk space. The results (shown in the accompanying table) also highlight the differences in philosophy between the two approaches to database management. R:Base System V performed well when the user specified demands on the full database, and its speed for drawing (screen) reports was the more acceptable. dBASE III Plus showed its strength if the user were capable of programming and hand-crafting the application. R:Base could not beat dBASE if the developer is able to write applications making intelligent use of FIND for an indexed database; if you make casual enquiries of a database, then in some circumstances R:Base System V will win hands down.

Obviously, the results are a mixed bag. The key to understanding Benchmarks 3 to 5 lies in the differing manners in which dBASE III Plus and R:Base System V implement index or key fields. In the case of dBASE III Plus, an open index is a very positive attribute *if* you confine your activity to the currently selected index. For example, if you have a name and address database with the Surname field indexed and that index selected, you can very quickly find any surname. If however, you wish to display all records with postcodes greater than 3000, that open Surname index becomes a liability, slowing operation. R:Base System V uses a system of nomination of key fields, and the fact that one or more fields are nominated as key will accelerate a search on these fields. Unlike dBASE III Plus, however, there is no deterioration in performance caused by having key fields when you are searching on other than the key field.

The relative sort times (Benchmarks 1 and 2) need to be considered in context. Whilst they both measure the skill with which the software has been written, a sort on ten fields is a rare beast since only very unusual databases actually have the first nine fields the same and differ only on the tenth. Although R:Base System V is faster on the single-field sort, dBASE III Plus creates a permanent version of the sorted output which can be re-used.

Overall, there is no winner on pure speed, but R:Base is likely to be faster in the hands of users of novice to intermediate capability, whilst dBASE III PLUS can be equally as fast for an advanced programmer and more useful if sorted data is essential. ▷

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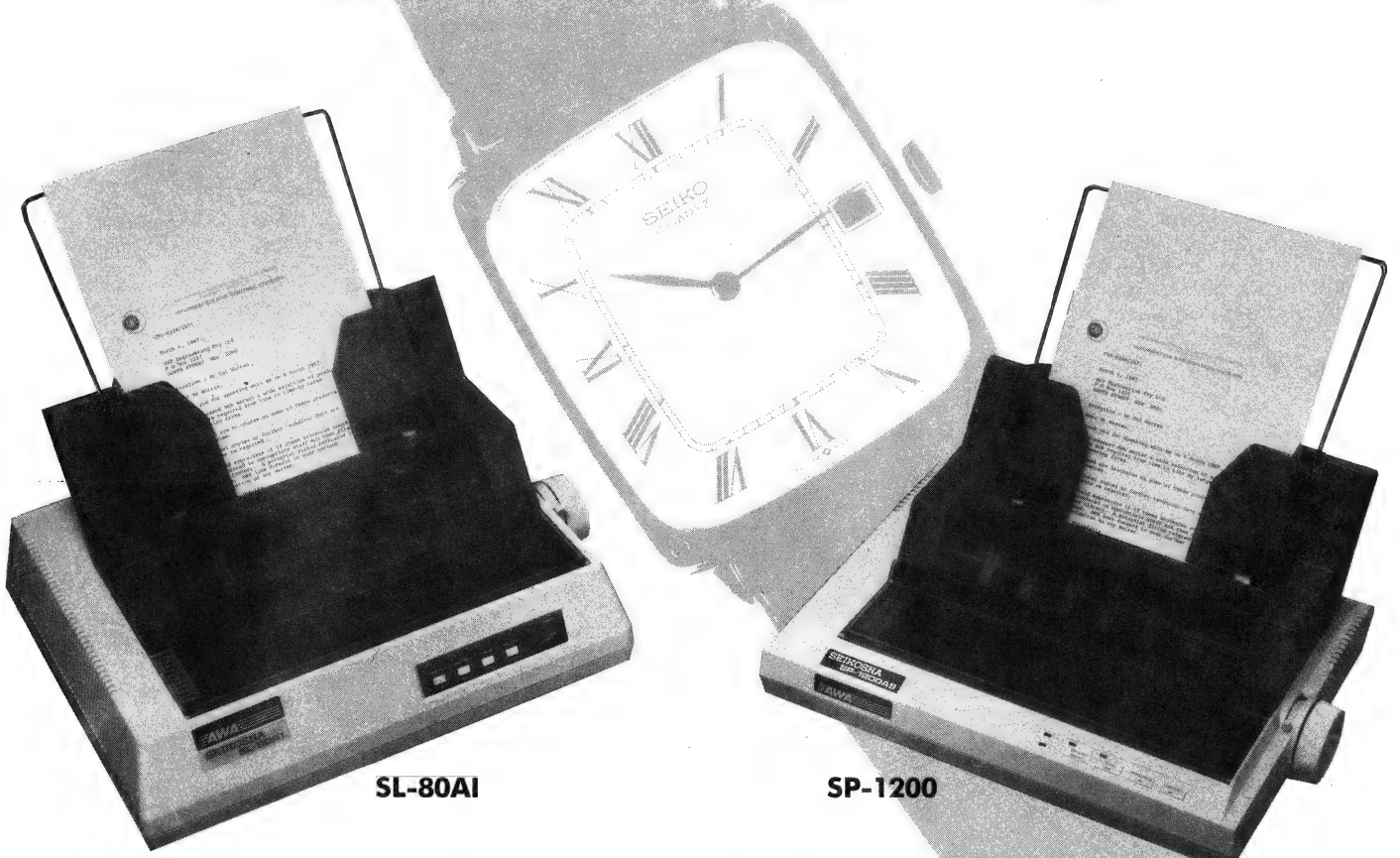

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Packed with a host of advanced features such as auto paper load, draft and NLQ modes, 8K buffer, enhanced printing, graphics, optional cut-sheet feeder and many others, the SP-1200 series gives you professional output at a price you can afford.

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User interface: dBASE III Plus provides the facility to guide the novice user through creating, using and retrieving data from a database through the excellent ASSIST facility. R:Base System V extends this concept to each module of the suite of programs. Each of these products is remarkable for the degree of assistance that is provided to the user. However, the consistency throughout all of R:Base System V's modules and the clarity of the menu descriptions for each task, give it a winning edge.

R:Base System V takes this category convincingly despite its lack of a tutorial module. Whilst dBASE III Plus provides a code generating module called APPSGEN, it is very basic relative to the handholding facilities provided by R:Base System V. In APPSGEN one has the choice of either generating the most basic of applications or choosing the ADVANCED method which does little more than present a blank screen on which to write a command tree. The various EXPRESS modules in R:Base System V allow modestly complex systems to be built up by inexperienced users, and are far more consistent and flexible than the dBASE CREATE equivalents.

Database structure: Again R:Base wins the day: as well as the Tables/Views approach, the integration of Rules and Passwords into the database is an intuitive and useful approach. Whilst dBASE III Plus is now providing views and catalogs (groups of related database files, command files and reports) as part of the package, these features are tacked on rather than being intrinsic parts of the database structure as in R:Base.

Documentation: There is very little to choose between the two packages. In each case the documentation is extensive to say the least, and is structured for various user levels from novice to expert. In neither case is the index as good as it ought to be: trying to get a thorough understanding of CATALOG or VIEW in dBASE III Plus by reference to the index is a sample session in frustration.

Support: dBASE III PLUS is supported on four levels — 1) Informal: there is always someone around who knows dBase II/III-/III Plus; 2) Utility: the *Your Computer* publication 'dLetter' is a typical sample of knowledgeable product support from experienced users (dLetter is distributed free of charge monthly with subscription copies of the magazine); 3) Training: many independent training centers provide dBASE training, few (if any) provide R:Base training; 4) Formal: Ashton-Tate gives every appearance of longevity.

1. Show all in sorted order (sorting on one field)

	START DISPLAY
R:BASE	48
dBASE	88

Whilst these times might all appear long, bear in mind that the database used was quite large. A comparison with Lotus 1-2-3 Release 2 (one of the integrated alternatives to these dedicated database managers) showed that to load the database (1-2-3 format) took 11 minutes, to sort on one field in memory took 104 seconds, and to save the result took 68 seconds, creating a .WK1 file of 480 kB. If you have to deal with large databases, then you really need the best of the stand-alone database managers available.

2. Show all in sorted order (sorting on ten fields)

	START DISPLAY
R:BASE	211
dBASE	95

3. Show all for a condition

	START DISPLAY
R:BASE	2
dBASE	3

4. Show all for a certain condition (indexed)

	START DISPLAY
R:BASE	2
dBASE	30

5. Find a record (indexed)

R:BASE	1
dBASE	1

6. Create Index

R:BASE	123
dBASE	51

A comparison of dBase III Plus and R:Base System V using a database of 2315 records or lines.

R:Base, despite an enthusiastic following, cannot claim the same depth of support. Whilst the Australian distributors of R:Base System V (Microsoft) have great stability, R:Base is less well-established as a database system and is still finding its feet. Microsoft are tackling this by providing training for selected audiences and videos of these training sessions. Additionally, they are in the process of setting up a technical and tips bulletin board to support the product. Such systems (which are more common in the US) can be important to resolution of 'undocumented features' (known in the real world as *bugs*).

I would recommend R:Base System V over dBASE III Plus *if* you can afford it — in this case afford means not only the price, but also the fact that you have to invest adequate effort to become competent with the system. Whilst dBASE III Plus is showing its age (or more accurately the age of its origins in dBASE II) it is well supported by books, user groups and training courses which ease the burden of becoming familiar with such complex packages. □

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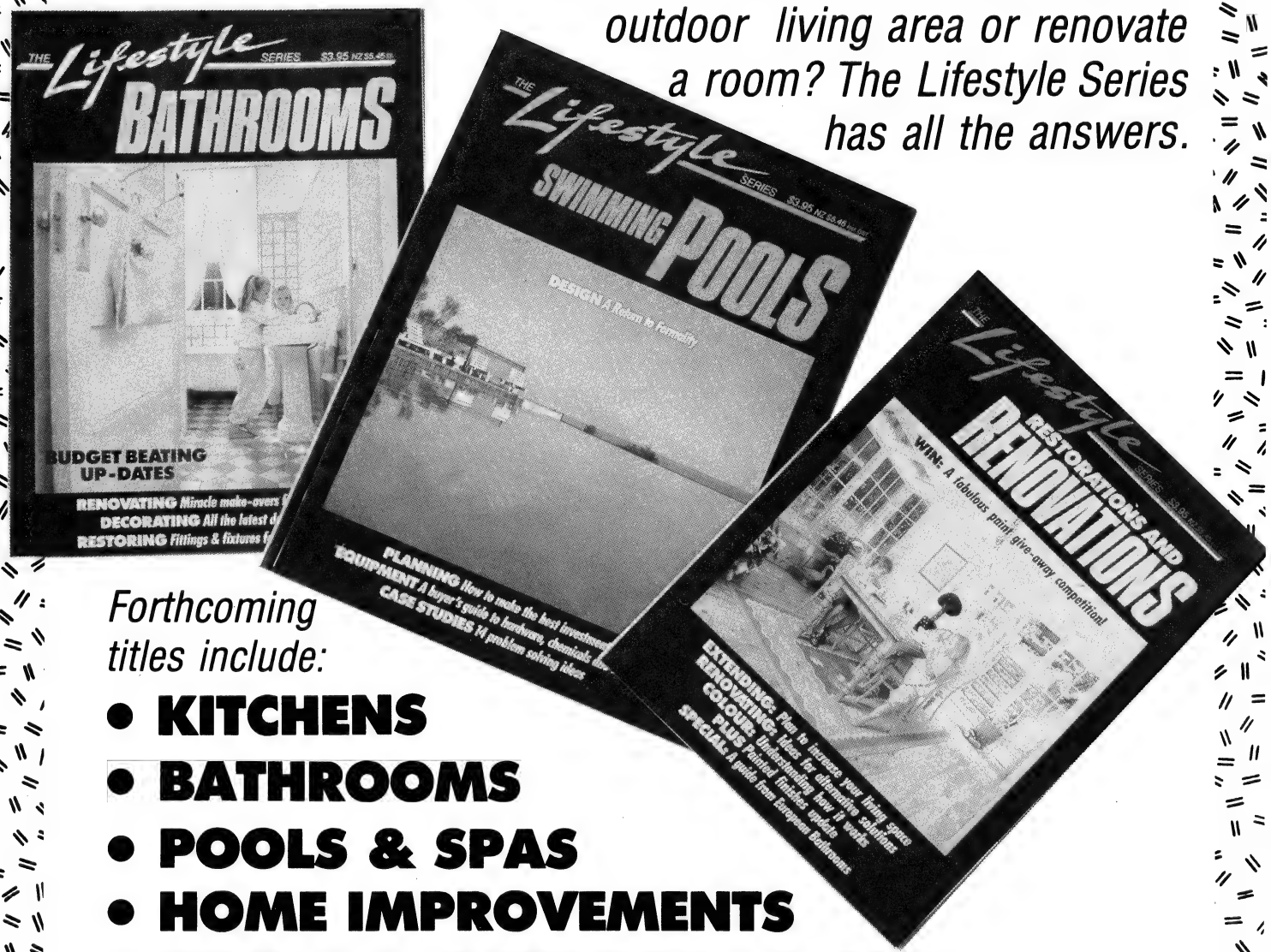

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Some packages are useful, and some are just plain fun — this graphics printing enhancer is both! It can even take some of the rough edges off your drawing, as Ewart Stronach found.

PIZAZZ

— see what your printer's been missing!

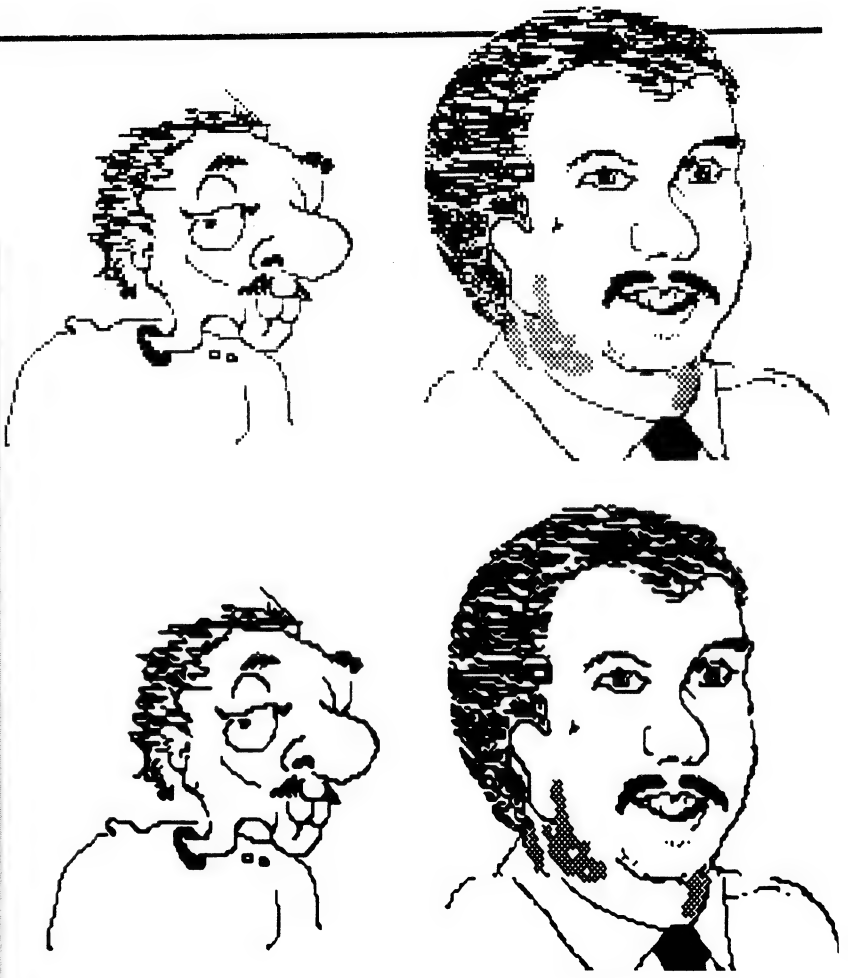


Figure 1. *The figures on the top were dumped straight from* PC-Paint, *those on the bottom were dumped through* Pizazz *with the smoothing function on.*

NOW HERE'S A little beauty! I have always been fascinated by graphics because it allows the frustrated artist in me some easy outlet and makes my pathetic, free-hand efforts look better than they really are. But, on most occasions that I send a masterpiece to the printer, the result always lacks a certain *je ne sais quoi*.

Now comes Pizazz in it's bright pink cover with the easy-to-follow directions and the promise of total printer control. Pizazz takes just about any image your computer can display, from almost any application program running under DOS, and allows you to print it better than is possible with a screen dump. Or, you can alter its size, layout, density, or colour before printing. It can be used with almost any display adapter and automatically detects the current display mode. It will talk to almost any dot matrix printer or any printer which can be configured to emulate a dot matrix.

Installation

Installation of the software is easy. The distribution diskette is not copy protected and may be copied into a sub-directory on your hard disk with the main PZ.COM program in the root directory. And all runs without a hitch — well, almost without a hitch —

I load a series of utilities with a batch file at every power-up. These include Mace, a hard disk utility, Sidekick, a memory resident utility, and Norton Commander, a menu driven directory/utility program. I also call my mouse driver at this time. Having loaded and tried to run Pizazz for the first time, I was confronted with the dreaded message: 'Internal Failure, Stack Overflow,' and a total system lock-up. Obviously, there was some conflict with memory-resident software already installed. By deleting each program sequentially from my batch files, I discovered that Pizazz cannot live in the same environment as Sidekick. With this small set-back resolved, everything proceeded apace.

Running the installation program was straight forward. Pizazz leads you through a simple question/answer menu which sets up the program relative to your hardware. Each question has a help screen available, so even those who don't know the difference between a CGA, EGA or Hercules board should have no trouble in configuring the program. After configura-

Figure 2. *A screen dump using Pizazz with the background set to high density. To achieve the density required in the background, the print head made two passes, but paused about two-thirds across each line — there's nothing wrong with the software, just a tired printer.*

tion (which writes a configuration program into your directory area), the program is initialised by typing PZ. You then get an introduction screen which invites you to print it as a test.

I did so three times, selecting the three different densities offered at the menu. At the low density setting, the background was a medium grey and the failings of a heavily over-worked printer were obvious in the lines between print head passes. On medium density, the print head took only one pass to print each line but the background was much more even and the definition much better. On the third run, set at high density, the print head made two passes and paused about two-thirds of the way along each line. The result is a very clear representation of the screen, marred only by the shortcomings of my printer being visible as a line down the page where the head paused.

Print Options

Pizazz falls into the background after loading, and is automatically called with Shift-PrtSc. Each time you use this command, from any application on screen, you are confronted with the Main Menu, listing print options. These options may be selected with the Arrow and Enter keys or called directly with a keystroke related to their needs. The first is PRINT, and this starts the printer with all values at the default settings. Alternatively, you may select the opportunity to alter the colour, width, height, margin indent, form feed, density, number of copies, ribbon style, top of form, smoothing action, a view of the screen or the direction of print.

Much of the menu is given over to the options available to those of you lucky enough to own a colour printer, but a surprising number of alterations can be made to a black and white picture.

Pizazz takes just about any image your computer can display, from almost any application program running under DOS, and allows you to print it better than is possible with a screen dump.

Using Pizazz

As a test, I loaded my favourite graphics program, PC-Paint, called a screen I had previously drawn, and dumped it. I then dumped the same file through Pizazz, using the smoothing function. The result is obvious, but not particularly staggering. The smoothing function causes the program to examine each line in the context of those surrounding it and decides which jagged edges to smooth out. In the example (shown in Figure 1), a crude sketch of a well-known computer identity, the enhanced result gave both a clearer print and one which looked a lot smoother, particularly in areas of large curves such as that well-known nose.

As a further test, I ran another program called Execuvision which I have never been able to make talk to my printer. The result in high density mode, apart from pounding the daylights out of cheap printer paper on the heavy black sections is very pleasing. ▷

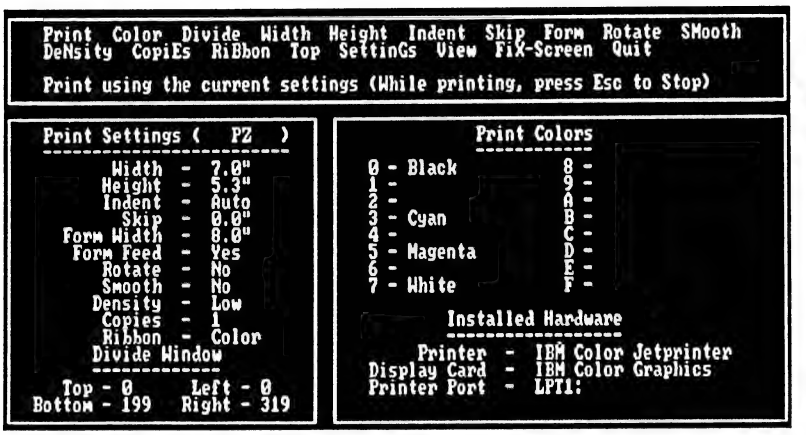


Figure 3. *The Pizazz Main Menu, shown above, is invoked by typing Shift-PrtSc. The screen on your monitor before the program was invoked, can then be printed by typing P or Return, twice.*

The Reverse function of Pizazz allows production of what amounts to a negative, with all colours reversed. The picture may be examined on screen before printing, as is the case with all the options. The Identify function shows what shades are to be printed. In the black and white mode, colours are obviously treated as shades of grey — your subject is shown on screen with the areas of the same shade shown as a highlighted ripple.

Each of the shades may be varied from a shade table. The lack of a colour printer severely hampered the fun I was having with the program and the wide range of variations available. A nice touch is the over-ride which allows a normal print screen for dumping a directory or such, without going through a full graphics dump.

In the colour mode (here I speak as a document reader rather than a tester), you are offered a wide range of colour handling options. Each of the displayed colours can be changed for printing purposes — that which appears red on the screen could be printed in green, for instance. An EGA adapter is capable of displaying 64 different colours but only 16 at a time. It is possible that a colour menu will display different colours than those used by the screen; when this occurs, the menu warns you of a conflict and allows you to resolve it.

Sections of a screen can be isolated and printed out, and screens can be captured and filed along with all pre-set print instructions for later printing. This allows the use of a print spooler for those who need to print a lot of graphics. As printer capabilities vary in direct proportion to how much you spent, a program called COLORS.COM will print a reference sheet showing all the colours your particular printer is capable of handling. As the colours vary considerably with your selection of density, it would pay to run this reference three times, once at each density setting.

Unusual Situations

Great care has been taking in the writing of Pizazz to accommodate unusual situations such as other resident software that may use the same keystrokes, or 'hot key' which would disrupt Pizazz' operation. If this is a potential problem, the program is loaded with a /K option. This records the current keyboard setting and automatically re-assigns the keyboard when you return to your application program. Another option available, /A option at load, allows the print screen keystroke to function even if the application program in use has reassigned those keys.

Normally the entire Pizazz program is resident in RAM and occupies between 80 and 224 Kbytes, depending on your display card. If loaded with the /S option, Pizazz loads only the minimum portion required to recognise your print screen command. When called, it takes the portion of memory above its load point and saves it to a disk file. It then loads the remainder of itself into memory, goes about its business, then restores the status quo. On a floppy system, this could be tiresome as a special swap disk is needed to handle the temporary memory file.

Well, the program works just as the documentation suggests it should, but what are its applications? It's great fun to use but I don't think the output is good enough from a dot matrix printer to be used as camera-ready artwork for publication. Production of business graphs to enhance reports, comes readily to mind (I have no doubt that neither my standard colour graphics board nor my middle-aged printer, do the program the same justice as an enhanced graphics board and a high quality colour printer would. The ability to clean up existing picture files is excellent. Its application for production of better looking graphs from almost any application such as Lotus 1-2-3 should find it a ready place in the market. And it gets 10 out of 10 in the Fun-to-Use category. □

Product Details

Product:	Pizazz Graphics Printing Utility
Manufacturer:	Applications Techniques, Massachusetts, USA
Review Copy From:	Syscorp Pty Ltd 41 Military Rd, Neutral Bay 2089 NSW (02) 908 1599
Price:	$159 untaxed

WORDS WORDS WORDS WORDS WORDS

WORDS, WORDS, WORDS

WORDS WORDS WORDS WORDS WORDS

Micropro's Wordstar 3 and Microsoft's Word 3.1

Recently we've seen a number of new word processors released, some with very sophisticated enhancements, some with nothing new. We programmed Keith Mackay to put words to processors and sort them out for us — this month he reviews two of the heavyweights: Wordstar 3 and Word 3.1.

Micropro Wordstar Release 3

IN ITS FULL GLORY, with spelling correction, mailmerge, indexing and the rest, Wordstar Version 3 runs to five or six floppy disks; but in its raw state, as a simple word processor, it is just three files occupying between them about 120 Kbytes (the exact size varies between subversions): WS.COM, WSOVLY1.OVR and WSMSGS.OVR. The first of these is the guts of the program, while the other two are overlay files, controlling, respectively, the less frequently used commands and the message texts. This means that the program needs only some 64K to run, so there are virtually no standard MS-DOS machines, or even CP/M machines, that will not handle it.

This may not be important to those whose budgets run to fitting multimegabyte boards, but for the humbler user, still plugging away on 256K, it is a point worth bearing in mind. In fact, on a single drive system it is possible to dispense with WSMSGS.OVR and thereby save about 30K of disk space. This requires some experience with the program, however, since no error messages would be displayed. (I was driven to this pass myself once on a CP/M machine with only one drive.)

Installation

The Wordstar package includes an installation program, which allows various defaults to be established: screen colours, initial help level, definition of function keys as rudimentary macros, and so on. Micropro's default definitions of the function keys are rather unimaginative: F5, for instance, turns on boldface while F6 underlines; I wouldn't have thought that either of these was used frequently enough to justify trying to save a keystroke or two; a little reflection suggests better uses to which the function keys can be put.

F10 acts as a sort of Alt key, toggling between two different definitions of the function keys. Unfortunately, the function keys may only be redefined to a maximum of six ASCII characters, which effectively means three pairs of control characters with normal characters. It is necessary, furthermore, for the definitions to be entered in ASCII code, which is not an ideal approach for inexperienced users (nor for anyone else, for that matter).

Other options on the install program include default margin settings, default help level and printer installation. The installation program itself gives a misleading impression of user-friendliness, offering repeated summaries of features chosen and constantly requesting reconfirmation, which eventually becomes more irksome than friendly. And if only one aspect of the program is to be changed — the help level, for example — it is necessary to go through the entire process.

Macros are very much the flavour of the month for word processors, but beyond the definitions of the function keys, Wordstar 3 does not offer this feature — users wishing to enjoy the advantages of macros need a package such as Superkey.

One of Wordstar's shortcomings, as far as hard disk users are concerned, is that it does not recognise subdirectories. While this can be overcome to some extent by judicious use of the CD (change directory) command on booting, it does constitute an impediment to tidy disk management.

Menus

Wordstar has six menus: the opening menu from which a file may be edited, printed, spell-checked, and so on; and five other menus for text manipulation, one of them provides on-screen help. The majority of commands involve invoking one or another of these menus and selecting an option. With the help level set at 3, the menus are actually displayed, occupying the first eight lines of the screen; at level 2, they are displayed if no key is pressed after the control character; at levels 1 and 0 they are not displayed at all. These last mentioned levels give Wordstar the advantages of a menu-driven system without the drawbacks — in other words, at help levels below 3, Wordstar commands consist of Control-key combinations.

The keys often have no apparent connection with their purpose, which makes them hard to remember — indeed, this is one of the most common criticisms of Wordstar. For example, ^KD performs a save; and while it is logical, given Wordstar's structure, to expect file-save to be on the K or block menu, there is no good reason why D should be the key which performs the save.

Another two ^K commands, ^KW and

^KR — unusual in being mnemonic — respectively allow sections of a file to be written to and read from disk; this allows boilerplate files to be used and different formats to be built into a text. ^KW can also save the user from having to abort a file altogether due to lack of disk space to save it: One of Wordstar's defects is that it is not possible to determine how much disk space is free without leaving the text file, but ^KW can be used to get out of it by marking the entire file as a block and writing it to disk A: for later transfer to a fresh disk.

Both search and search-and-replace can be performed in either direction (a word processor *not* offering this feature must be excluded from serious consideration) and a number of other options are offered, including making a given number of replacements, and repeating the last search.

The speed of search and search-and-replace depends on the length of the text, since the file is loaded in and out of RAM as required in small chunks (about 16K, I believe): an unconfirmed global search-and-replace making 44 replacements on a 40K file required 1 minute and 40 seconds. Suppressing the screen display, however (by pressing Escape after the search has been initiated), speeds things up considerably: with replacements not displayed until the process was completed, the same global search-and-replace took 37 seconds (all timings in this review refer to a 4.77 MHz system).

Display

Wordstar's display with the help level set at 0 is uncluttered. At the top of the screen there are five small boxes showing text name, cursor line, character length or page number, cursor column number and insert/overwrite status; while at the bottom there is a line of ten boxes showing the commands assigned to the function keys (judicious patching allows this to be disabled.)

Text may be displayed either justified or ragged-right, with no perceptible difference in screen-refresh time. The cursor can be controlled either by the arrow keys or by Control-key combinations. Scrolling is rapid, with the last six lines of the screen repeated on the following screen. Wordstar does not support a mouse. Movement from the top of a text to the bottom is not particularly fast: 15 seconds on a 40K file, rather longer if the file contains non-contiguous blocks.

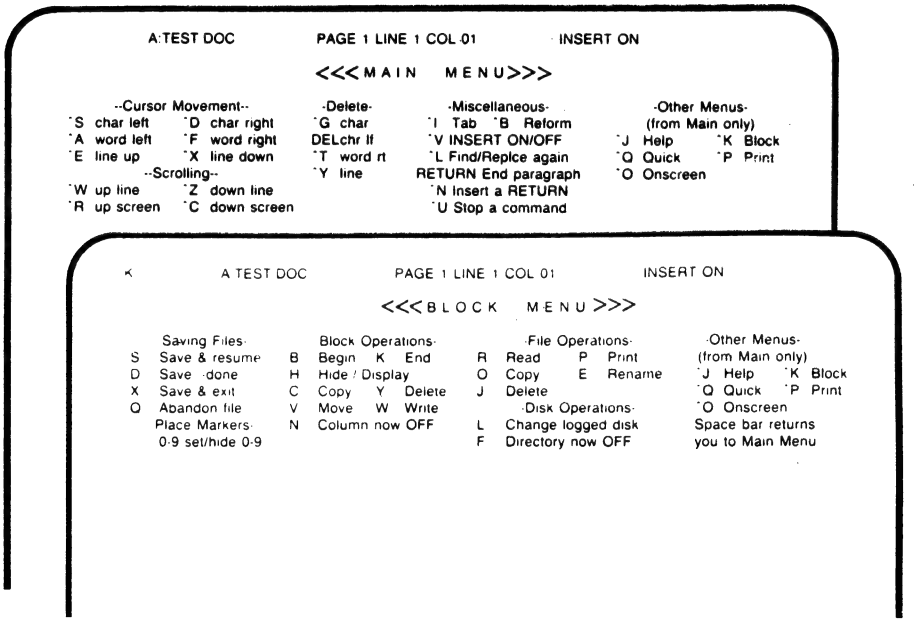


Figure 1. *Two of Wordstar's menus are shown above: Novices can menu-drive the program, but with the Help level set at 1 or 0, the program can be command-driven.*

Printer Commands

Aside from defaults set in the installation procedure, printer commands are issued by means of letters preceded by dots. These 'dot commands' control such things as page breaks and line format. Wordstar is a WYSIWYG program to the extent that a page will be printed exactly as shown on screen, but — underlines, italics and so on are shown as codes: ^S, for example, denotes underlining. (This display may be switched off in the installation procedure and toggled off and on while editing.)

Wordstar also allows printing to disk, producing a disk file which displays the text exactly as it will appear on paper (with the above-mentioned limitations); this allows close control of the final appearance of a printed text. A file may be written to a RAM disk, which is considerably faster than writing to a floppy or hard disk. Since lines beginning with a dot are ignored by the printer, non-printer commands or comments that aren't to be printed, may be incorporated into the text.

Although Wordstar includes place markers, they are lost when the file is saved; dot commands can be used as permanent place markers, however — my approach is to use ..@ followed by a number as a marker (since I have no other use for @), and to use a Superkey variable-field macro for a search.

Automatic hyphenation is supported in Wordstar; it's turned off or on either in the initial installation or at any time from the Block or K menu. Hyphenations offered are seldom inaccurate, but must be confirmed by the user. In a re-edited paragraph with line breaks changed, redundant hyphens are suppressed. While Microsoft Word (discussed below), comes with the works — spell checking, outlining, mail merge, and the like — Micropro seems to take the eminently sensible view that since not everyone needs every possible word processing feature, it is preferable to package them separately. Leaving aside considerations of RAM mentioned above, there is also the question of price: Word retails around $800 without the mouse, while Wordstar costs $400 for the basic package and $600 in its complete configuration.

Spelling Checkers

Micropro offers two spelling checkers for use with Wordstar: Spellstar and Correctstar. Correctstar is undoubtedly the better, although it needs a hard disk to make it really hum. It consists of an overlay file and three dictionary files, INTERNAL.DCT, PERSONAL.DCT and MAIN.DCT, the latter being remarkable for its erudite vocabulary. There is also an installation file which determines whether a hard or floppy disk system is being used and establishes on which drives the various parts of the program are to be found. Correctstar requires WS.COM, WSMSGS.OVR and INTERNAL.DCT to be on the same disk with it, while the main and personal dictionaries can be on another disk.

Considerations of space therefore mean that a certain amount of acrobatics is involved in using the program on a standard-format floppy system. When the spell check is in progress, suspect words are highlighted on screen and alternatives are offered which the user can either accept or reject; in the latter case, further suggestions can be requested. If all else fails, a correction can be entered from the keyboard and the word added to the personal dictionary.

Text is automatically reformatted after a correction. The personal dictionary has a maximum capacity of some 25K, which is rather on the small side. It is possible to circumvent this problem to some extent by creating specialised dictionaries of little-used words and passing the text through them after the first check.

Other packages for Wordstar include Starindex, an excellent index generator; WSCONVT, which converts files to Wordstar format; Telmerge, a communications package; and Mailmerge. To my knowledge, there is no footnoting option, which is a serious omission. (Footnotes could be handled perhaps using a combination of SideKick and the ^KR command.)

Wordstar has been around for eight years or so and is among the most widely-used programs in the world. However, considerable criticism has been leveled at its complex battery of commands and the difficulty of remembering them. Indeed, it must be admitted that learning Wordstar is no easy matter, even with assistance from the thorough help screens. But, it would be unreasonable to expect to become proficient in a powerful computer program in a couple of hours. Wordstar's strength lies in its malleability, in its potential for adaptation to the user's needs, provided the user is prepared to put a little thought and effort into designing his own solutions.

If Wordstar is regarded as a customisable word processing skeleton, then, to which other features — a macro program, for example — can be added, it is an extremely powerful, elegant and flexible workhorse. In his review of Word Perfect 4.1 (*Your Computer*, Nov.'86), Les Bell speaks of 'open-endedness' in computer programs: their ability to do things which their designers did not anticipate and to grow with the user. It is my own experience that Wordstar displays this quality to a very high degree, despite its failings, and that once one has become familiar with the program, there is very little it will not accomplish. □

Product Details

Product:	Word Version 3.1
Manufacturer:	Microsoft
Review Copy From:	Microsoft Australia 1/17 Rodborough Rd, Frenchs Forest 2086 NSW (02) 452 5088
Price:	$845 untaxed

Microsoft Word Release 3.1

WORD REQUIRES A minimum of 256K and two floppy disk drives to run. On a twin floppy system with standard-format drives, however, it is in practice impossible to create a self-booting Word disk without erasing the help files. Although there appears to be ample space for COMMAND.COM and an AUTOEXEC.BAT file, Word writes various editing files to drive A: as text is being edited on B:, and at least 20K must be left free for them. One could, of course, boot from a DOS disk with an AUTOEXEC.BAT file in A: and Word in B: and then replace a text disk in A:, but this would involve just as much inconvenience as the more obvious approach.

Certain of the program's features, moreover, such as the spelling checker, cannot be used on a 256K machine from within the word processor itself and must be run straight from DOS. Word is therefore best run on a generously berammed system with a hard disk. A mouse is also supported (although I do not have such a creature, so I am unable to comment on the program's behavior therewith).

Word comes with an extensive tutorial on two disks — one devoted to the use of the mouse. The tutorials, although they take the view that the user is a simpleton idiot, present an adequate coverage of the program, all the way from identifying the space bar and moving the cursor to the arcana of creating outlines and style sheets. The documentation is of a high standard also, well-written and well-organised.

The help file, which runs to 58K, offers context-sensitive help — entering the help file while attempting a given task provides information about that task, which can be resumed when the information has been digested. It is also possible, given sufficient RAM, to exit editing, run through a given section of the tutorial and return to the text file.

Installation

Word may be loaded ina number of ways: word/c, for example, disables Word's graphics capabilities, which, on an appropriately configured system, allow display of underlining, italics and so on; and has the further effect of slightly increasing the scrolling speed. With a Hercules Graphics Card attached, word/h starts Word in condensed mode, displaying 43 lines of 90 characters instead of the normal screen size. Word/l loads the last active text file with the cursor at its location on the last save, even if the computer has been turned off. This feature depends on a file called MW.INI which Word reads from the program disk when the program is started and updates on quit, recording the way the last active text file was set up. These various slash options may be used in combination.

Earlier releases did not allow the use of any memory-resident software — bitter squabbling would break out over the use of the keyboard and nobody won. This problem has been rectified in release 3.1, however, and Word will now live in harmony with Sidekick and Superkey.

When Word is booted (rather slowly on a floppy system), the screen displays a box which serves to border the text, thereby wasting a certain amount of screen space — the standard computer screen is already small enough without cluttering it with cosmetics. A menu is displayed at the bottom of the screen, occupying three lines. This may be switched off, allowing a maximum of twenty-two lines of text, the last two of which are repeated on the next screen. The cursor is solid and unblinking, and thus rather hard to find in a sea of prose. Cursor movement and scrolling are distinctly sluggish.

Movement from the top of a text to the

bottom, on the other hand, is instantaneous, probably — and this is speculative — because Word knows on loading a text file how long it is and can identify the end without looking for an end-of-file marker, as Wordstar does. Text loading and saving are, perhaps for the same reason, a little on the slow side. A global search-and-replace through a 40K file making 44 replacements took 47 seconds.

Menus

The majority of Word's commands are given from the menu, which is accessed with the Esc key. Thus, to perform a search-and-replace, it is necessary to leave the text mode — the 'Alpha mode,' in Word parlance (an attempt to make Word familiar to Multiplan users?) — press Esc and select from a number of options. This menu-driven approach is an excellent system for beginners, since it allows them to begin writing within a matter of half an hour or so. But, after some experience with the program, this approach soon becomes tedious — since a number of formatting commands can be given with Alt combinations rather than through the menu, one wonders why Microsoft (within the context of such a powerful program) doesn't offer alternatives, perhaps with the Control key, for the more frequently used commands. (Word makes relatively little use of the Control key, and it is hard to see why it was not configured as I have suggested.)

Manipulating Text

Word relies heavily on marking blocks for text manipulation. Although a search may be performed in either direction, search-and-replace is restricted to forward unless a block is marked within which the search is to be performed, in which case direction becomes immaterial. This means that if text is to be replaced at an unknown location in a document, the entire file must be marked as a block (Shft F10), replace mode entered (Esc R) and the search-and-replace instituted. This is rather a cumbersome way of going about things. Search-and-replace is global by default, which means that it must be terminated with the Esc key if only one replacement is to be made.

Word allows the use of up to eight windows for simultaneous viewing of different parts of the same text, or simultaneous editing of multiple texts (with the above maligned border now doing something sensible, namely enclosing each window).

Word is formidable: It is a very powerful word processor, easy to learn and probably worth the asking price in terms of the number of features offered.

A number of options are offered, including adjusting the window size, vertical or horizontal split, loading a text to a window, saving a text from a window and copying texts between windows, although if a single document is split, changes in one window are not made in any others. (I am, in the best tradition of word processor reviewers, writing this section of the article using Word, with a total of four documents on the screen just to prove it can be done.)

Microsoft, aiming at Wordstar users, includes in the package a program called CONVWS, which converts Wordstar files to a format legible by Word. The convert utility did not perform with one hundred percent efficiency on the document you're reading — when I edited it under Wordstar and then reconverted it to Word, there were still one or two Wordstar glyphs scattered around. A more orthodox single conversion works smoothly, if rather slowly. Word files can be read by Wordstar with little difficulty, although it is necessary to delete a couple of Word command lines at top and bottom of the text and reformat with the ^Q^Q^B command, since Word paragraphs appear in Wordstar as single lines.

Dictionary and Thesaurus

With Release 3.1 of Word, Microsoft has introduced a 220,000 word thesaurus, which allows the usual options of listing synonyms for a selected word and carrying out replacement in the text. It is also possible to look up any of the words given in the synonym list.

Word's spelling checker consists of three dictionaries, the main one having 80,000 words. It is by no means either the fastest or the most efficient system I have seen: After reading through the file, it displays the suspect line of text in one window, the unrecognised word in another and, upon prompting, the suggested correction in a third. The usual options of ignoring an unrecognised word or adding it to the dictionary are also presented. Once this process has been completed for the whole text, Word offers the curious option of 'processing' it, which means incorporating the corrections made — I would have thought there was little point in running the spell checker at all if the corrections were not to appear in the final version of the text. In addition to these eccentricities, the program fails to recognise some rather common words; and in this document allowed 'adequat' to pass unqueried.

Word's automatic hyphenation was less than satisfactory on the present document: The program offered to hyphenate, among others, 'highlight', 'useful', 'processor', and 'excellent' — while the proposed position of the hyphen was correct in every case, none of the words occurred at the end of a line.

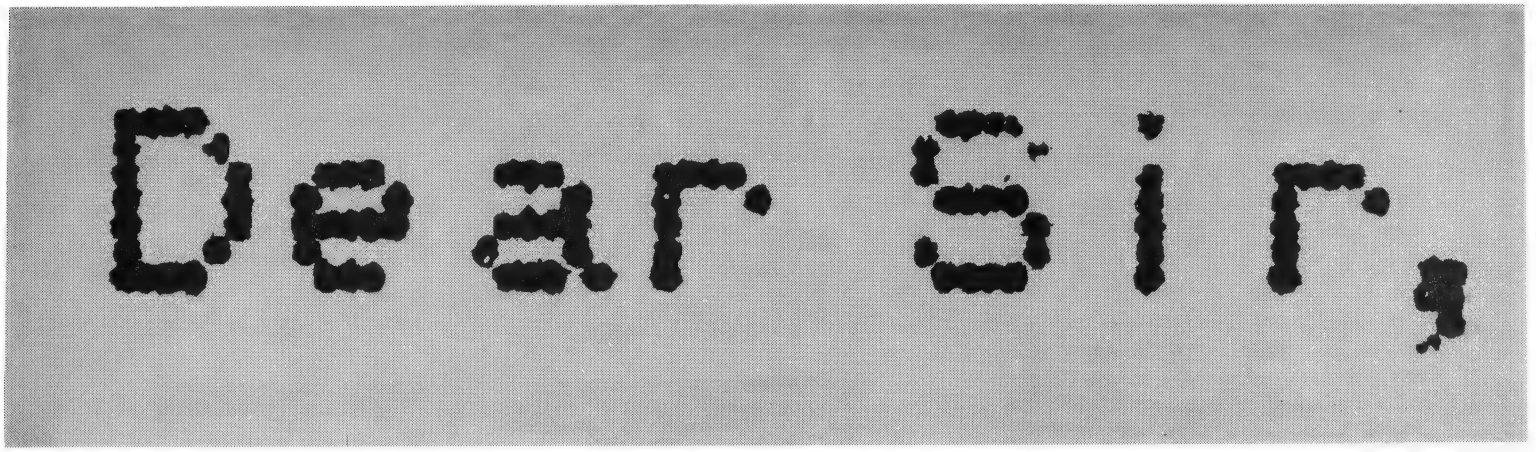
The Undo command allows the last editing command to be revoked. Issuing the Undo command twice after an editing command allows two recensions of a text to be compared, providing no further editing has been carried out in the meantime. There is a maths function which will perform the four basic arithmetical operations on highlighted figures, whether as a column or included in lines of text. Word also includes an outline processor, which allows a text to be viewed in 'collapsed' form (only headings displayed) or 'expanded' form (the entire text displayed).

While I personally have no time for outline processors — it seems to me that the effort spent using them would better be devoted to clear thinking — Word's performs efficiently, although there seems to be increased sluggishness of cursor movement in outline mode.

The Gallery

The Gallery, which has its own menu, is, among other things, a way of accessing RAM or disk space for temporary or permanent storage. It may thus be used for cutting and pasting or as a rudimentary macro for storing frequently use words or phrases. The Gallery contents may be saved to disk, allowing boilerplate text to be stored. The feature is a useful one, but essentially no different from Wordstar's ^KW and ^KR commands and rather more cumbersome to use.

The Gallery also allows the use of style sheets. Great emphasis is given in Word to text formatting, which is simply and comprehensively established by means of



Actual unretouched photo – 9 pin printer

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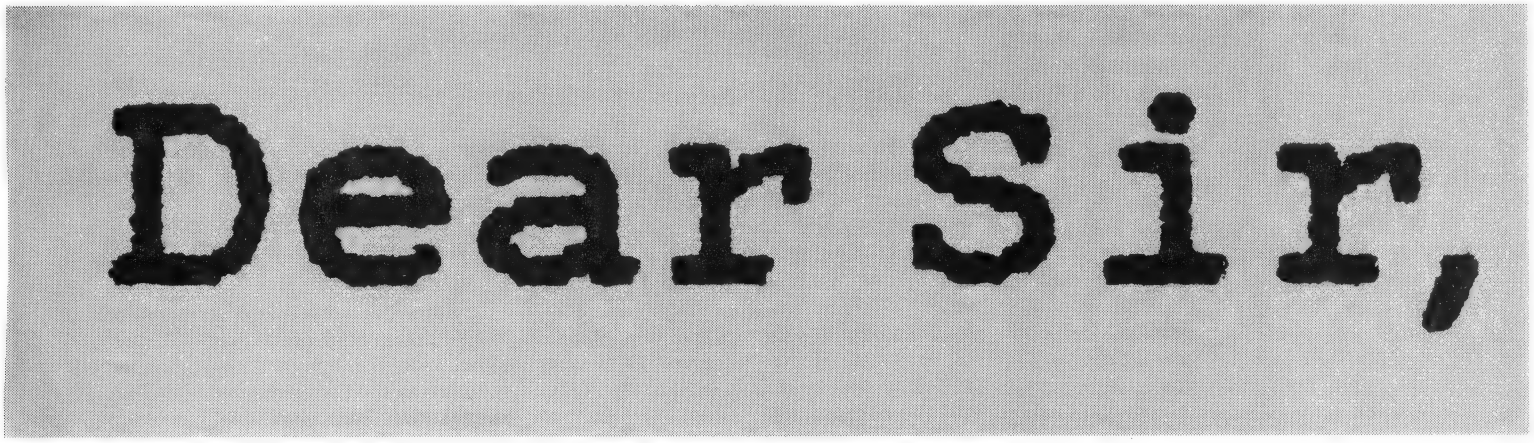

Actual unretouched photo – Toshiba 24-pin printer

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style sheets. Microsoft's default style sheets can be used, or style sheets can be created to taste, establishing the likes of margins, print fonts, tabs, and indents. Style sheets may be attached to files and later changed, and they constitute a fast and efficient way of formatting text. In fact, the ease with which a text's format may be changed is greater than the ease with which the text may be edited, which appears to be a reversal of priority.

Word standardly supports over 100 printers, including a number of laser printers. On a system with a graphics card, Word is all but fully WYSIWYG — italics, boldface, underlining, small caps and strike-through being displayed on screen. There is a powerful, automatic footnote facility which also allows footnotes to be viewed in a window, an equally powerful header facility and an excellent mail-merge. The only feature I can think of which it does not have is a fully-fledged macro system.

Word is formidable: It is a very powerful word processor, easy to learn and probably worth the asking price in terms of the number of features offered. However, there is an element of overkill, an attempt to cram in everything possible (as opposed to the modular form of WordStar), which is reflected in Word's cost. Personally, when using Word, I am constantly annoyed by the slow screen refresh and cursor movement, particularly in graphics mode (displaying italics and the like), as well as by the difficulty of locating the cursor. And, I found Word's menu-driven structure to be cumbersome, resulting in a program in which many of the most frequently used commands are the most awkward to enter. Far too much stress, furthermore, has been placed on ease of text formatting, and far too little on ease of text input and editing, which are supposed to be the things that word processors do well.

A good word processor should be flexible as well as powerful. The program should be adaptable to the user rather than demanding that the user adapt to the program. Word seems to lack this essential — and perhaps indefinable — quality, despite having everything that opens and closes. If it had it, it would be one of the best word processors on the market.

Summing Up

These two programs represent very different approaches to word processing and appeal to different types of user. Wordstar is austerely elegant, makes few compromises for learners and assumes that they will eventually become proficient. And once this happens, the program suddenly loses its seeming rigidity and becomes transparent. Word, on the other hand, is packed with goodies and bends over backwards to help the learner, but after attaining a certain degree of proficiency one wishes it would stop bending and fade into the background.

In this sense, Word is far more intrusive, far less transparent — Word seems to regard all users as permanent learners, while Wordstar regards all users as potential experts. For the frequent user, Wordstar is preferable for this reason, while the casual user will probably prefer Word, although few casual users would require all Word's features and even fewer would be likely to learn them all. (In this connection, incidentally, it is difficult to understand Microsoft's intentions with Word: if it is aimed at casual users, why does it have so many features? If it is aimed at heavy users, why is its command structure so cumbersome?)

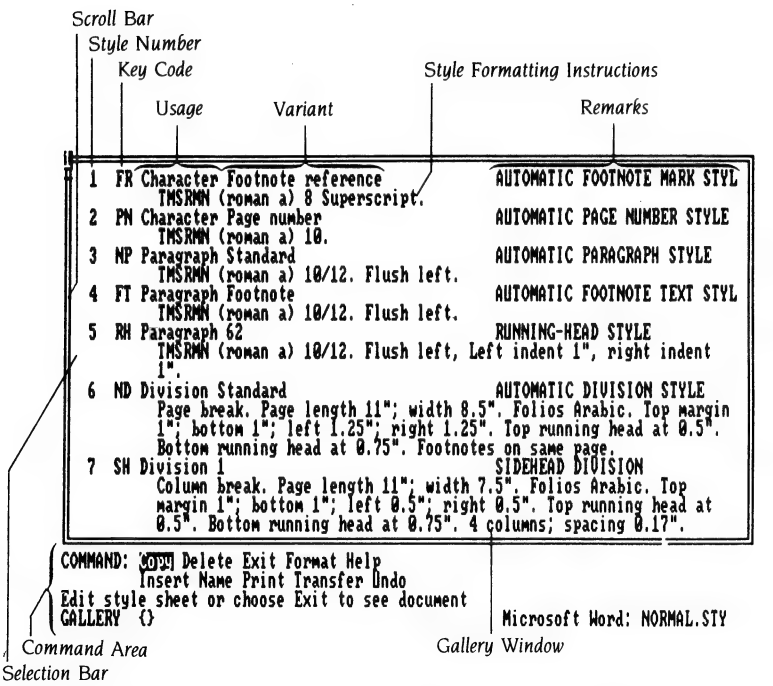

Figure 2. *Word's Gallery feature is used to edit style, as opposed to text. It's also used to cut-and-paste between documents.*

In sum, if I were asked to recommend one of these word processors to a professional writer or anyone else who expected to be using the program every day, I would suggest Wordstar with a macro program such as Prokey or Superkey — Wordstar is far more of a writer's word processor (particularly if the writer is prepared to tinker with the DOS debug utility). If I were advising a person who wanted a fully featured and easy-to-learn word processor for more casual use, I would recommend Word. And if I were asked to choose between them for an office environment, I would be in something of a quandary — if the efficient production of highly polished printed material in large volumes were a major consideration, Word would have the edge. □

Product Details

Product:	Wordstar Version 3
Manufacturer:	Micropro International
Review Copy From:	Wordstar Australia Suite 44, Chatswood Village, Chatswood 2067 NSW (02) 411 7255
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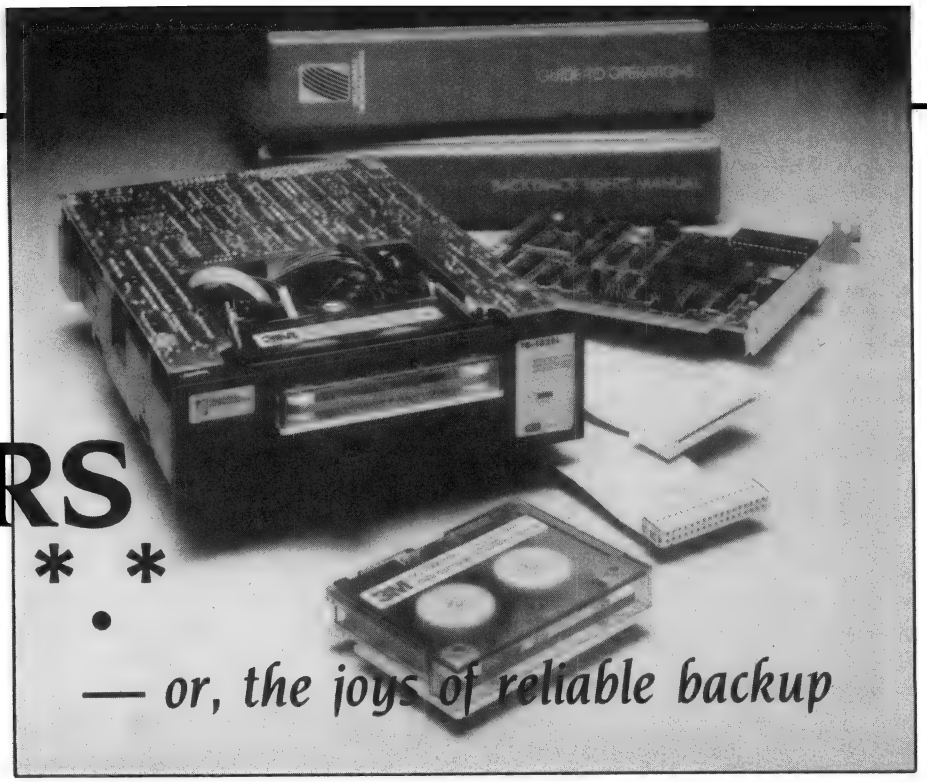

THE DANGERS OF DEL *.*

— or, the joys of reliable backup

Erased the root directory on your hard disk lately? Ewart Stronach did and discovered (too late!) the meaning of 'backup.' If only he'd installed that Grasshopper a week before . . .

LATE ONE NIGHT, whilst tired and emotional, I was engaged in the laborious task of filling my newly-fitted Qubie Hardpack with my favourite application programs. At the same time I was recovering floppy disks, packing data onto floppies for storage and backup, and cleaning old floppies for re-use. Having loaded about 174 files onto the hard disk, I blithely set out to delete unwanted files from drive A. I issued the command DEL *.*, replied to ARE YOU SURE? with a confident Y and wiped out the entire root directory of my hard disk. Many hours later, I retired (substantially more tired and emotional), but at least I was able to include in my evening prayer a small vote of thanks to Mr Norton.

My problem was caused by *total* stupidity on two counts. First, that I should make such a mistake, and second, that lying beside my lovely little Lingo PC88 was a Tallgrass Tape Drive backup unit, sent to me about a week earlier for testing and not yet installed. Had the unit been in place and operating, all my files would have been simply and easily re-created and restored. Let me tell you about this marvelous device . . .

Called the Grasshopper, the hardware consists of a drive unit the same size as a half-height floppy drive and a controller card. Installation is painless. With the Lingo, I am able to flip the top open like a car bonnet and search for an empty slot. The controller board fits a short slot and a 40-way cable connects it to the drive. I elected to locate the drive unit in my machine in the place of drive B — I simply removed the floppy drive and slotted the tape drive in its place. The power connector is the same and the mounting screws line up perfectly. No other modification was needed. The tape unit could be fitted in place of any drive on a normal PC — but you may have to get a half- height floppy to replace the old full-height ones on an IBM. This would leave you with an original full-height unit in one opening and a half-height and your new toy in the other.

The Grasshopper looks like a floppy drive except that the slot is about the size of the end of a cigarette pack. It accepts a custom-made cassette, which is thicker than an audio cassette and about half its size. The unit is sturdily built on an aluminium base plate, with a clear, rigid cover. It simply pushes into the front, displacing a protective cover, and locks in; it's released with a push button on the face of the drive.

Installation is Only a Hop Away

So far so good. We've followed the very clear installation instructions (apart from the direction to be sure to align the 40-way cable with the red stripe opposite pin 1 on the drive unit, but no numbers were visible on the said unit), we are however ready to test. A program on the provided floppy called ITEST is invoked and *wonders upon wonders*, reports that the interface is correctly installed and operating. Now onto the first format.

The tape must be formatted like a disk drive before first use. The utility for this is provided and a separate booklet called *Guide to Installation and Maintenance for Tape* will lead you carefully through the procedure. A program called FTAPE automatically re-tensions the tape, adds the format, writes test data to the tape, verifies that the tape can be read and creates a 'Manufacture's Block' that lists any flaws on the tape and locks out any bad sectors. The first couple of times I tried this, the system reported 'Unable to locate edge of tape within desired range.'

Another booklet entitled *Guide to Problem Solving for Disk and Tape* indicated that this meant that the tape could not be read or written to and I should try another tape. As none was available, I re-ran the tape tensioning utility and tried again. On the third attempt I was rewarded with the message 'Formatting, 18.55 mins remaining.' I had a cup of coffee. And a cigarette. Eighteen minutes is a long time. Finally all was complete and my tape was formatted into the default pattern of five logical volumes, each of which may be treated as separate drives. From there on, it's very like a normal DOS operation, but with more drives.

Control of the tape is taken over by a utility called TEX. Invocation of this utility alters your prompt to TEX C> and allows you to call for directories from your new logical drives D through to H. Normal DOS type commands can be implemented such as DIR and COPY, ERASE and back to where I came in, DEL. Text takes about a minute to load each time as it runs the tape from end to end, and sounds like a slot car with wheel tramp as the tape spins and the head steps up and down the

width of the tape. A very clearly written tutorial will guide you through the use of TEX. Most of the commands are the same as DOS but many have extended function by the addition of extension commands.

Backup

The command BACKUP transfers a copy of all files from a disk or diskette to a tape volume. You may elect to backup all or only selected files with sub-directories included automatically. Log on to your chosen volume with the normal H: and the screen will display TEX H>. The command BACKUP C:BACKSLASH h: will transfer all the files from C on your harddisk to volume H on the tape.

The backslash in the command line directs the backup operation to begin at the root level directory. The addition of /M to the command line transfers only files that have been modified since the last backup and overwrites the old versions of the modified files. /O instructs TEX to continue onto the next volume if your files are too large for one volume and /H initiates the copying of all hidden files. Files from a given date forward may be selectively copied using the additional command /D{10-31-86 and specified sub-directories may be copied with normal BACKSLASH SUBDIR BACKSLASH FILENAME commands.

The BACKUP command is quite fast. For a timed test, I placed a nearly full floppy (318300 Kbytes) in drive A and issued a BACKUP A: BACKSLASH E:. The backup took 2 minutes 6 seconds. From the hard disk, the process is considerably faster as the access time of the floppy disk is a limiting factor. For the hard disk test, I selected a directory with 85 files and a total of 1.1 Mbytes. This time the procedure took 1 minute 43 seconds. *Beats handwriting the data.* Restoring the file to the floppy took a slightly longer 2 minutes 32 seconds. All the TEX commands can be the subject of a batch file and it is quite possible to write a file which will automatically backup your chosen data at the end of a day — and do it unattended.

For the less computer literate and those who are unfamiliar with DOS commands, there is an alternative program called IMAGE. This menu-driven program allows you to quickly make an 'image' of the data on the entire disk. During processing, IMAGE creates a special file on the tape into which it puts all the files from your disk with all file structure and directories intact. While IMAGE is operating, a counter display indicates how many bytes of data have been transferred from disk to tape or *vice versa* and how many are left to transfer. Files made on tape by BACKUP or IMAGE can not be run from the tape but must be RESTORED to the floppy or hard disk. Files made with ordinary COPY commands are intact and may be loaded and run from the tape. An additional feature of the IMAGE facility is that the files for restoration can be selected — that attribute is not normally available with full image type copies.

So?

So, it works, it's fast and it seems very reliable. How useful and how good a value is it? For a commercial use, where sensitive files are in constant use and non-expert users abound, there seems no alternative to regular backup. Other types of backup are available and many of them are only a fraction of the cost of a Grasshopper. There is a disk utility called FASTBACK from Daneva ($119 plus tax) which backs up your hard disk to a pile of floppies at a speed which would make your head spin — the cost is pennies compared to hardware. A second hard disk would be cheaper and others might see fit to transfer files via a modem to a remote storage device. Another possibility is the fitting of a 1.2 Mbyte floppy which holds enough data to satisfy many users.

As I see it, Grasshopper's main attributes are it's reliability and the fact that you get another 20 Mbytes of data storage online, available *either* as backup or useable as overflow storage on a particularly long application program. The flexibility of the TEX utility means you can use one of your logical drives as just that, another drive for access or storage. It is unlikely to suffer the same potential problems as a hard disk, although the likelihood of head crash is becoming more remote as technology advances. A major disadvantage of the system is the cost of the cassettes. Each cassette costs over $80 and there would be plenty of applications, particularly when archiving, where this could become a limiting factor. Although these cassettes are quite strong, they have little tolerance for abuse. The maintenance instructions warn that the tapes should be allowed to stand in the operating environment for a period equal to the time they were away from the environment or up to eight hours, whichever is the lessor, before use — and stringent standards for operating temperature and humidity are recommended. Re- tensioning of the tape is recommended if it has been stored for more than 12 hours or if you suspect it has been knocked or you are getting 'excessive' read/write errors.

The Grasshopper is well-packaged, well-documented and easy to use. It is available in a number of formats and can be bought as a 'Standalone' unit with its own power supply; in this configuration it's small enough to sit on top of your PC alongside the monitor. Another advantage is that by purchasing extra controller boards ($475 each), the system may be used to backup a number of different PCs, backing up all of them for a lot less outlay per PC. All configurations carry a 12 month total warranty and are supplied with a bonus software package consisting of Xtree and Backtrack. The unit certainly fills a particular need in commercial environments and Tallgrass enjoy a good reputation in the industry. It can be installed easily without technical assistance and, like so many of the products I get to fit into my hard working Lingo, I shall be sorry to have to return it. □

Product Details

Product:	Tallgrass Grasshopper 20 Mbyte Tape Backup Unit
Manufacturer:	Tallgrass Technologies
Review Unit From:	Tallgrass Technologies Aust Pty Ltd 34 East St, Five Dock 2046 NSW (02) 712 2010
Price:	$1,899 as tested $2,599 as a Standalone $475 each extra controller card $399 for 5 spare cartridges *(prices do not include tax)*

The Prophet Speaks

BUILD YOUR OWN BULLETIN BOARD—*Part 3*

Along the way to building a bulletin board, Larry Lewis takes us on a sample driver to low level I/O.

BEFORE we get into the ins and outs of low level I/O (Input/Output), let's have a quick think about I/O in general. From Part 2, most of you will have already assumed that this article will cover getting and putting characters to and from a modem. Well — how many of you added some more necessities that need I/O to the list? How about file I/O? Did you forget the system clock? So — there are a few extras that need to be done when you're building a BBS.

First off the queue is character I/O. Now, remembering that we want low level I/O: what do we have to get done? The first part of it is easy if you have a system that uses a serial port for the operating system — then you can run it like an R/CPM sys-

```
TITLE Character IO Driver MPM XIOS

; This is the "low" level drivers for the bulletin board.
; NOTE: except for DOS calls these routines must not call
;       any other functions.


        .psect  _TEXT

cpmint          equ     0E0h            ;CP/M system call interrupt

modem_dcd       equ     00000010B       ; Carrier Detect
modem_cts       equ     00000001B       ; Clear To Send - CTS is not available
                                        ;                 so DSR is tied to CTS

modem_online    equ     00000011B       ; DTR/RTS High
modem_offline   equ     00000000B       ; DTR/RTS Low
modem_break     equ     00000111B       ; Modem Break with DTR/RTS high


        push    bp              ; Save C registers as per
        push    di              ; Hi-Tech C Manual.....
        push    si

        pop     si              ; set up for return
        pop     di              ; to caller
        pop     bp

        .globl  _pamgetc

_pamgetc:
        mov     ax,stored_unget_character       ; Check to see if a character
        or      ax,ax                           ; has been ungotted!!!
        jz      1f
        mov     stored_unget_character,#0,word  ; clear character
        ret,
```

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tem. That's the theory — let's have a look at the practical requirements.

Now I know this sounds obvious, but you need to write functions that will *get*() us a character from the modem and *put*() a character to the modem. Then there is the problem of controlling the modem itself, since no operating system I've heard of gives you any method of accessing it (DTR, CD and so on) — you have to write routines to perform those functions as well.

The low level driver for your bulletin board doesn't need to concern itself with a number of activities that would appear to relate to low level I/O. One of these is character translations — adding line feeds after carriage return, sending nulls after a line feed, backspace and tab processing. These are left to the high level driver because when you want to send a binary file (when using modem protocol, for example), you do not want any changes to the information being sent or received over the line.

The listing given here is actually the driver for the AED machine that Prophet is using — it is not meant to be an example of good programming style, just a sample driver. One thing worth mentioning, though, is that throughout the code, literals are used instead of using mnemonic names: when the calls are to the machine's XIOS (eXtended I/O System, a different BIOS for CP/M machines), it's much easier to see what the registers are being loaded with and to check that against the machine when these little babies don't work — mnemonics are great but they don't help when you are deep inside the machine.

```
1:
        csavereg
        call    get_console_number      ; What console am I using ?
        mov     cl,bl                   ; put it where BIOS call wants it
        mov     ch,#3                   ; conin xfunc0 function
        mov     al,#6                   ; xfunc0 XIOS function
        mov     ah,#0
        mov     dx,#0
        call    bios
        and     ax,#0FFH                ; No high order rubbish thanks
        crestoreg
        ret
        .globl  _pamputc

_pamputc:
        csavereg
        mov     bp,sp                   ; Get the stack pointer to use
        push    bp
2:
        call    modem_get_cts           ; see if modem is ready
        cmp     ax,#1                   ; pam_on (1) means ready
        je      1f
        mov     dx,#20                  ; set up for a 20 tick sleep
        mov     cl,#141
        int     #cpmint                 ; sleep function
        jp      2b
1:
        call    get_console_number      ; What console am I using ?
        mov     dl,bl                   ; put it where BIOS call wants it
        and     dl,#0FFH                ; zap the high order shit
        pop     bp
        mov     cx,8[bp]                ; get the character to output
        mov     ch,#2                   ; conin xfunc0 function
        mov     al,#6                   ; xfunc0 XIOS function
        mov     ah,#0
        call    bios
        and     ax,#0FFH                ; No high order rubbish thanks
        call    drain_output_buffer     ; waituntil MPM empties the IO Buffer
        crestoreg
        ret
        .globl  _pamunget

_pamunget:
        cmp     stored_unget_character,#0,word  ; Check if one already there
        jz      1f                              ; nope ok to do unget
        mov     ax,#-1                          ; char already there ignore
        ret                                     ; call and return error
1:
        csavereg
        mov     bp,sp                           ; Get the stack pointer to use
        mov     ax,8[bp]
        mov     stored_unget_character,ax       ; store character
        crestoreg
        mov     ax,#0
        ret
        .globl  _pamscan

_pamscan:
        mov     ax,stored_unget_character       ; Check to see if a character
        or      ax,ax                           ; has been ungotted!!!
        jz      1f
        mov     ax,#1
        ret
1:
        csavereg
        call    get_console_number              ; What console am I using ?
        mov     cl,bl                           ; put it where BIOS call wants it
        mov     ch,#4                           ; constat xfunc0 function
        mov     al,#6                           ; xfunc0 XIOS function
        mov     ah,#0
        mov     dx,#0
        call    bios
        and     ax,#1
        crestoreg
        ret
        .globl  _console_number
```

```
_console_number:
        csavereg

        call    get_console_number
        crestoreg
        ret

get_console_number:
        mov     cl,#99H                 ; Get Console Number
        int     #cpmint
        cbw                             ;sign extend result
        ret

        .globl _modem_get_dcd
_modem_get_dcd:
        csavereg
        call    modem_get_dcd
        crestoreg
        ret

modem_get_dcd:
        call    modem_get_status
        and     ax,#modem_dcd
        jz      1f                      ; zero means carrier low
        mov     ax,#1                   ; pam_on
1:      ret

        .globl _modem_get_cts
_modem_get_cts:
        csavereg
        call    modem_get_cts
        crestoreg
        ret

modem_get_cts:
        call    modem_get_status
        and     ax,#modem_cts
        jz      1f                      ; zero means cts low
        mov     ax,#1                   ; pam_on
1:      ret

modem_get_status:
        call    get_console_number      ; What console am I using ?
        mov     cl,bl                   ; put it where BIOS call wants it
        cmp     cl,#0                   ; check for console 0 (SYSCON)
        je      2f                      ; Yep -- special processing
        mov     ch,#7                   ; xget xfunc0 function
        mov     al,#6                   ; xfunc0 XIOS function
        mov     dl,#0                   ; this gets the status of the Modem
        call    bios                    ; DCD, DSR, parity, overrun & framing error
        and     ax,#0FF         ; Zap high order stuff
        ret
2:      mov     ax,#0FFH                ; System Console doesn't have status
        ret

drain_output_buffer:
        call    get_console_number      ; What console am I using ?
        mov     cl,bl                   ; put it where BIOS call wants it
        mov     ch,#10                  ; draino xfunc0 function
        mov     al,#6                   ; xfunc0 XIOS function
        mov     dl,#0                   ; wait for buffer to drain
        call    bios                    ; DCD, DSR, parity, overrun & framing error
        ret
        .globl _modem_set_online
_modem_set_online:
        csavereg
        call    get_console_number      ; What console am I using ?
        mov     cl,bl                   ; put it where BIOS call wants it
        mov     ch,#8                   ; xset xfunc0 function
        mov     al,#6                   ; xfunc0 XIOS function
        mov     dl,#modem_online        ; this raises dtr/rts
        call    bios                    ; also affects break and reset
        crestoreg
        ret

        .globl _modem_set_offline
_modem_set_offline:
```

Notice that most of the routines have two entry points: one starting with an underline character and the other without. The underline creates an entry point for a C function to use. The other is for use by assembler routines (which are all included in the module itself), to save the extra overhead of saving registers that don't need saving. This achieves only a small saving, but it does make the driver much quicker as the routines are called many, many times during processing.

Another low level function is the hardware clock interface. On the AED system (and IBMs), there is already a routine to access the clock, so all that the driver does is call it up. However, to cater for machines that do not have this convenience, *pamsecs*() is used to access the hardware clock.

Another function that is not in the sample driver is the code necessary to change to I/O port configuration (speed and stop bits, for example). I may as well own up to it now that you've read this far — the sample driver given here is a temporary one and the coding for controlling the port will be in the new one. The current driver is a quick and dirty one — I wanted to work out the IBM requirements before actually doing all the work necessary for the complete port driver.

Most of this is pretty basic and boring, but low level driver are boring — there is only one important point to remember about low level drivers — *they must work*! *They must work, work well, and work fast*! If they don't, nothing else that you do in your system will be worth a cent. □

```
        csavereg
        call    get_console_number      ; What console am I using ?
        mov     cl,bl                   ; put it where BIOS call wants it
        mov     ch,#8                   ; xset xfunc0 function
        mov     al,#6                   ; xfunc0 XIOS function
        mov     dl,#modem_offline       ; this drops dtr/rts (hangs up modem)
        call    bios                    ; also affects break and reset
        crestoreg
        ret

bios:
        mov     biosfunc,al     ; Store function code
        mov     bioscx,cx       ; cx parameter
        mov     biosdx,dx       ; dx parameter
        mov     cl,#32H         ; BIOS call number
        mov     dx,#biosdesc    ; BIOS Descriptor Block
        int     #cpmint
        ret
        .psect data

stored_unget_character:
        .word   0H
biosdesc:
biosfunc:
        .byte   0H
bioscx:
biosch:
        .byte   0H
bioscl:
        .byte   0H
biosdx:
biosdh:
        .byte   0H
biosdl:
        .byte   0H
```

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DABBLING IN dBASE

— *emulating Lotus-type menus*

When Peter Hill set out to demonstrate some of the new features of dBase III Plus by emulating the Lotus 1-2-3 point-and-shoot type of menu, he didn't really expect that the task would be so simple.

DBASE III PLUS IS nowhere near as radical a departure from dBase III as the latter was from dBase II, but Ashton-Tate deserve credit for tackling a number of areas which made it difficult to generate professional applications in dBase III.

Whilst the II to III transition resulted in different file structures and solved a number of long-standing limitations of dBase II (especially the limited relational abilities of dBase II), the III to III Plus transition (other than the introduction of LAN support) has been aimed more at applications development. There are a number of aspects of this upgrade which appear relatively insignificant, but actually simplify and accelerate program development substantially.

Three techniques are presented and discussed here and a brief program module is listed to show their application. The module operates as follows —

□ It is invoked with the following parameters: The number of menu options (1 to 9), and 9 menu prompts. Even if you have only three options, you must pass the module the number of parameters it expects, so it would be invoked as —

```
DO dBLotus WITH ;
        3,'First','Second','Third','','','','','',''
```

□ A menu appears with the first option highlighted,

□ By using the cursor control keys, another option can be highlighted. These keys work as follows: *Home* or *PgUp* selects the first option; *End* or *PgDn* selects the last option; *UpArrow* and *DownArrow* work predictably, changing the option selection by one item either way.

□ At this stage, Return can be pressed which selects the highlighted option or Esc can be pressed which exits without selection;

□ Alternately the first letter of the desired selection can be pressed (hence options should start with differing letters);

□ If Esc was pressed the module returns 0 to the calling procedure, otherwise it returns the number of the selected option

The new features of dBase III Plus which facilitated fitting all this into 97 lines of code are discussed in detail below.

Load and Call

It has always been possible in one way or other to interface assembly language or even high-level languages with dBase II and III, but it has never been easy.

Experienced (and patient) programmers could load programs at particular memory locations, which, they had determined by diligent research, were suitable to use. In the case of dBase III Plus, instructions and the standard procedures to both Load and Call (execute) assembly language modules are provided in the manual.

Although the creation of the assembly language modules still requires advanced technique, the use of them is straightforward. This opens the way for distribution of both Commercial and Public Domain extensions to dBase III Plus.

I have incorporated two binary files (CURSON and CURSOFF) supplied by Ashton-Tate as part of the package which (predictably) turn the cursor on and off. This leads to a cleaner screen during operation. The routines are LOADed (incorporated ready for use) at lines 18 and 19 and CALLed (executed) at lines 45,85,92 and 102.

Box Drawing

At lines 51, 53 and 54 the module uses three varieties of the new box drawing routine. Its syntax is 'row1,col1 [CLEAR] TO row2,col2 [DOUBLE].' If CLEAR is specified, the nominated area is cleared. If neither CLEAR nor DOUBLE is specified, a single line box is drawn from row1,col1 to row2,col2, and a double line is drawn if DOUBLE is specified. Specifying both CLEAR and DOUBLE gives an undocumented syntax error.

This probably sounds like a trivial function if you have never had the dubious pleasure of drawing boxes in a command file! Drawing a box on the screen in dBase III required the programmer to choose from: *a*) loading a screen from disk (slow); *b*) writing a DO WHILE procedure of at least 12 lines which was also slow; or *c*) coding the lines as variables which consumed memory and was easily destroyed by using the program editor provided.

This box drawing routine should find a place in every coder's toolkit.

String Functions

At line 57 I have used the new function LTrim() to trim leading blanks from a string. This is necessary in this case because the Str() function (convert a number to a string) can leave leading blanks. This is a routine to perform LTrim in dB III —

```
WHILE SubStr(Var,1,1)=' '
      VAR=SubStr(Var,2,Len(Var)-1)
ENDDO
```

This is not only slow in execution, but also more prone to coding error.

At line 59 I have used the new function Left(), which is less exciting; its function can easily be replicated by SubStr().

The core of this module is the new function InKey() which first appears at line 69. This function returns a special code for

the last key pressed and pops a value off the keyboard buffer. For example it removes and returns the topmost value from the stack of values (pops, for the cognizant) representing the key which have been recently pressed.

Both parts of this function are particularly useful. The first allows more thorough access to the keyboard, and is the property which allows us to detect which of the cursor control keys have been pressed. The programmers have allocated an individual code to each of the keys on the cursor control pad, and also to their shifted forms (Ctrl-RightArrow). Lines 34 to 41 of the module are dedicated to establishing the values of these keys in memory variables. Note that there is a flaw in the documentation here; version 1.1 shows two entries for the End key, both 6and 23. The correct value is 6, whilst 23 is actually the value for Ctrl-End.

IIF (the Mexican IF)

Having established the value of the ScanCode, we only need to take appropriate action to move the highlighted menu bar, which we can achieve with a simple CASE statement. When we move the bar up or down with UpArrow or DownArrow, we need to check that it stays in bounds; if not we would move it to the other end of the menu. In dBase III this would be achieved by something like —

```
CASE ScanCode=UpArrow
     IF Y-1<1
       Y=MaxOpts
     ELSE
       Y=Y-1
     ENDIF
```

In dBase III Plus the same can be achieved by the two lines 75 and 76, which is slightly faster (a simple 1000-loop test gave times of 85 seconds for the IIF() approach and 95 seconds for the conventional approach). This new construct has the syntax 'IIF(Condition,True outcome,False outcome),' which will be familiar to users of macro functions in Lotus 1-2-3 and other packages.

Again, this is a very useful additional construct which speeds execution and

dLetter

dLetter, the newsletter for dBase II and III users, is distributed free of charge with subscribers' copies of *Your Computer*. Regular features include dLatest (which covers updates and add-ons), dBriefing (reader's problems), dTips (usage tips), and Dear Dele (features of dBase). □

```
 1: ***********************************************
 2: * dBLotus.PRG                                 *
 3: * Emulate Lotus menus in dBase III PLUS       *
 4: * commenced: 16/1/1987                        *
 5: * revised  : 19/1/1987 (colour changes)       *
 6: ***********************************************
 7: * set up the environment                      *
 8: ***********************************************
 9: * this must be first executeable statement    *
10: PARAMETERS NrOpts,MP1,MP2,MP3,MP4,MP5,MP6,MP7,MP8,MP9
11: SET ECHO OFF
12: SET PRINT OFF
13: SET STATUS OFF
14: SET SCOREBOARD OFF
15: * we will handle escape ourselves
16: SET ESCAPE OFF
17: SET TALK OFF
18: LOAD CURSOFF
19: LOAD CURSON
20: ***********************************************
21: * initialise variables                        *
22: ***********************************************
23: PRIVATE ALL EXCEPT ReturnCode
24: M1=MP1
25: M2=MP2
26: M3=MP3
27: M4=MP4
28: M5=MP5
29: M6=MP6
30: M7=MP7
31: M8=MP8
32: M9=MP9
33: MaxOpts=NrOpts
34: UpArrow=5
35: DownArrow=24
36: EndKey=6
37: HomeKey=1
38: PgUp=18
39: PgDn=3
40: CReturn=13
41: Esc=27
42: Y=1
43: OldY=1
44: YPos='1'
45: OldYPos='1'
46: ScanCode=0
47: L=1
48: LPos='1'
49: CALL CURSOFF
50: SET COLOR TO W/N
51: @ 1,1 TO 3,56
52: @ 2,2 SAY 'Use cursor keys to select and press CR,
    or Esc to quit'
53: @ 3,10 TO MaxOpts+7,36 DOUBLE
54: @ 4,11 CLEAR TO MaxOpts+6,35
55: @ 4,15 SAY "MENU"
56: DO WHILE L<>MaxOpts+1
57:    LPos=LTrim(Str(L))
58:    @ L+5,15 SAY M&LPos
59:    FM&LPos=Upper(Left(M&LPos,1))
60:    L=L+1
61: ENDDO
62: DO WHILE .T.
63:    ScanCode=0
64:    @ OldY+5,15 SAY M&OldYPos
65:    SET COLOR TO R/W
66:    @ Y+5,15 SA M&YPos
67:    SET COLOR TO W/N
```

Listing 1. *Module for emulating Lotus menus in dBase III Plus.*

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```
68:     DO WHILE ScanCode=0
69:        ScanCode=Inkey()
70:        @ 4,24 SAY Time()
71:     ENDDO
72:     OldY=Y
73:     OldYPos=YPos
74:     DO CASE
75:        CASE ScanCode=UpArrow
76:             Y=IIF(Y-1<1,MaxOpts,Y-1)
77:        CASE ScanCode=DownArrow
78:             Y=IIF(Y+1>MaxOpts,1,Y+1)
79:        CASE ScanCode=HomeKey .OR. ScanCode=PgUp
80:             Y=1
81:        CASE ScanCode=ndKey .OR. ScanCode=PgDn
82:             Y=MaxOpts
83:        CASE ScanCode=Esc
84:             SET COLOR TO W/N
85:             CALL CURSON
86:             ReturnCode=0
87:             CLEAR
88:             RETURN
89:        CASE ScanCode=CReturn
90:             SET COLOR TO W/N
91:             ReturnCode=Y
92:             CLEAR
93:             CALL CURSON
94:             Return
95:        OTHERWISE
96:        L=1
97:        DO WHILE L<>MaxOpts+1
98:           LPos=LTrim(Str(L))
99:           IF Upper(Chr(ScanCode))=FM&LPos
100:               SET COLOR TO W/N
101:               ReturnCode=L
102:               CLEAR
103:               CALL CURSON
104:               Return
105:            ENDIF
106:            L=L+1
107:         ENDDO
108:     ENDCASE
109:     YPos=LTrim(Str(Y))
110: ENDDO
111: *end of module dBLotus.Prg
```

helps to keep code concise without making it illegible.

In Closing

The module gives a very professional looking type of menu with only one failing: it is rather slow in execution since there is so much to do at each keypress. The speed can be slightly improved by converting the code with the dBase III Plus 'compiler,' which does not really compile the code but rather strips comments, removes spaces and tokenises the source code. Despite the the marginally acceptable speed of operation under dBase III Plus, it is a dubious proposition whether the module could be implemented at all in dBase III in the absence of the function InKey(): it would certainly be slower.

I was pleasantly surprised to be able to present this in only 97 lines of code. It is a compliment to the design of the upgrade from III to III PLUS that nearly all of the additions to the program development have been thoroughly useful rather than 'bells and whistles.' □

dBase Programs to Download

Did you know about the collection of dBase programs on the YC Bulletin Board? There's quite a collection which ranges from complete order entry/inventory and property management systems, to handy utilities like POKE1.CMD (used to poke memory from dBase), TIMECHAR.CMD (structure for a job costing calculations), and a banking system and decoders and a toolkit library and, well, have a look on 3B> on the board for yourself — there's lots more (want to manage a church or set up dBII under M/PM or set the date on an NEC APC?)

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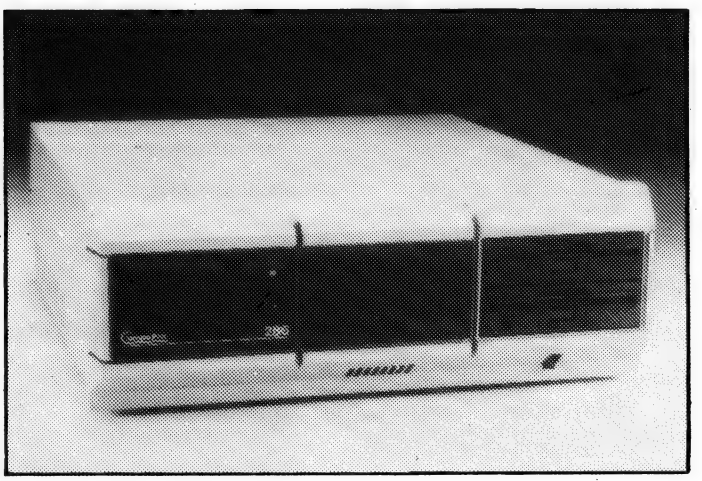

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U7. DIRECTORY PATHS. Lets programmes write to other directories.

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

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

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

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

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

U13. SPEEDKEY. Increase speed of cursor.

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

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

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

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

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

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

U115. WORDSTAR INDEX. Indexing system for Wordstar.

U116. UNDERLINE STRIPPER. Strip underline from Wordstar files.

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

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

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

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

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

U127. SQUEEZE LIST. Lists squeezed library files.

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

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FILE LOCATING

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

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

U204. CHARACTER SEARCH Searches disk for character or string.

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

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

FILE READING/DISPLAY

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

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

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

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

U306. BROWSE. Examine files with 4 way scrolling.

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

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

U309. KEYBOARD BUFFER. Keyboard buffer of 160 characters.

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

EQUIPMENT HANDLING

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

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

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

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

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

FILE MOVING

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

U502. REDIRECTS output to a disk file.

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

U504. SECTOR RETURN. Recovers deleted first sectors.

U505. SELECTIVE COPYING. Copy programme using menu system.

U506. SELECTIVE DELETION. Programme delete using menu system.

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

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

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

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

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U601. ARCHIVER. Superior file compressor and library creator.

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

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

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

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

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

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

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

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

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U705. ALARM. Sets time for alarm to sound.

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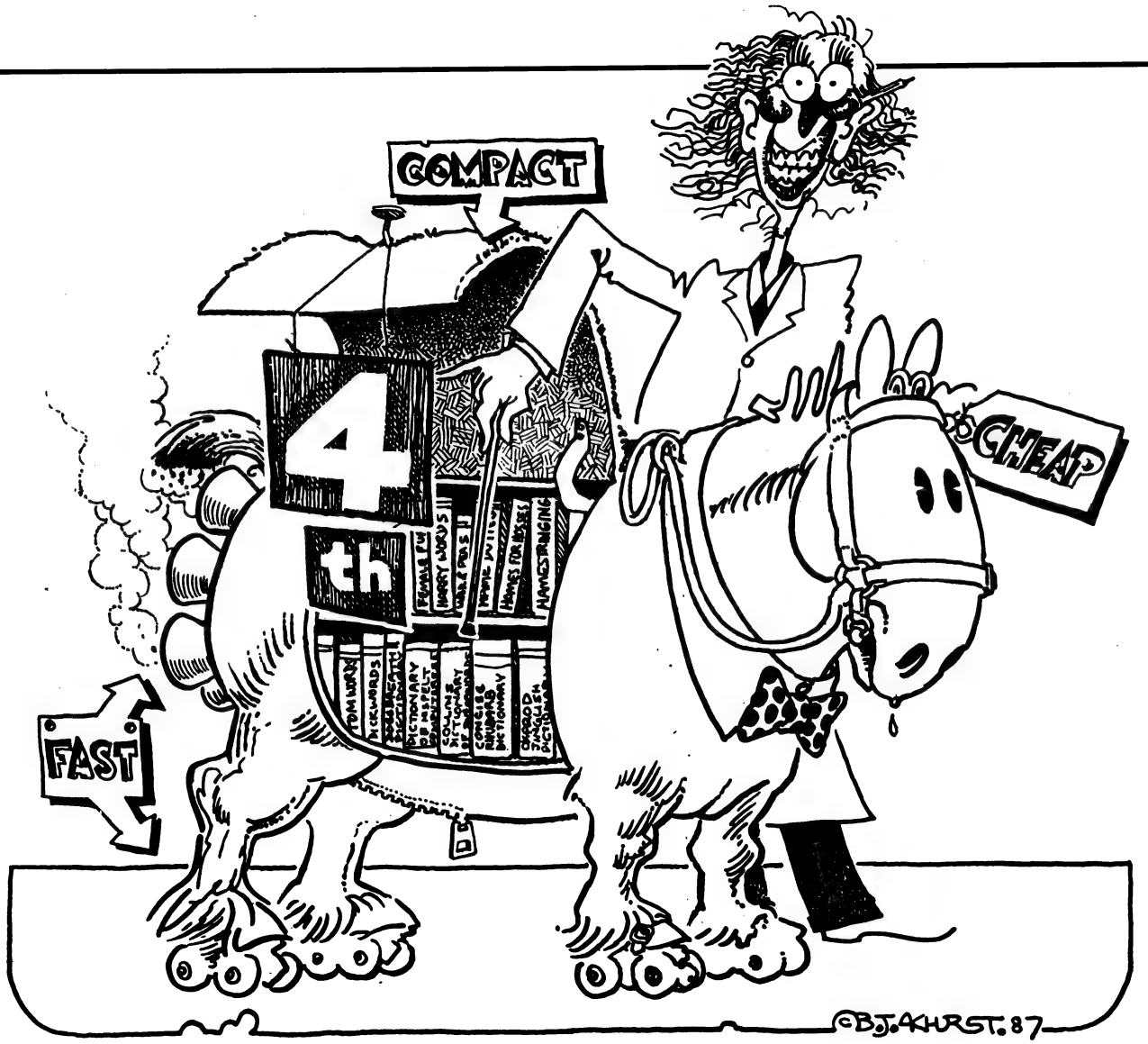

Come Forth-Part 1

Forth was the first of the fourth generation languages. (Born, we are told, from the arrogance of Charles Moore.) It's compact, fast and cheap — sound interesting? Let Roy Hill tell you more . . .

FORTH HAS BEEN around for some time now, since 1970 in fact, when a fully operative version was produced by the designer of the language, Charles Moore, to run on an IBM 1130 computer. However, the origins of Forth go back much further than that. The language was not a 'Eureka' type of development; it was a gradual adaptation of existing programming features into a model of what the author thought programs should really do.

In Moore's own words:. 'As I began thinking of rather drastic improvements to programs, I think I was arrogant. I wanted to do things my way . . . . .I was promoting ideas that everyone said were wrong and that I thought were right. But if I were right, that meant that all the other people would have been wrong.' (*Byte*, Aug.'80)

Indeed, Moore *is* arrogant, judging from many of the interviews with him that I have read over the years. However, without this arrogance, Forth would probably never have reached the stage of development that it has. At a time when fourth generation languages were only just being talked about, Moore developed his own and even had the arrogance to name it FOURTH. Unfortunately, the IBM 1130 only permitted five-letter identifiers, so the name was abbreviated to Forth.

What then, is Forth? In this two-part introduction, I'll present a working guide to the uses and means of programming in Forth, by providing several relevant programs to illustrate the unique features of Forth. Let us start with an overview of the construction of the language . . .

The Forth Language

Forth is a language of apparent contradictions. Once again in Moore's own words (from the same issue of *Byte*) it is 'a polarizing concept. There are people who love it and people who hate it. It's just like religion and politics. If you want to start an argument, say: Boy, Forth's a really great language.' It's both a compiler and an interpreter — almost at the same time. It's both a language (like Basic) and a devel-

opment tool (like Multiplan). A Forth system is extremely compact — a typical Apple version occupies only 12 Kbytes of memory and a typical IBM version occupies only 30.

The whole language is based on the identity known as the 'word.' The Forth 'word' is identical in usage to any other word: According to the Concise Oxford Dictionary, a word is a commonly used term, 'conveying an idea . . . and capable of serving as a member of . . . a sentence.'

The word is the smallest unit of the Forth language and is directly related to the ATOM of LISP. Forth programs are written by taking previously defined words, combining them into a 'sentence' and then allocating the completed (and hopefully operative) sentence to a new word, which can then be executed by the operating system. Let me give some examples of typical Forth words —

EMIT outputs a single ASCII character on the screen;
. outputs a single integer number on the screen; and,
." outputs a message (delimited by a closing ") to the screen.

If that doesn't seem to make sense, hang in there, it'll all become clear very shortly.

Let's suppose I said to you that I build 'hames' for a living. You would immediately think that I really meant 'homes'. But, to be sure, you can either ask me very bluntly what 'hames' are, or you can look it up in a dictionary (like I did). When I tell you that hames are 'two curved pieces of iron or wood forming (part of) the collar of a draught-horse, to which the traces are attached', you immediately know what I'm talking about, even if you've never seen them. Now that we all know what a hame is, I can quite happily use this word in future conversations (sentences) with you and you won't feel uncomfortable with it. I can take this analogy one step further. Consider the word 'hamestringer' (don't look it up, I've only just invented it). If I now tell you that I have defined this word to mean someone who attaches hames to horses, then I have just extended the language (and hence, the dictionary) by one word.

This illustrates one of the problems of a language like Forth. If programmers make extensions to the language, then no-one knows what these extensions do until the programmer explains their use. But this is also one of the features that makes Forth

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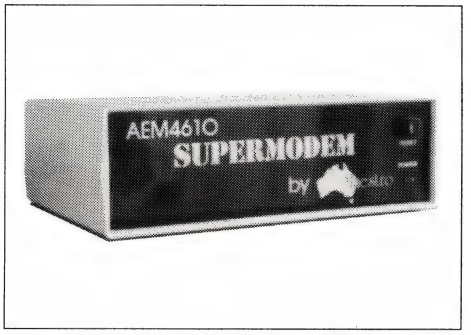

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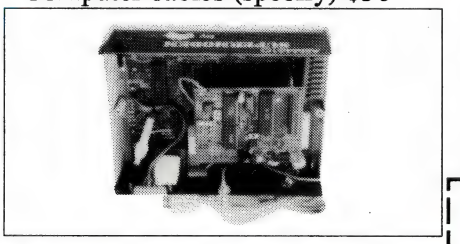

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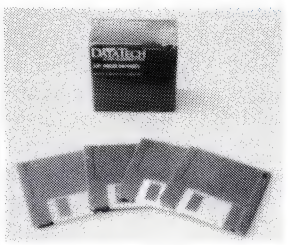

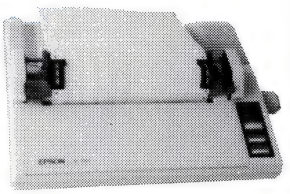

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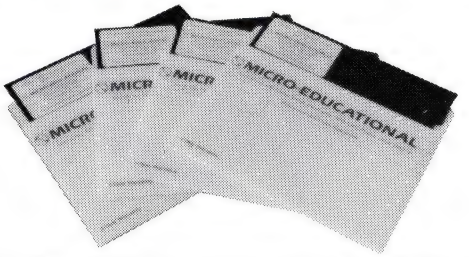

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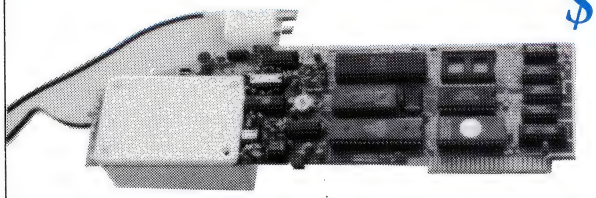

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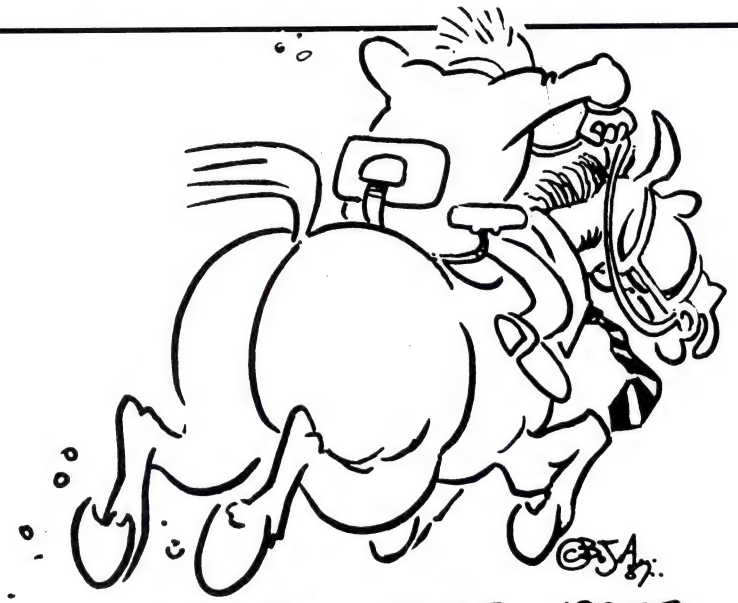


'As I began thinking of rather drastic improvements to programs, I think I was arrogant. I wanted to do things my way . . . I was promoting ideas that everyone said were wrong and that I thought were right.'

the exceedingly powerful tool that it is. The language can be tailored to suit the needs of the programmer.

My version of Forth is quite different to my friends' versions, because they use theirs for different purposes.

Dictionaries

In much the same sense that English words and their definitions are listed in dictionaries, Forth words are arranged in dictionaries according to their specific uses. When I define a new word in Forth, I use previously defined words to create the new one and I then place the new word in an appropriate dictionary. This is essentially the same concept as specific purpose dictionaries, such as technical, geological, or medical — all of which contain words specific to that field. Some words even have different meanings when used in different applications and the same can apply with Forth, although for obvious reasons it is unwise to do so.

Thus, in a typical Forth version, there are usually several dictionaries — Forth itself, an EDITOR and an ASSEMBLER, each with its own set of specific purpose words. A typical Forth system may have approximately 100 words, called primitives. Perhaps 30 per cent of these are written in the assembly language for the processor being used, with the remainder being written in Forth.

In order to see how Forth words are created and then used, let us examine the steps in writing a very simple Forth program, the ubiquitous Celsius-to-Fahrenheit temperature conversion program. Before we do so, however, some further features of Forth need to be explained —

1) All numeric processing in Forth takes place through a facility known as a 'stack.' This stack is very similar to that used on some well known brands of calculators using RPN (Reverse Polish Notation — so called after its Polish inventor). Numbers are placed on the stack, manipulated and massaged and then either left on the stack as products, quotients, whatever, or passed to other parts of the program for further operations. The stack is called a LIFO (Last In, First Out) stack and operates in an identical manner to the stacking mechanism used to dispense trays in a cafeteria — numbers added to the top of the stack, push those already on the stack down one place.

2) By convention, Forth only operates on integer quantities. While there are are several Floating Point packages readily available, these are not commonly included as part of the language (refer to *Forth Dimensions*, the Journal of the Forth Interest Group, *Vol. 1 to 6*, 1978-85). The reason for this is fairly simple: Forth was primarily designed as a language for controlling the setting, operation and data collection routines of large radio telescopes. Applications such as this do not need numbers with decimal points. However, Forth is now finding many uses outside of control applications. SAVVY (a database program for IBM PC's) and an Australian-written Viatel program (Maestrotex) were both written in Forth and several expert systems are being developed using Forth as the AI component.

3) Forth is case-sensitive, that is, it differentiates between upper and lower case letters. For example, the Forth words EMIT, emit, Emit, eMit and eMIT are all different.

4) Just as we use spaces in English to tell where words start and finish, Forth uses spaces to detect the start and finish of words. Later in the article, note the uses of spaces after the colon sign and after the ." word, in particular.

The Immediate Mode

Forth can be used in the immediate mode, in a similar manner to Basic. The two main ways this mode can be used are for the immediate execution of previously defined words, or for use as an RPN calculator.

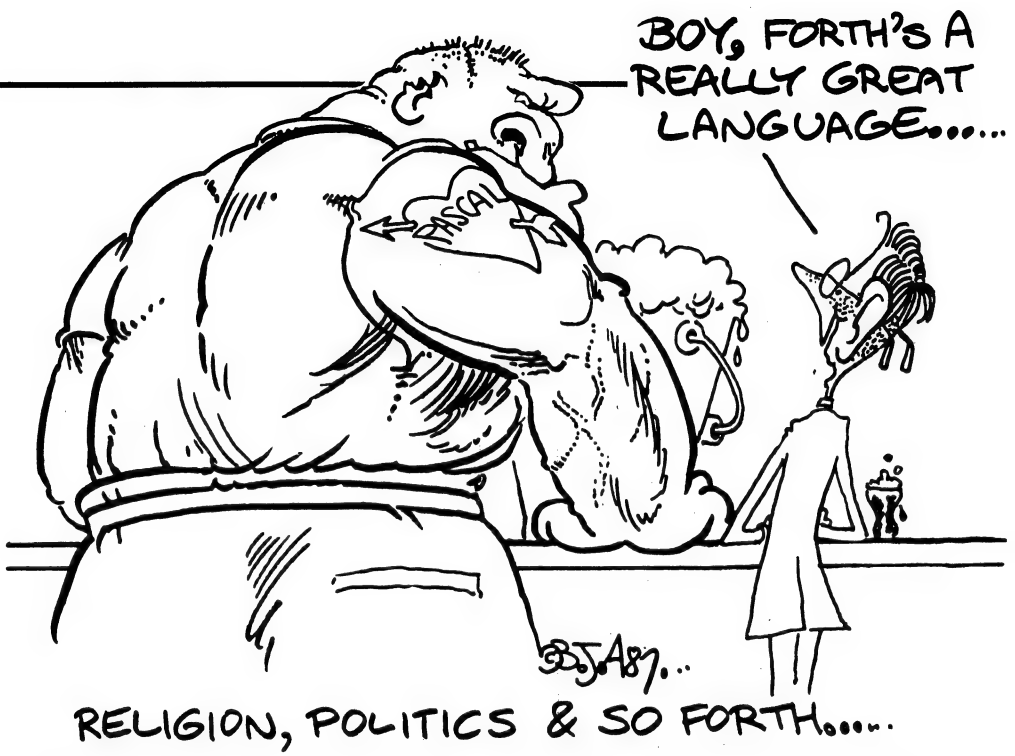
If you're lucky enough to have a Forth system (if not, see the boxed item 'Public Domain Forth'), but are not familiar with RPN notation, try these examples of calculations in immediate mode (Remember that we are using Reverse Polish Notation where the operator follows the operand; and that the results are to be placed on the top of the stack.) —

1) 3 4 5 6 + + + .
2) 3 4 5 6 * * * .
3) 3 4 5 6 * * / .
4) 3 4 5 6 * — + .

Public Domain Forth

WHEN Charles Moore released his Forth system, he placed it in the Public Domain, thus ensuring the ready availability of an inexpensive system. One of my favourite versions of Forth is a Public Domain one for the Apple II series. I am happy to pass on a copy to any interested reader: Simply send $15 (to cover the cost of handling, copying and the disks) to Forth System, care of *Your Computer*. Documentation and source code are included on the disk. (Cheques or money orders only.)

I also have a Public Domain version for IBM PC's — untested as yet (all care, no responsibility), for the same cost as the Apple version). □



These will help you become conversant the stack and with Forth words that operate on values placed on the stack.

Note the spaces between each of the numbers and also the full-stop at the end of each line. This prints out the answer that has been left on the top of the stack by the previous calculations. The answers are 1) 18; 2) 72; 3) 10; and 4) 13.

If you worked the correct answers out without using Forth, then you won't have any trouble in handling stack manipulations and RPN notation. Let's try the following immediate mode example, involving words other than arithmetic type operators —

```
3 DUP 4 DUP * SWAP /
  SWAP 2 * + HEX . CR
```

The answer should be a 'B'. DUP simply copies the top stack value to the top position (pushing all the others down one level) and SWAP interchanges the top two stack values. HEX changes the normal number base (which is usually decimal) to base 16 (hexadecimal). (Forth makes it just that easy to change number bases.) In Part 2, I'll explain how the Forth programmer can easily select *any* number base from binary to base 31, by simply defining the required base.

Let us now proceed with the the temperature conversion program. The first step is to define a Forth word that will print the necessary headings —

```
: HEADING
  CR
  11 SPACES ."Celsius"
  9 SPACES ."Fahrenheit"
  CR CR ;
```

Did I hear you say HOLD ON!? Let's take that definition apart and describe exactly what is happening.

Firstly, the colon sign is the signal to the compiler that a new Forth word is being built and that space must be set aside in the dictionary for it. The name of the new word is HEADING. Most versions of Forth will allow names of words to be from one to thirty characters long; they can contain any character except spaces. The next word is CR, which simply generates a carriage return/line feed sequence.

Next, we print 11 spaces, followed by the (English) word 'Celsius', another 9 spaces, then 'Fahrenheit', two CR/LF sequences and that's it. The semi-colon is the signal to the compiler that the new definition is completed. If everything went well, we can now execute our new word in the immediate mode, simply by typing in its name. The output should look identical to that shown in Figure 1.

```
HEADING
          Celsius          Fahrenheit

OK
```

Figure 1. *Output from the Forth word* HEADING *(defined in the text).*

The 'OK' message in Figure 1 is Forth's way of telling the user that it has executed the command and found no errors. The only type of error that we would expect from the above compilation is a syntax error (usually resulting from a typing error), or an error indicating that the word HEADING wasn't unique and we have redefined an existing word. This is no real problem, so long as we don't use the old version.

This also introduces another very useful feature of Forth. We can build our program piece by piece, testing and checking it as we go, correcting errors and enhancing the output. When everything is correct, we can combine all the words into a single definition (as we are going to do) and then execute the single word.

The next word we will define is CALC, which will be used to calculate the Fahrenheit value (given a starting Celsius value on the stack) and leave the answer on the stack —

```
: CALC
  9 *
  5 /
  32 + ;
```

The value on the top of the stack is multiplied by 9, divided by 5, then 32 is added to it and the result is left on the stack. Once again, the colon sign indicates the start of compilation and the semi-colon signals the end. We won't go through the execution as there is really nothing to test and very little can go wrong. The next word handles printing the calculated values —

```
: PRINT
  14 SPACES .
  15 SPACES . CR ;
```

The only difference in this definition compared to the earlier ones, is the use of . — the full-stop is used to print out the value located on the top of the stack. We must then ensure that the numbers that we wish to print out are on the stack in the correct order. This will be taken care of in our final word —

```
: C->F
  HEADING
  1+ SWAP
  DO
    I DUP
    CALC
    SWAP
    PRINT
  LOOP ;
```

This requires two values to be passed to it on the stack — the starting and finishing values for the conversion loop. For example, when we execute our new word, we will do so in the form —

```
20 60 C->F
```

followed by a carriage return. Incidentally, I have provided the source code for this program as a listing in Figure 2. As you will notice, the source listing is heavily commented to remind me what is happening with the program, particularly on the stack.

The 1+ simply increments the top stack value (in the case of our example, 60), so that the program terminates at the correct place. SWAP places the values in the correct order on the stack for use by the

Program: C -> F	By: HILL	Date: 6/7/86
R Stack (Top →)	FORTH	Comment
	: HEADING	Print Titles
	CR	across Screen
	11	
11	SPACES	Leave 11
	." Celsius"	
9	9	
	SPACES	Leave 9
	." Fahrenheit"	
	CR	New line
	CR	+ 1 Blank Line
	;	
C-val	: CALC	Expect a Value
	9	for C on top
Cval 9	*	of Stack —
9C	5	Convert to
9C 5	/	F and leave
9C/5	32	on stack
9C/5 32	+	
F	;	
F C	: PRINT	
	14	
F C 14	SPACES	
F C	.	Print C Value
F	15	
F 15	SPACES	
F	.	Print F Value
	CR	
	;	

Program: C -> F	By: HILL	Date: 6/7/86
R Stack (Top →)	FORTH	Comment
n_1 n_2	:C -> F	Put it Together
n_1 n_2	HEADING	
n_1 n_2	1+	
n_1 n_2+1	SWAP	
n_2+1 n_1	DO	
	I	Always indent
Cval	DUP	LOOPS & IF's
Cval Cval	CALC	
Cval F	SWAP	Top Value is
F Cval	PRINT	1ST one Printed
	LOOP	
	;	

Figure 2. *Coding sheets like those shown above can make life easier for the Forth programmer. The text of the program is written in the centre column and what it should do, is written in the right column. The left column shows the stack values after the previous operation (note the half-line offset — it's also the value on the stack for the next operation).*

DO . . . LOOP. We could have asked the user to enter them in reverse order, but programs are supposed to make things easier, not more difficult. That's also why we increment (+) the final value on the stack, rather than asking the user to do it manually. The word I puts the current value of the loop counter onto the top of the stack (remember, it's the current Celsius value) and DUP duplicates it.

It's necessary to DUP the top of the stack because the process of CALCulating the corresponding Fahrenheit value actually destroys the original Celsius value on the stack (see the comments in Figure 2).

SWAP again puts the values into the correct order for printing out, then we pass the two values to our word PRINT, and continue through the LOOP until all of the values have been calculated.

In Part 2, I'll develop another program and discuss the use of mass storage, why people actually use Forth, and what systems are available for the newcomer. □

Celsius	Fahrenheit
20	68
21	69
22	71
23	73
24	75
25	77
26	78
27	80
28	82
29	84
30	86
31	87
32	89
33	91
34	93
35	95
36	96
37	98
38	100
39	102
40	104
41	105
42	107
43	109
44	111
45	113
46	114
47	116
48	118
49	120
50	122
51	123
52	125
53	127
54	129
55	131
56	132
57	134
58	136
59	138
60	140

Figure 3. *Output from the example Fahrenheit to Celsius temperature conversion program.*

Teaching an old DOS new Tricks

Would you like to add three extra tracks to your Apple II's DOS 3.3 disk? Recover deleted files? Change the name of your HELLO program? Greg Walpole shows how to perform these feats (and more) with AppleDOS.

DOS HAS A NUMBER of commands such as SAVE, READ and WRITE which allow access to files on the disk. For most purposes, these are entirely adequate. However, to perform feats like the ones mentioned in the introduction, it is necessary to be able to access particular sectors on the disk. For example, to change the name of the HELLO program, we must write the new program name onto the area reserved for it on track 1, sector 9. Normal DOS commands cannot access this part of the disk; here I'll explain how direct reads and writes *can* be done. As an example, a program which reads and prints the catalog track is included. The next article in this series will include a program to provide three extra tracks on your AppleDOS 3.3 disks.

Before delving further, a word of warning is in order: Do *not* test any of the programs in this series on a disk containing important files. A typo in any of the programs could lead to some or all of the data on the disk being lost. You have been warned!

How DOS Does It

When you issue an instruction such as SAVE STARWARS, DOS first decides on which tracks and sectors to place the program, and then performs a write to those sectors — DOS itself contains a routine which allows access to the disk at the sector level. The routine is called 'Read or Write Track and Sector,' or RWTS. Direct access to the disk can be achieved by using a CALL to the RWTS routine from our program.

Before DOS can carry out our wishes, however, it must have certain information such as which track and sector it is to read or write to. This and other information is held in the input/output control block (IOB). While this can be located anywhere, we will be using the IOB which DOS has already created beginning at 47080 ($B7E8). From Basic, the POKE instruction is used to place the necessary values in the IOB before the CALL is made to RWTS. Because we are using the same IOB which DOS uses for its own operations, some of the information required is already filled in for us.

For our purposes, the information which must be supplied is: the drive number, volume number, track, sector, part of the sector to be read or written and whether a read or write operation is to be performed. During a read, data is taken from a single sector and placed in an area of RAM, known as the data buffer. It can be place anywhere in memory, but all of the programs here use a data buffer located at 20500 ($5014). In addition to the information mentioned above, the IOB must also contain the address of the data buffer. Table 1 details all the IOB items with which we will be concerned and their addresses in both decimal and hex. ▷

Purpose of Address	Decimal Address	Hex Address
Drive number to be read/written to (can be 1 or 2)	47082	$B7EA
Volume number expected (0 accepts any volume)	47083	$B7EB
Track to be read/written to	47084	$B7EC
Sector to be read/written to	47085	$B7ED
Low Byte of data buffer address	47088	$B7F0
High byte of data buffer address	47089	$B7F1
Part of sector to be read/written to (0 for entire sector)	47091	$B7F3
Operation to be performed (1 to read; 2 to write)	47092	$B7F4

Table 1. *Decimal and hexadecimal addresses in the input/output control block (IOB) for the data items discussed in the text. (The 'options' shown in the Purpose column, refer to the last digit of the decimal address.)*

```
4E20  A9 00     LDA   #$00  ; Zero
4E22  85 06     STA   $06   ; address $06
4E24  20 E3 03  JSR   $03E3 ; Load address of RWTS IOB
                            ; into registers A and Y
4E27  20 D9 03  JSR   $03D9 ; Call RWTS
4E2A  90 04     BCC   $4E30 ; If carry flag is clear (i.e. no
                            ; error during disk operation)
                            ; branch to $4E30
4E2C  A9 01     LDA   #$01  ; If carry flag not clear (i.e.
4E2E  85 06     STA   $06   ; error during disk operation)
                            ; store "1" at $06
4E30  A9 00     LDA   #$00  ; Zero
4E32  85 48     STA   $48   ; address $48
4E34  AD 0F 9D  LDA   $9D0F ; Store the value held at $9D0F in
                            ; A register
4E37  60        RTS
```

Listing 1. *Assembler subroutine used to access the* RWTS *(read/write track and sector) routine.*

Having placed the necessary values in the IOB using a series of POKEs from Basic, it is then necessary to CALL RWTS. However, three further factors need to be taken into account —

1) Because we are not working through Basic, no error messages will be generated. That means, for example, that a direct write to a write-protected disk will not be successful, but no warning will be given. To overcome this problem, we must use the error indicator provided by RWTS. On return from RWTS, the carry flag in the microprocessor will be set if an error has been encountered.

Basic cannot access the carry flag, so a machine language routine is required to check the carry flag on return from RWTS. If an error has occurred, a '1' is stored into address 6. A Basic program can detect an error by a PEEK at this location. Naturally, it is necessary to ensure that address 6 does not already contain a value placed by some other program or a previous error message, so the subroutine also stores a zero in location 6 before the CALL to RWTS. Why use location 6? Simply because this address is not used by DOS, Applesoft Basic or the monitor; its use is consistent with the relocatability of the routine.

2) RWTS expects to find the address of the IOB in the A and Y registers of the microprocessor when it is called. Because Basic cannot load values directly into processor registers, this function must also be carried out by our machine language routine. This is achieved by a call to another routine within DOS.

3) Address 78 ($48) is used by RWTS and so should be set to zero by our routine after the disk access.

All of this is achieved by the assembler program presented in Listing 1. As in all of the programs presented in this series, the routine loads at address 20000 ($4E20). However, it is, completely relocatable and so could be loaded into any convenient location.

Listing 2 presents a sample Basic program to illustrate the use of this method. Two routines are of particular importance. Beginning at line 120, variables for the track and sector to be read or written, address of the data buffer, and whether a read of write is to be performed are set. The actual disk access is achieved by a GOSUB at 20000. Note that after the return from the subroutine beginning at line 20000, line 170 checks for an error by a PEEK at address 6.

Line 20000 begins the subroutine which actually performs the CALL to our machine language program. Lines 20050 to 20100 POKE the required values into the IOB. Some of these values are supplied in variables set by the calling routine, for example, line 20060 places the values of variables TRACK and SECTOR set in line 120 in the IOB. Other values are constants in the subroutine, for example, the 0 placed in the IOB by line 20050 allows a disk with any volume number to be accessed.

The Program

Lines 100 *to* 210 —

110: initialise the read/write subroutine by

COMPUTER WIDOW

'Bits' and 'Bytes' and flashing lights,
Of these I do not know.
'Nibble' or 'Word' — it's all absurd,
'Bugs' seem to breed and grow.

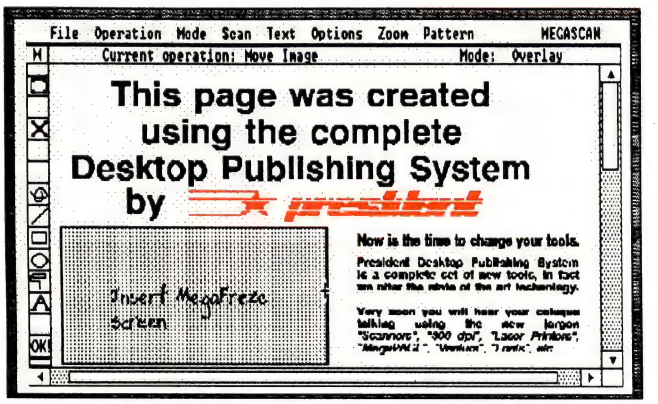
It's early morn cold light of dawn,
Reveals the hidden Bugs.
Almost berserk — for one small quirk:
Half empty coffee mugs.

Is he possessed or just obsessed,
Computer man I love?
I must admit — they really fit,
Together hand in glove.

This affliction is addiction,
For friendly home PC.
I'll follow my hunch — order lunch,
Two serves of TLC.

— **Michelle Tan**

This page was created using the complete Desktop Publishing System by president



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President News on MegaPAGE

New Features and utilities make MegaPAGE the most advance page composition software

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President Computers is offering total support on site for the complete system as well as a formal "hands on" training facility available in all major cities.

HARDWARE

Presidents hardware consists of a Publisher 286 Computer which is a custom A.T. built in Australia at Labrador, which incorporates a 80286 processor with 6-8-10 Mhz selectable speeds, a choice of 44 or 71 megabyte voice coil hard disk with fast access speeds, 60 megabyte of tape backup and a special 101 keyboard incorporates the new tactile positive keys. The standard CGA colour monitor is supplied or a choice of EGA or powerful Wyse-700 which displays 1260 x 800 lines. A specially modified Canon A1 Laser Printer comes with the system giving a full 300 D.P.I. resolution at 8 copies per minute. The AVR-300 Flatbed Scanner which is Australian Built is a key component which has the ability to scan any A4 document in an amazing 9 seconds at 300 D.P.I. the results are astoundingly high quality scans from sheets, photographs, oversized documents, books, even some 3 dimensional objects. With scanning, a flat bed scanner is essential to give all the flexibility and choice you will most certainly require.

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Standard Features

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Allows you to capture complete screen images from your monitor and store and use at will, particularly useful for creation of training manuals etc.

Mega Disk

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Mega Gem

Transfers megabuffer files into Gem files and allows scanning into Ventura or Gem.

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Mega Read

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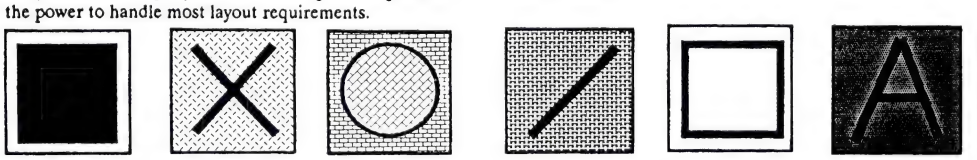

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President News on Ventura

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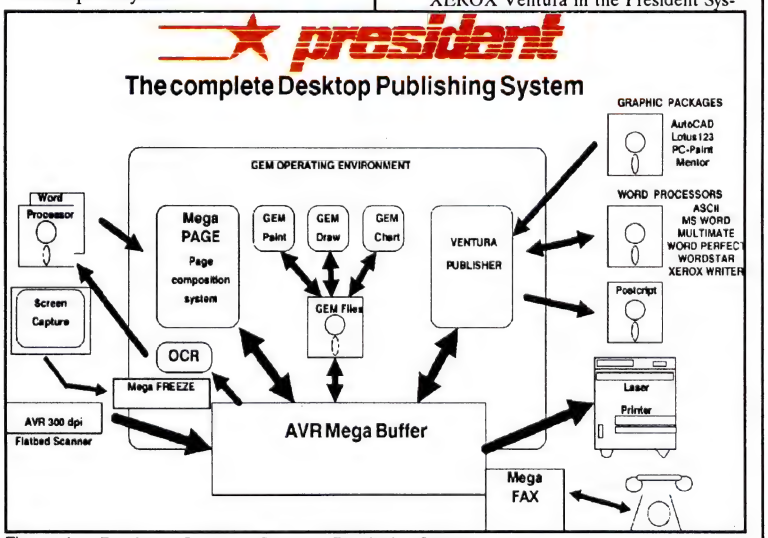

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means of a gosub to line 22000;
130: set variables TRACK and SECTOR to the values required to read the first sector of the catalog;
140: set variable ADDRESS to the address of the data buffer (where data read from disk will be placed);
150: set variable OPeration to REED (a read operation is to be performed);
160: GOSUB to line 20000 performs a disk operation as specified by the variables set in lines 110 to 150 (that is, read track 17, sector 15 into the data buffer at 20500 decimal);
170: if address 6 contains a value of 1, print an error message;
180: if no error occured during the disk access (0 is stored at address 6), print the contents of the data buffer in ASCII by means of a GOSUB to line 2000.

Lines 2000 *to* 2090 —
Data read from the disk is placed in the data buffer. In this case the data buffer starts at 20500 (the value of the variable ADDRESS). Because a single sector has been read, the data is 256 bytes long. In order to print what appears in the sector, it must be retrieved using the PEEK instruction.
2040: ensure that true ASCII values are used; values greater than 128 (high bit set) must have their high bit cleared;
2050: turn control characters with ASCII values less than 32 into ASCII 32s (spaces);
2060: print the character.

Lines 20000 *to* 20210 —
20010: this line checks that drive numbers used are valid by means of a GOSUB to line 21000;
20050 to 20010: fills in the IOB by means of a series of POKES, supplying values for volume number, track, sector, data buffer address, entire sector to be read/written, and whether a read or write is to be performed;
20110: CALLS the machine language subroutine at address 20000.

Lines 21000 *to* 21030 —
This routine checks for valid drive numbers. The last-used drive value at 43624 and the drive-to-use value in the IOB must be the same. Naturally, the only acceptable values are a 1 or a 2. If the values are found to be different or any value other than 1 or 2, the following actions are carried out: **a)** all pending RETURNs and NEXTs are cleared from the stack with the

```
1  REM TEACHING DOS.LISTING 2
2  REM COPYRIGHT GREG WALPOLE 1986
100  TEXT : HOME
110  GOSUB 22000: REM INITIALIZE
120  REM READ FIRST SECTOR OF CATALOG INTO SECTOR BUFFER *****
130 TRACK = 17:SECTOR = 15: REM SET TRACK AND SECTOR TO START OF CATALOG
140 ADDRESS = 20500: REM ADDRESS OF SECTOR BUFFER
150 OP = REED: REM READ OPERATION TO BE PERFORMED
160  GOSUB 20000: REM READ/WRITE TRACK AND SECTOR
170  IF  PEEK (6) = 1 THEN  PRINT : PRINT "ERROR DURING ACCESS": PRINT "TO
     TRACK ";TRACK;", SECTOR ";SECTOR: PRINT
180  IF  PEEK (6) = 0 THEN  GOSUB 2000: REM PRINT DATA BUFFER IF NO READ E
     RROR
190  GOSUB 23000: REM FIX HIMEM; DISABLE ONERR
200  PRINT : PRINT : PRINT : PRINT
210  END
2000  REM PRINT SECTOR BUFFER IN ASCII *****
2010  PRINT
2020  FOR I = 20500 TO 20755
2030 :::CH =  PEEK (I)
2040 ::: IF CH > 128 THEN CH = CH - 128: REM CONVERT APPLE ASCII TO ASCII
2050 ::: IF CH < 32 THEN CH = 32: REM CONVERT CONTROL CHAR TO SPACE
2060 ::: PRINT  CHR$ (CH);" ";
2070  NEXT I
2080  RETURN : REM END PRINT SECTOR BUFFER
20000  REM READ/WRITE SECTOR *****
20010  GOSUB 21000: REM CHECK DRIVE NUMBER
20020  REM CALLING ROUTINE MUST SUPPLY VALUES FOR: TRACK; SECTOR; ADDRESS;
     OP.
20030  REM DRIVE NUMBER MUST BE SET AT 47082
20040  REM RETURNS "1" AT ADDRESS 6 IF DISK ERROR ENCOUNTERED
20050  POKE 47083,0: REM ANY VOLUME NUMBER
20060  POKE 47084,TRACK: POKE 47085,SECTOR: REM TRACK & SECTOR
20070 HB =  INT (ADDRESS / 256):LB = ADDRESS - HB * 256: REM FIND LOW & HI
     GH BYTES OF SECTOR IMAGE ADDRESS
20080  POKE 47088,LB: POKE 47089,HB: REM POKE LOW & HIGH BYTES OF SECTOR I
     MAGE
20090  POKE 47091,0: REM ENTIRE SECTOR
20100  POKE 47092,OP: REM SET READ/WRITE FLAG
20110  CALL 20000: REM READ OR WRITE SECTOR
20120  RETURN : REM END READ/WRITE SECTOR
21000  REM CHECK DRIVE NUMBERS *****
21010  REM @ 43624 & 47082
21020  IF  PEEK (43624) <  >  PEEK (47082) OR  PEEK (47082) < 1 OR  PEEK (
     47082) > 2 THEN  CALL 54915: PRINT : PRINT : PRINT "DRIVE NUMBER ERRO
     R"; CHR$ (7): GOSUB 23000: STOP : REM IF DRIVE NUMBER POINTERS INVALI
     D CLEAR STACK:ERROR MESSAGE
21030  RETURN : REM END CHECK DRIVE NUMBER
22000  REM INITIALIZE *****
22010  POKE 768, PEEK (115): POKE 769, PEEK (116): HIMEM: 19999: REM SAVE
     OLD HIMEM VALUES, SET HIMEM
22020  ONERR  GOTO 24000
22030  POKE 47082, PEEK (43624): REM SET DRIVE IN IOB TO VALUE IN LAST USE
     D DRIVE VECTOR
22040  GOSUB 21000: REM CHECK VALID DRIVE NUMBERS
22050 REED = 1:WRITE = 2: REM READ/WRITE VALUES
22060  REM POKE RWTS ROUTINE INTO MEMORY
22070  POKE 20000,169: POKE 20001,0: POKE 20002,133: POKE 20003,6: REM STO
     RE 0 IN ADDRESS 6
22080  POKE 20004,32: POKE 20005,227: POKE 20006,3: REM JSR $03E3
22090  POKE 20007,32: POKE 20008,217: POKE 20009,3: REM JSR $03D9
22100  POKE 20010,144: POKE 20011,4: REM BRANCH IF CARRY FLAG CLEAR
22110  POKE 20012,169: POKE 20013,1: POKE 20014,133: POKE 20015,6: REM IF
     CARRY FLAG SET, STORE 1 IN ADDRESS 6
22120  POKE 20016,169: POKE 20017,0: POKE 20018,133: POKE 20019,72: REM ZE
     RO ADDRESS $48
22130  POKE 20020,173: POKE 20021,15: POKE 20022,157: REM LDA $9D0F
22140  POKE 20023,96: REM RTS
22150  RETURN : REM END INITIALIZE
23000  REM RESTORE HIMEM *****
23010  POKE 115, PEEK (768): POKE 116, PEEK (769): REM SET HIMEM TO ORIGIN
     AL VALUES
23020  POKE 216,0: REM DISABLE ONERR
23030  RETURN : REM END RESTORE MEM
24000  REM ERROR HANDLING *****
24010  PRINT : PRINT : PRINT "ERROR NUMBER "; PEEK (222);" IN LINE "; PEEK
     (218) +  PEEK (219) * 256; CHR$ (7)
24020  CALL  - 3288: REM FIX STACK
24030  GOSUB 23000: REM FIX HIMEM;DISABLE ONERR
24040  END
```

Listing 2. *A Basic program for disk accessing under* AppleDOS *using the method discussed in the text.*

CALL 54915; **b)** an error message is printed; **c)** restore HIMEM and disable ONERR via GOSUB 23000; **d)** STOP. If no error is found, the program falls through to line 21030 where control is RE¯URNed to the calling routine.

Lines 22000 *to* 22150 —
22010: this program places a machine language program in memory at 20000 ($4E20), so HIMEM must be set below this figure to protect the machine language program from Basic variables. Programs which set HIMEM can produce puzzling and annoying results when there is insufficient memory to run subsequent programs. To avoid this difficulty, when the program begins the HIMEM value (normally held in addresses 115 and 116) is saved in addresses 768 and 769. This allows the initial HIMEM value to be restored when the program ends. See line 23010.
22030: an instruction such as CATALOG will apply to the last-used drive unless the drive is specifically stated as in CATALOG,D2. This value is stored by DOS at address 43624.

When RWTS is accessed directly, it will ignore this value and use the value stored in the IOB at 47082 ($B7EA). It is possible to create a situation where a program such as this will access a drive through RWTS without resetting the last-used-drive value. After the program has ended, a disk operation such as CATALOG will access what is apparently the wrong drive. This may be disastrous if the init instruction is used. Line 22030 ensures that the two drive-to-use values (at 43624 and 47082) are the same.
22040: by means of a GOSUB, checks that the two drive to use values are, in fact, the same;
22050: sets variables READ and WRITE to the appropriate values required in the IOB to perform a read or write operation (REED was chosen as a variable name to avoid syntax errors due to use of the reserved word READ);
22060 to 22140: POKE the machine language routine into memory (The REMs associated with these lines refer to the effect of the machine language routine).

Lines 23000 *to* 23030 —
This subroutine should be called before ENDing the program.
23010: HIMEM is restored to its value immediately before the program was run by transferring it from its temporary location at 768 and 769 (see line 22010);
23020: disable error trapping.

Lines 24000 *to* 24040 —
24010: print an error message;
24020: if an error handling routine is not terminated by a RESUME instruction, the stack can be effected (A routine to fix this is in the Applesoft ROM at address –3288);
24030: reset HIMEM: to the value before the program began and disable ONERR by means of a GOSUB to 23000.

Direct Disk Access From Your Own Programs

If you wish to use this method to achieve direct disk access in your own programs, all lines from 20000 to 24040 must be included. A GOSUB 22000 should be done before any variables are declared. To access a disk —

1) Set variables TRACK, SECTOR, ADDRESS (of data buffer) and OPeration. If the variable OP is given the value of REED (that is, 1), a read will be performed. A value of WRITE (2) will cause a write operation to be performed. If the intialisation routine at 22000 is used as is, the value of ADDRESS must be greater than 20023 to avoid overwriting the machine language routine.
2) GOSUB 20000 will perform a read or write of the track and sector specified.
3) On return from the subroutine, if a read has been performed, the contents of the specified track and sector will be stored in the 256 bytes starting at the address specified by the variable ADDRESS. If a write has been performed, the 256 bytes starting at ADDRESS will have been saved to disk on the specified track and sector.

If an error has occured during the disk access, address 6 will contain a 1.

Listing 3 can be used to replace lines 1 to 210 of listing 2. It is designed to read the entire catalog track. As listed here, only the first two sectors are read. To see the rest of the track, change line 150 to: 150 FOR SECTOR = 15 TO 1 STEP –1.

```
]

1  REM TEACHING DOS.LISTING 3
2  REM COPYRIGHT GREG WALPOLE 1986
100  TEXT : HOME
110  GOSUB 22000: REM INITIALIZE
120 TRACK = 17: REM CATALOG TRACK
130 ADDRESS = 20500: REM ADDRESS OF SECTOR BUFFER
140 OP = REED: REM READ OPERATION TO BE PERFORMED
150  FOR SECT0R = 15 TO 14 STEP  - 1
160 ::: GOSUB 20000: REM READ/WRITE TRACK AND SECTOR,
170 ::: IF  PEEK (6) = 1 THEN  PRINT : PRINT "ERROR DURING ACCESS": PRINT
     "TO TRACK ";TRACK;", SECTOR ";SECT0R: PRINT
180 ::: IF  PEEK (6) = 0 THEN  GOSUB 2000: REM PRINT SECTOR BUFFER IF NO R
     EAD ERROR
190  NEXT SECT0R
200  GOSUB 23000: REM FIX HIMEM; DISABLE ONERR
210  PRINT : PRINT : PRINT : PRINT
220  END

]
```

Listing 3. *To read the entire catalog track, replace lines 1 to 210 in Listing 2 with the above lines. As listed, only the first two sectors are read. To see the rest of the track, change line* 150 to: 150 FOR SECTOR = 15 TO 1 STEP –1.

Since few disks have their catalogs full, it is most likely that the display will consist largely of blank spaces! Note that the catalog is stored 'backwards' — it begins at sector 15 and ends at sector 1.

Part 2 of this series will include a program to INITialise a disk with 3 extra tracks available for storage. Lines 20000 to 24040 will be exactly as listed here, so start typing now! □

NEW PRODUCTS

Software

The Broker
Medix Software
Phone: (02) 449 9162
Price: $599
The Broker, a powerful new share portfolio and investment management software package, has recently been released by Medix Software. It is designed to meet the needs of both new and experienced investors on the stock market, and accommodates multiple portfolios with no software limit to the number of shares in each portfolio. Prices, price targets and earnings per share can be easily updated. The Broker features familiar Lotus style menus and access to each portfolio is password protected providing security where one package is used for several investors. It is designed to run on the IBM XT/AT and close compatible computers.

Anvil's Stallion
Anvil Designs Pty Ltd
Phone: (07) 858 2853
Price: forge it out of them
Anvil Designs have recently announced the release of the Stallion Intelligent Terminal I/O subsystem for multi-user IBM PC and AT compatible computers. The Stallion is said to enable desktop computers to achieve minicomputer performance, supporting up to 16 users in a UNIX/XENIX operating environment. The system is based on mainframe design concepts and relieves the main processor of all overheads normally associated with processing characters for sixteen terminals. By utilising an Intel 80186 16-bit processor and dual-port memory, the software can support data rates on each channel up to 38.4 Kbytes per second.

Altos Desktop Publishing System
Altos Computer Systems
Phone: (02) 419 6199
Price: not for publication
Moving into the desktop publishing arena is Altos Computer Systems with the release of their Office Manager Deskset Publisher. The program was designed for use on Altos powerful Xenix-based AOM Word Processor and will produce near-typeset quality documents using a laser printer. Operation is relatively transparent since typesetting commands are entered as normal word processing commands. Graphics capability includes vertical and horizontal line drawing, boxes, integration of graphs from spreadsheets and the ability to merge freehand drawings done with PC-Paint. Roman type is available in normal, italic and bold italic in sizes from 6 to 36 point.

Autocad Interface
ACI *Computer Services*
Phone: (03) 541 5600
Price: not supplied
ACI Computer Services have just released the latest version (3.0) of the CPS-PC software package which features an interface with Autocad. The interface allows two-way transfer of data between the two programs. Autocad can be used as a sophisticated digitiser, data entry and graphics editor for CPS-PC and, CPS-PC can, in turn, pass contour maps or three-dimensional drawings back to Autocad. The CPS-PC package enables the user to develop complex contour mapping, gridding and analysis applications. Some of other features include cross section maps, displaying three dimensional spatial information and surface modeling applications.

Cadvance Version 1.3
Datamatic Pty Ltd
Phone: (02) 888 1788
Price: not supplied
Datamatic have released Cadvance Version 1.3, a two dimensional CAD software package created for architectural and engineering purposes which is used to create professional-quality drawings and designs. Cadvance is designed for use on the IBM XT and AT PC's and 'true board-compatibles.' It has a full feature database which can be used automatically produce a bill of materials for job costing. Other features included in the package are automatic dimensioning, automatic symbol insertion within walls, automatic wall creation and intersection clean-up, as well as the ability to stretch entire walls.

MediX

Clinic Release 3.0
Medix Software
Phone: (02) 449 9162
Price: $1,500 standard package
Medix Software have announced the release of version 3.0 of their popular Clinic practical management system. The software is now available in several different versions targetted at specific types of medical practices. All versions of Clinic include the accounting features of 'instant billing' at time of consultation onto either plain or preprinted stationary, or to Medicare bulk billing forms, while also permitting the deferred printing of invoices. Clinic is designed to run on IBM XT, AT and close compatibles. In addition, the software requires version 1.12 of the IBM PC Local Area Network Program.

LAN Pack for dBase III
Ashton-Tate Pty Ltd
Phone: (02) 922 6577
Price: not supplied
Ashton-Tate have released Version 1.1 of their dBase III Plus LAN Pack which is now said to be fully compatible with IBM's Token Ring Network. The package has been designed to also support PC Net, Novell Advanced Netware, 3Com's Networking Operating System (1.0.1) and AT&T's Starlan. To operate on the Token Ring Network, dBase III Plus requires a minimum of 512 Kbytes of RAM (640K recommended).

C Tools Plus
Microway
Phone: (03) 555 4544
Price: not supplied
C Tools Plus is a C language application development package from Blaise Computing for systems using MS-DOS. With an extensive C library that gives full-function window support, the program can be used to develop pop up menus or windows. The numbers of windows is limited only by available memory. C Tools Plus supports the EGA text modes (including 43-line mode) and multiple display pages. Functions for all standard and advanced DOS directory and file handling are included.

Lead Software
Archives Computers Australia
Phone: (03) 699 8377
Price: not supplied
Archives have released Lead version 4.0 which is an upgrade to Lead, its client database and history software package. Written in DataFlex 2.2, Lead is compatible with the a number popular micro operating systems, including MS- and PC-DOS, and Xenix V and is fully transportable across a wide range of Local Area Networks, such as Novell, IBM Token Ring, Ungerman Bass and 3Com's 3+. Lead now has an interactive command screen which allows users to run any other software application from within Lead without exiting the main application. Lead 4.0 also allows reports to be displayed on the screen or stored as a disk file. A new feature, letter searching, finds all companies or names beginning with a particular letter and displays them in sequence for either querying or editing.

Executive Information Access
EPS *Software Consultants Pty Ltd*
Phone: (02) 439 3722
no information
Executive Information Access (EIA) is designed to provide on-line access to reports and graphs produced by the FCS-EPS decision support system. The user drives EIA through function keys that can be used to scroll, search and print reports as well as split the screen for multiple document viewing. Documents can only be accessed in read-only mode. The software is supported by the IBM's TSO and CMS operating systems.

Micro-FCS
EPS *Software Consultants Pty Ltd*
Phone: (02) 439 3722
Price: not supplied
EPS have released Miro-FCS Version 2.3 for the AT&T 3B2 range of computers marketed by Olivetti.

The software, which runs under MS-DOS and Unix, features full screen editing, a powerful financial modeling language, screen formatting for menu creation, comprehensive report generation, sensitivity analysis and targetting, plus user-defined functions and commands, and the ability to link to data from an external source. Micro-FCS is compatible with mainframe FCS-EPS, which is available for over 40 different hardware environments.

Proquote
Practical Software Pty Ltd
Phone: (03) 267 4844
Price: no quote
ProQuote is a dealer quotation package written by Melbourne software house, Practical Software. The system, written in Dataflex 2.1, provides dealers with a full stock control system plus invoicing, credit notes, ordering and a statement facility. It's transportable across MS- and PC-DOS, CP/M and Xenix and is said to be fully compatible with Novell and 3Com networking products. After selecting the products required from a screen 'menu,' a quote can be printed out for customers while the screen shows the dealer his margin, purchase price and tax level.

Powerpoint and MGM Station for the Macs
Software Corporation of Australia
Phone: (02) 211 4099
Price: Powerpoint $695
MGM Station $1450
In conjunction with the recent release of the Apple Computers' powerful new Macintosh Computer range, Software Australia have announced the release of two of their own new software products. The Powerpoint and MGM Station are software products designed to draw upon new capabilities of the enhanced devices. Both products are fully compatible with the new Apple Macintosh SE and Macintosh II. Powerpoint is designed to create and manage business presentations. The MGM Station is a full-featured, cadcam system software tool which provides the necessary designing requirements for charts and graphs which are used as the basis for time plan diagrams.

Lancourier from Tallgrass △
Tallgrass Technologies
Phone: (02) 712 2010
Price: $19,500.
Tallgrass Technologies have released Lancourier, a multifunction file server that supports a variety of local area network configurations and communications options, using VINES virtual networking software. The Tallgrass Lancourier (Model TG-8000), a 32 bit network file server provides resource sharing for small computer networks, wide area networking, host access and server-to-server communications. Unique features of the Lancourier include: file and peripheral sharing, access to minicomputers, mainframes and larger networks, gateways between similar or dissimilar local area networks, a global mechanism for tracking all network resources, multiple remote communications links and network diagnostics. □

Mouse Version 6.0
Microsoft Australia
Phone: (02) 922 6062
Price: $375
Microsoft have enhanced their Mouse hardware product in Version 6.0 with the addition of Show Partner Version 2.0, which allows users to capture images, create graphics, and assemble them for PC-based applications. This release has a new menu system that supports Lotus 1-2-3, Displaywrite and Multimate. Show Partner has four components: the first transfers images on the screen to disk; the second is a graphics editor; the third is a screen editor; and the fourth is a run-time module. Mouse Version 6.0 also includes Paintbrush. It's available in two versions: serial port for the IBM 9-pin PCs and ATs and a bus version for the IBM bus.

Unix V for the 80386
Microsoft
(02) 454 5088
Price: not yet
AT&T and Microsoft have announced that a new version of UNIX System V for Intel's 80386 microprocessor will be released in early 1988. AT&T will continue to market Unix system V and Microsoft will continue to market Xenix during the development. It's anticipated that the new system will run all current applications.

Peripherals and Extensions

Ida MicroWriter 4214-1 Printers
Bit Talk
Phone: (03) 429 8844
Price: not supplied
Bit Talk have recently released their new series of Ida MicroWriter dot matrix printers. The printers have a stated, fast 100 characters per second speed in near letter quality mode and 200 cps in draft mode. The printers come with eight character variations which support italic, bold, emphasised, underlined, subscript, superscript and double height in up to 14 different colours. The printers are IBM graphics compatible and they offer a built in print menu.

Dacos Smart Printer Buffer
Data Cable Pty Ltd
Phone: (03) 690 4799
Price: not supplied
In a bid to free computers of slow printing tasks, Data Cable have released the Dacos Smart Printer Buffer, a microprocessor-controlled printer/plotter that takes data from a host computer or terminal and feeds it to a printer or plotter. The printer buffer is available in either a 64 Kbyte, 128 Kbyte or 256 Kbytes memory buffer.

LaserNet from Case
Case Communications
Phone: (02) 451 6655
Price: $1995
Case Communications have introduced a range of networking products. The LaserNet is designed to make efficient use of expensive printers, allowing a number of PCs, terminals, word processors or mainframes to share a Laser and other printers. The device is connected between the printer, modem or auxiliary

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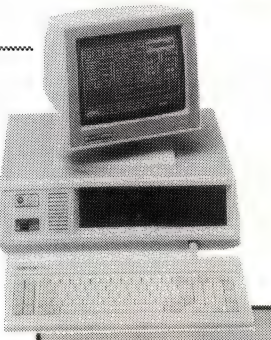

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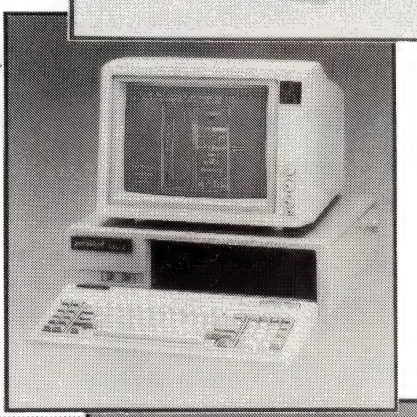
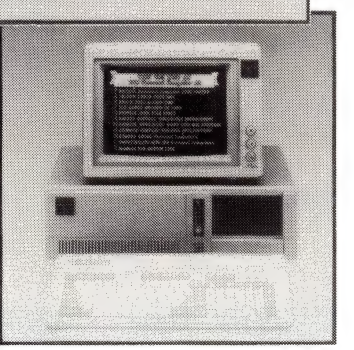


The Professional 386

- 1 Meg. RAM
- 16 MHz.
- 2 years warranty

$8700 ex-tax



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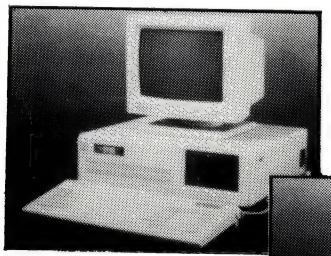

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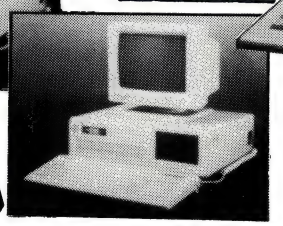

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TVM MD-7 EGA	$1,129
TVM MD-7 Plus ABM EGA Card	$1,514

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EPSON LQ-2500	$1,995

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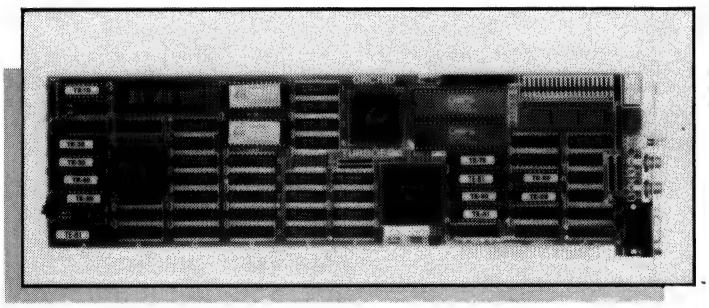
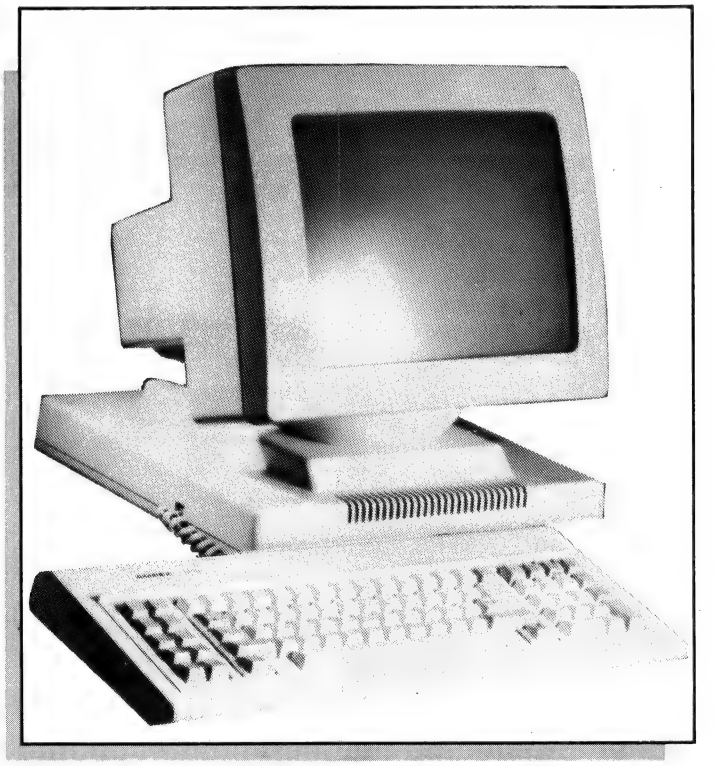


port of the sending units and the printing device. Equipped with both serial and parallel interfaces, LaserNet can support dot matrix printers, plotters, line printers and daisy wheels as well as laser printers. Buffering within LaserNet enables data to be dumped to the unit from the PC at high speed, enabling the PC to be free for other work.

Mannesmann Tally 165 Printer
Microprocessor Applications
Phone: (03) 894 1494
Price: not supplied
A dot matrix printer which produces output on all types of stationery and board, has been released by MPA. The MT165 prints at speeds of 160 characters per second in draft mode and 40 cps in near letter quality mode. MPA have designed a special push tractor system with a modified tear bar which allows printing on forms as heavy as typical airline boarding passes. For those fortunate enough to know the thickness of an airline ticket. A nifty feature of the MT165 is its small foot print which means it can sit on small tables or in offices where there is not much room.

PC Turbo Board
RC *Electronics*
Phone: (02) 327 6403
Price: $120 mail order
For those who would like their PC's to run at a faster rate, RC Electronics have come up with an answer, with the release of their new RCE Turbo board. The new board allows the PC to run at between 6.77 MHz and 8 MHz compared with the usual 4.77. The RCE Board also allows provides an intervention mode which lets you change speeds from the keyboard or via a three-way switch.

Graphics Adaptor △
Electronic Solutions
Phone: (02) 427 4422
Price: not supplied
Electronic Solutions have released a combination Turbo 'speed-up' and Enhanced Graphics card. It turns an ordinary IBM PC or 8088 into a cadcam type package, with business and graphics programs at IBM AT speeds, without the expense of upgrading to an IBM AT. The card supports all four graphics standards: EGA, CGA, MDA and Hercules Graphics, so you can run your existing software as well as programs on the new EGA.



Plug-in Card for Apples △
Logo Computer Centre
Phone: (02) 819 6811
Price: $795 not taxed

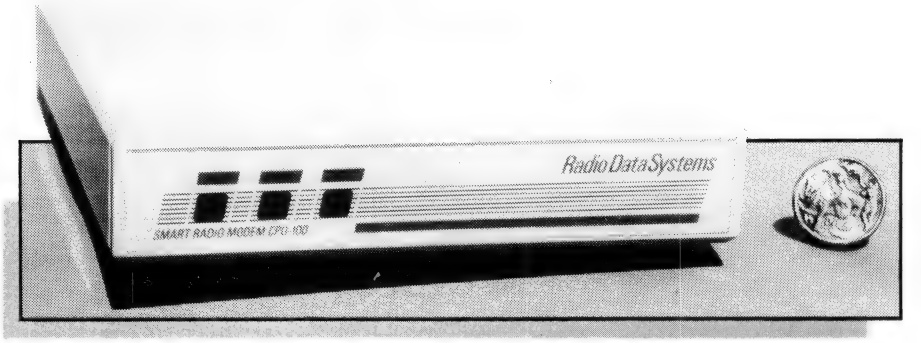
With the release of the Trackstar 128 it is now possible to run Apple Educational, business and games software on the IBM PC and most compatibles. With Trackstar, an IBM PC acts like an Apple II Plus, IIc, IIe (to the horror IBM hardcore types) with RAM card, 80 column card, and colour graphics card for RGB output. Both 64 Kbyte and 128 Kbyte programs are supported. Trackstar supports 80 column mode, RGB, composite colour, and monochrome for all Apple text and video modes and includes an Apple games port. It also provides file transfer between Apple and MS-DOS.

Ampex 232 Terminal △
Impact Datascape
Phone: (02) 406 6611
Price: not supplied
Impact Datascape have released the Ampex 232 Terminal, an addition to the growing number of high resolution terminals available on the market. The 232 has a tilt and swivel display and a low profile 30 mm DIN keyboard with adjustable slope, fully buffered bidirectional printer port, IBM scan codes or ASCII codes, and a full IBM 256 character set (ASCII 0 to 255).

Quattro Modem
Case Communications
Phone: (02) 451 6655
Price: $1650 not taxed
Case Communications have released a new version of the Quattro modem incorporating dial-up access security features. Quattro provides a built-in password checking and dial-back capability ensuring that only users with the correct password and operating from the right phone number can gain access to the computer system. Other features include automatic log-on, telephone number storage,

error correction features, help menus, automatic detection of asynchronous and synchronous modes of operation, and Wang protocol support.

ITT Qume's QVT 119 Plus STC Terminal
STC *Business Systems*
Phone: (02) 925 7272
Price: not supplied
ITT Qume have recently released their QVT-119 terminal. The QVT-119 features dual high-speed microprocessors, horizontal scrolling to 132 columns, four pages of memory and the ability to support two hosts and split screens. The terminal also offers a full range of emulations including the IBM 3101, ADPS Viewpoint A2, Wyse WY-50 and more. It has 16 programmable keys with up to 44 functions.



Smart Radio Modem △
GFS *Electronic Imports*
Phone: (03) 873 3777
Price: Not supplied
GFS Electronics and Radio Data Systems have released their latest version of the CPU-100 Intelligent Radio Data Modem. The CPU-100 features include full error correction, link baud rates of 1200 bps, ASCII range and adaptive block protocol for high throughput.

New Machines

Baby Blue Computer System
Barrington Corporation
Phone: (08) 232 1333
Price: $997 taxed
Barrington Corporation has announced the release of its latest 16-bit Baby Blue computer, a standalone PC with 256 Kbyte of RAM. The Baby is provided as a business portable or as an IBM compatible. The Baby looks to be directed at the market as a low priced compatible and will attract people looking for a computer which is designed for games, with its 640 x 200 graphics, 8087 socket, a parallel and serial printer ports and gameS port. The Baby runs on MS-DOS 3.1 and and comes with GWBASIC plus the choice of either IBM PC/AT style or enhanced-style keyboard. ◁

Wyse PC/XT Compatibles
Microprocessor Applications
Phone: (03) 894 1500
Price: not supplied
Recently released by MPA is a range of IBM PC/XT compatible systems which incorporate both 4.77 and 9.54 MHz user-selectable modes. The 4.77 MHz mode ensures compatibility with IBM PC-compatibles while the 9.54 MHz allows processing to occur twice as fast. Called the Wyse PC Plus, it is available in three basic models: Model 1400-01 has 256 Kbyte of RAM and a single diskette drive model 1400-02 has 640 Kbyte of RAM and dual diskette drives and model 1400-20 has 640 Kbyte of RAM and a 20 Mbyte hard disk drive.

Wyse PC 286 range
Microprocessor Applications
Phone: (03) 894 1500
Price: not supplied
A switch-selectable 16-bit AT compatible microcomputer range has been released by Mi-

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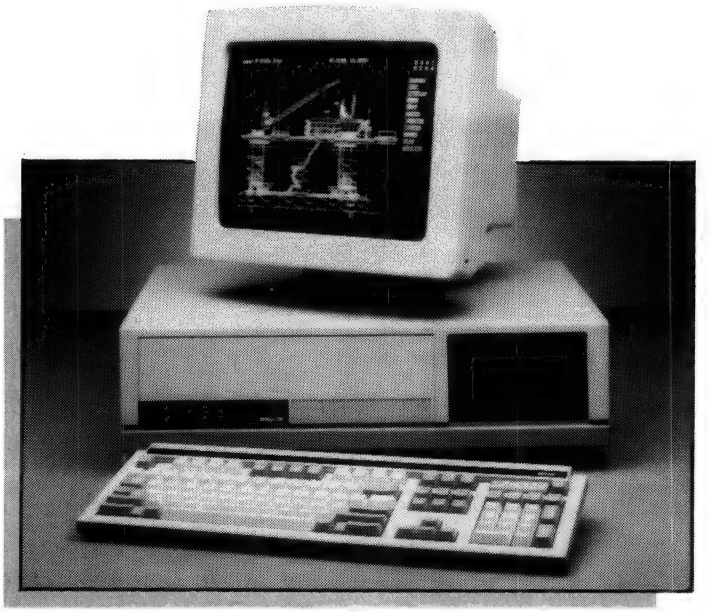
croprocessor Applications. The Wyse PC 286 models are based on the 16-bit 80286 processor and can operate at speeds of either 6 MHz or 10 MHz. The new systems includes a 640 Kbyte memory, serial and parallel ports MS-DOS 3.1 operating system and a choice either the IBM PC or A style of IBM style keyboard, and GWBASIC is included. The range is available in three configurations. These are the single diskette drive (Model 22 00-01) the 30 Mbyte half-height, hard disk version (Model 22 00-20) and the 40 Mbyte full-height, hard disk version (Model 22 00-40). ▷



Furniture

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Sylex Ergonomics
Phone: (02) 647 2888
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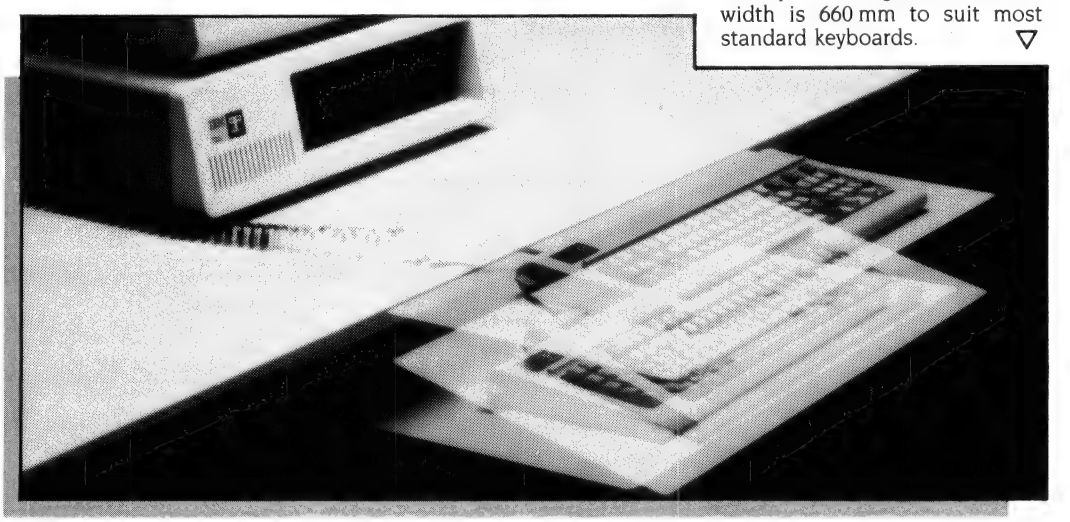

Miscellaneous

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Electronic Solutions
Phone: (02) 427 4422
Price: $145 Controller
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or $395 for both
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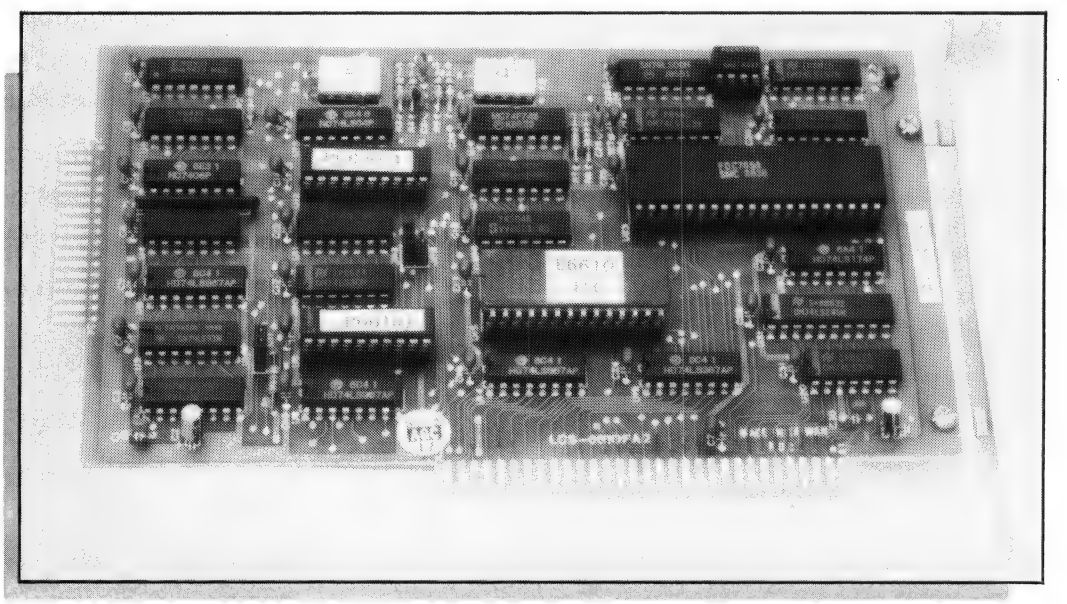
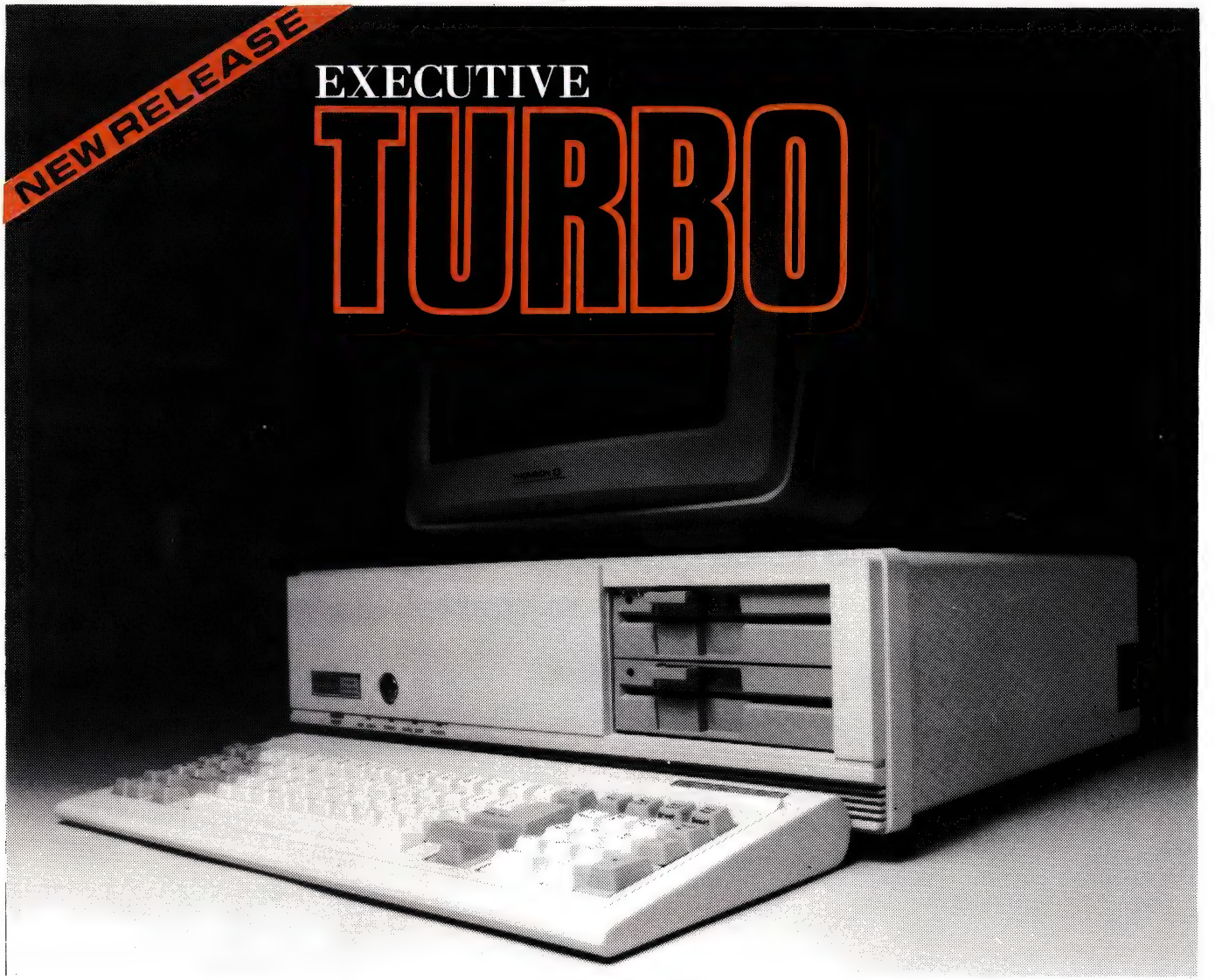
Tallgrass Technologies
Phone: (02) 820 0100
Price: $14,699 taxed
Tallgrass Technologies has launched a practical optical storage disk for personal computers. The Lightfile optical storage system combines the power permanence and removability of a write-once-read-many (WORM) optical drive with the flexibility and ease of use found in magnetic hard disk drives. The Lightfile product is available with single or dual drives and is designed primarily for high capacity, large database operations. It features a 200 Mbyte per side capacity in its four models.



NEW RELEASE

EXECUTIVE TURBO



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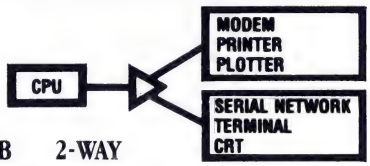

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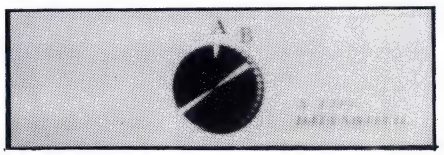

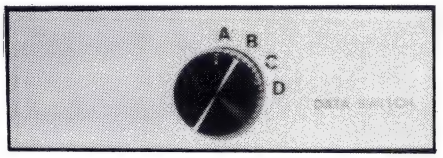

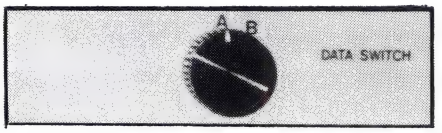

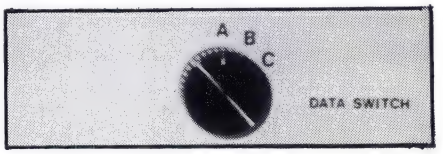

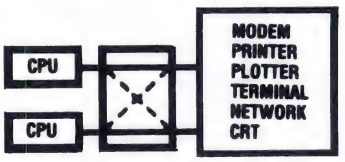

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Conroy Carpenter/TCP 0034(R)

BY JOHN HEPWORTH

THIS MONTH A LITTLE problem came to light: a user had developed the habit of responding to the date and time requests at boot up by merely hitting ENTER a couple of times. As a result all files were dated 1-1-80, and all times appeared to be in the early hours of the morning. Then the user came to me to ask if it were possible to get a printout of all records entered into a database on a certain day!

Accurate date and time stamping of files is essential. It makes determining the latest version on different disks possible, allows incremental backups with various library and backup programs, and is generally essential for smoothly running a system.

Fortunately the day my timeless user was concerned about was only a couple of days earlier and the database had not been sorted since then. So, with a little trouble it was actually possible to get the required report.

Getting the users to input the correct date proved a little more difficult, and a degree of subtle(!) coercion was required.

YEAR.COM

The DOS ERRORLEVEL function can be used to allow for interactive batch files. In 'Your IBM,' Sept.'86, SETERROR.COM read keyboard input and set the ERRORLEVEL to the ASCII value of the key pressed. A test of date to be carried out from within the AUTOEXEC.BAT file at bootup was essential, pending getting a clock-calendar, and YEAR.COM was born.

YEAR.COM reads the system date, and abbreviates the year to two digits. As an example, 1987 appears as 87. It then sets the DOS ERRORLEVEL to that abbreviated year.

These few lines in the AUTOEXEC.BAT file —

```
:REPEAT
DATE
YEAR
IF NOT ERRORLEVEL 87 GOTO REPEAT
```

— call for the date to be input, test the error level, and loop back to the label :REPEAT if the errorlevel is not 87 or greater. Any user who just taps enter and thus sets the year as 1980 is trapped out until a date on or after 1-1-87 is set. An accurate date is nicest — but any date at all is sure to be more random than 1-1-80 and give some chance of separating reports by day of creation of records.

YEAR.DAT

With your word processor in *non*-document mode, create the following file, calling it YEAR.DAT. Press <enter> to terminate each line, and where <enter> appears before the line reading rcx, press the enter key to create a blank line.

```
a
MOV   AH,2A       ;load value 2A (hex)
                  ;into register AH.
                  ;Function 2A reads
                  ;system date and loads
                  ;it into register CX
                  ;
INT   21          ;execute function 2A
                  ;
MOV   AX,CX       ;move contents of
                  ;register CX into AX
                  ;
SUB   AX,076C     ;subtract 076C (hex),
                  ;(1900 decimal) from
                  ;number in AX. This
                  ;leaves abbreviated
                  ;year in register AL
                  ;
MOV   AH,4C       ;load 4C (hex) into
                  ;register AH. Function
                  ;4C exits program and
                  ;sets DOS ERRORLEVEL
                  ;to value in
                  ;register AL
                  ;
INT   21          ;execute function 4C
<Enter>
rcx
d
nYEAR.COM
w
q
```

Using Debug as an Assembler

Now use DEBUG to create YEAR.COM by using the command DEBUG <YEAR.DAT

Debug will run, read its input from the file YEAR.DAT, and create YEAR.COM. The remarks in the source code starting with a ';' are ignored in the process. One little point — if DOSEDIT is active the process will fail giving error messages indicating a '?' in the file, and after running through the file the machine will hang and require a reboot.

Other versions of the same routine can read the month, day of the month, day of the week and hour of the day. Again, create a .DAT file and read it into DEBUG with the command —

```
DEBUG <filename.DAT
```

MONTH.DAT

MONTH.COM sets the error level equal to the month, using numbers from 1 to 12 (October appears as 10) —

```
a
MOV   AH,2A       ;Function 2A
                  ;reads system date.
                  ;and loads month into
                  ;register DH
                  ;
INT   21          ;execute function 2A
                  ;
MOV   AL,DH       ;move contents of
                  ;register DH into AL
                  ;
MOV   AH,4C       ;load 4C (hex) into
                  ;register AH.
                  ;
INT   21          ;execute function 4C
<Enter>
rcx
A
nMONTH.COM
w
q
```

DAY-MON.DAT

DAY-MON sets ERRORLEVEL equal to the day in the month, in the range 1 to 28, 29, 30 or 31 depending on the month —

```
a
MOV   AH,2A       ;Function 2A
                  ;reads system date.
                  ;and loads day into
                  ;register DL
                  ;
INT   21          ;execute function 2A
                  ;
MOV   AL,DL       ;move contents of
                  ;register DL into AL
                  ;
MOV   AH,4C       ;load 4C (hex) into
                  ;register AH.
                  ;
INT   21          ;execute function 4C
<Enter>
rcx
A
nDAY-MON.COM
w
q
```

DAY-WEEK.DAT

DAY-WEEK sets ERRORLEVEL equal to the day in the week (0 for Sunday through to 6 for Saturday) —

```
a
MOV   AH,2A       ;Function 2A
                  ;reads system date.
                  ;and loads day of week
                  ;into register AL
                  ;
INT   21          ;execute function 2A
                  ;
MOV   AH,4C       ;load 4C (hex) into
                  ;register AH.
                  ;
INT   21          ;execute function 4C
<Enter>
rcx
8
nDAY-WEEK.com
w
q
```

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HOUR.DAT

HOUR sets ERRORLEVEL equal to the hour of the day using a 24 hour clock (5pm gives an ERRORLEVEL of 17) —

```
a
MOV   AH,2C     ;Function 2C
                ;reads system time.
                ;and loads hours into
                ;register CH, minutes
                ;into CL, seconds in DH
                ;hundredths in DL
INT   21        ;execute function 2A
                ;
MOV   AL,CH     ;move contents of
                ;register CH into AL
                ;
MOV   AH,4C     ;load 4C (hex) into
                ;register AH.
                ;
INT   21        ;execute function 4C
<Enter>
rcx
A
nHOUR.COM
w
q
```

TEST.BAT

After date and time are entered, or if the lines Date and Time are omitted, and the clock calendar board sets the DOS clock, the batch file will loop continuously through one or other of the tests until 9.00 am on December 12, 1987, and then complete the file and echo the message. A quick demonstration routine will show how the above routines work —

```
date
time

:repeat1
YEAR
if not errorlevel 87 goto repeat1

:repeat2
MONTH
if not errorlevel 12 goto repeat2

:repeat3
DAY-MON
if not errorlevel 25 goto repeat3

:repeat4
HOUR
if not errorlevel 9 goto repeat4

echo "Merry Christmas"
```

Remember that some versions of DOS will not increment the date more than once in a session, and that if this file is left running, DOS will access the drives constantly as it reads and re-reads the batch file and reads and executes the .COM files. □

Interfacing With The Outside

I DISCUSSED INTERFACING your Beeb to the outside world through the user port, mainly with Lego in mind, in my column which appeared in the November '86 issue of *Your Computer*. For those with more diverse tastes and especially for those who haven't tried connecting their Beeb to the real world, I'm going to discuss a simple setup that provides a basis for lots of experimentation with both software and hardware. For an investment of less than $10 worth of parts it will provide just as many hours of frustration as any other computer activity.

I'll describe an optical device that controls just one line of the user port. Not exactly a grandiose project, but with time and only a little imagination you'll find such beginnings can produce complications akin to those in the largest adventure game.

The chosen line is PB0. The PB stands for the 6522 VIA's Port B (Port A is used to control the parallel printer) and the 0 indicates that it is line 0 of the eight control lines attached to this port.

The 6522 is a fearsome beast with all manner of complications and intricacies which I neither know, nor want to know, very much about — I'm too old to spend a major portion of my life working it all out from the data sheets and muddy explanation in textbooks. What you do need to know is that the 6522 is located at &FE60 in the Beeb's memory. This location is treated like an ordinary memory location. It can be read to find out what's coming in those eight lines, and when you store data there it sends signals out along those lines.

Write and read the same lines? Yes, it's a disaster just waiting to happen unless you decide in advance whether a line is going to be written to (controlling something out there) or whether it will be read (to tell the computer what's happening out there). For example, it wouldn't make much sense to be reading a line attached to an on/off switch controlling a light, since this application would require the line to be defined as an output line.

To prevent this confusion there is a special register at &FE62 (the data direction register), just a single byte of memory, that tells the 6522's B port which lines are going to be read and which are to be written to. For example, storing the value 3 in this register (that is, ?&FE62=3) would set lines PB0 and PB1 to be write lines because 3 in binary is 00000011 and a 1 in the DDR means that line is an 'output' line. It follows that since the data direction register bits associated with PB2 to PB7 have been cleared to 0, these lines have been defined as 'input' lines.

If all this is still a bit obscure, don't worry: it's only taken me five years to get this far and since 99.99999 per cent of the world seems to get by without understanding it I guess our collective survival isn't at immediate risk if it all remains a bit hazy for a while yet. All you need to remember is that there are two steps to program when using the 6522 lines: First define what lines are doing which, then read or write them. Rather than theorise any longer let's find out just how unreliable things that we take for granted can be.

Getting a Better Picture

I'd always thought that when a camera shutter speed knob was inscribed 1/125 that the shutter actually opened for $^1/_{125}$ th of a second. How naive one can be! After testing several cameras with the setup below I'm full of admiration for film manufacturers for the way their product is so forgiving of such mechanisms.

A simple (and I stress *simple*) way of timing a camera shutter is to open the back, point the lens at a light source and use a light-sensitive switch to turn on a timer when the shutter opens. For a light sensitive switch I used an opto-transistor and for a timer I used the computer. The opto-transistor goes behind the shutter where the film would normally be. When light strikes the opto-transistor, a line attached to PB0 is switched to 1 and the computer is launched into a timing loop until the line drops back to 0.

The hardware is wired up as shown in Figure 1. I mounted the opto-transistor on a block of Lego to make it easy to point in the direction you want, but a piece of opaque plastic tube is just as useful. Power is drawn from the computer through the user port connection. While this practice is not normally recommended the current drain is very small and won't upset your machine.

The software is shown in Figure 2. It's necessary to use assembler code to do the timing because the Basic timer only operates in 0.01 second units, not small enough for this application. Its accuracy is also affected by interrupts in the operating system. While is would be more elegant and accurate to use one of the timers in the 6522 (oh yes, there are all kinds of things in there!), we're trying to keep this simple enough to be enjoyable so we'll use the crude but almost understandable method of delay loops.

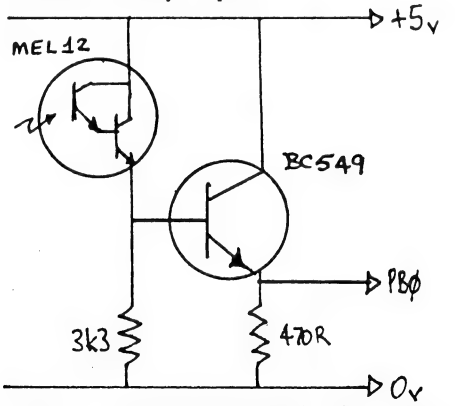

Figure 1. *Schematic diagram for the Camera Shutter Timer.*

The DIM statement in line 40 of Listing 1 sets aside a small amount of memory for the code that will be assembled by the program. Don't worry about the value of cal in line 50 for a while — that's for when you're fine tuning your timer. The first thing the assembler code does is tell the data direction register which lines are

```
 10 REM TIMER
 20 REM Controlled via PB0
 30 MODE7
 40 DIM timer &30
 50 cal=1.2
 60 FOR pass=0 TO 2 STEP 2
 70   P%=timer
 80   [ OPT pass
 90   .timer   LDA#0:STA &FE62
100            STA &70:STA &71
110            STA &72:STA &73
120   .wait    LDA &FE60:AND#1
130            BEQ wait
140            SEI
150   .count   LDX#&70
160            INC 0,X
170   .loop    CPX#&73
180            BEQ checkport
190            INX:INC 0,X
200            BEQ loop
210   .checkport
220            LDA &FE60:AND#1
230            BNE count
240            CLI:RTS:]
250   NEXT:CLS
260 REPEAT
270   CALL timer
280   PRINT INT(1E7*cal/!&70)
290   UNTIL 0
```

Listing 1. *Assembler code for the Camera Shutter Timer.*

going to be read. In this application, with only one line in use, we'll set all the lines to be inputs so we store 0 in &FE62.

Four bytes in zero page (&70-&73) are used to keep count of the number of loops made while the shutter is open. Lines 100 and 110 clear these. Everything is ready for the timing job to begin.

The cue to start timing is when PB0 goes from 0 to 1. Whichever is as 0 the program returns to line 120 to take another look at the line. As soon as it changes to 1 all the askable interrupts in the computer are switched off. This is not normally a very smart thing to do because it means that the keyboard isn't read, the TIME clock is halted and all sorts of important housekeeping is ignored. (The computer is in much the same state as this country finds itself while the Melbourne Cup is being run.) It really doesn't matter because we aren't using any other facilities; since it's only for a short while nothing is going to get too upset.

While PB0 remains high the program loops between lines 150 and 200, incrementing the counter each time it loops. During each loop PB0 is checked to see if it has returned to 0. Once it has, all interrupts are re-enabled and the program returns to Basic. Some simple arithmetic on the value in the four byte counter gives the fraction of a second the shutter was open.

Remember that this program is simple, crude and needs calibration. The value of 1.2 for cal in line 50 is fairly arbitrary and should be checked against a reliable reference. Nevertheless it is genuinely useful if you're testing the repeatability of your camera's shutter. For example, I found my trusty Nikon wasn't too bad at slower speeds, but fluctuated wildly from shot to shot by up to 200 per cent at its highest settings Clearly it's in need of a service.

An extension of this program would be to use two lines to time the speed of an object travelling between two points. In this case you would use PB0 to turn the timer on and PB1 to switch it off. Assuming you're using interrupted light beams to switch the timer, lines 130 and 220 would have to be changed to —

```
130 BNE wait
220 LDA &FE60:AND#2
```

between the light beams and the units you want the speed or time expressed in.

It's not state-of-the-art stuff, but it's useful and expandable. If you haven't played around with hardware this is a cheap and safe starting point. There's no reason not to give it a try as long as you understand the risks to your sanity and spare time if your creativity starts getting out of hand.

Just one word of warning: Don't get so carried away that you use this sort of setup to try to measure things inside the family V8. The voltage spikes there will utterly destroy all sorts of expensive computer innards. □

Do You Sometimes Feel Like Joe . . .

Joe's got a real problem. Last week his keyboard just hung-up on him and this morning he found that the files he was working on yesterday were somehow corrupted.

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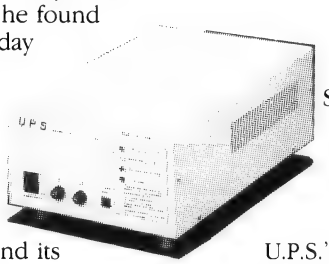

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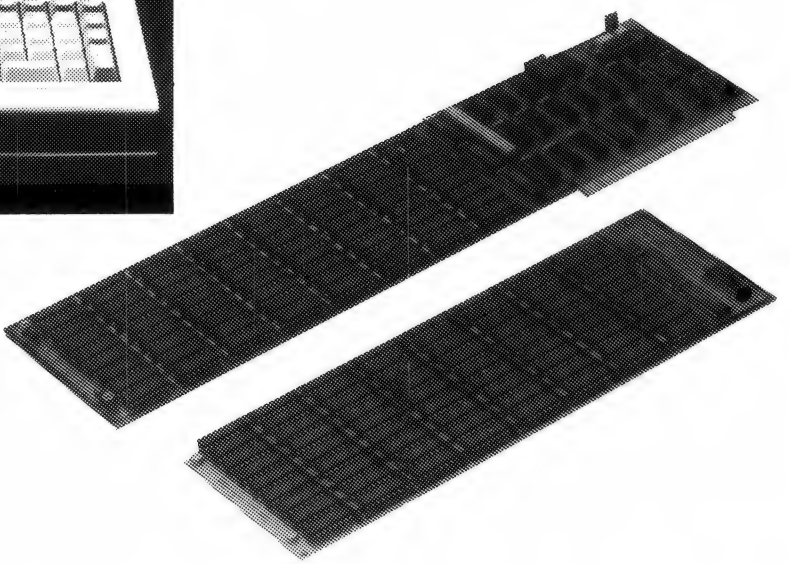

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WE HAVE SEEN in the underground all sorts of utilities, word processors, data bases and games. But where is that mainstay of the business user: the omni-useful spreadsheet?

PC-Calc, written by Jim Button of PC-File fame, is just such a product for the entry level spreadsheet user. Distributed in an evaluation edition via the normal Public Domain channels, PC-Calc is, in fact, User Supported software. You are invited to obtain a copy, try it and make copies for friends. If you like the product and continue to use it, a donation to the author is requested.

Starting Up with PC-Calc

Type PCCALC at the DOS prompt, and PC-Calc loads and displays the typical spreadsheet screen, with a reverse video border across the top and down the left side. In the top border are letters identifying the columns of the spreadsheet, and down the left border are numbers for the rows.

PC-CALC has a maximum size of 16,384 cells. In the default configuration this is arranged as 64 columns by 256 lines, but may be customised to any combination which results in a number of cells up to 16,384.

At the bottom of the screen is the Entry and Message area. Again this is extremely flexible and can be user-customised to place the Entry and Message areas above or below the main spreadsheet display in any sequence.

Customisation

One of the features of PC-CALC is the easy user customisation. Pressing the / key brings up a menu of choices, and configuration may be selected from that menu by pressing C. Now the user may select the screen width, from 40 to 132 characters, screen height from 7 to 32 lines, layout of entry, message and display, colours, number of rows and columns, smart keys (a form of macro) and printer selection.

The configuration chosen may be saved to a profile file, with the user selecting the file name. If the profile file is named PCCALC.PRO it is automatically used when PC-CALC is started. If another name is used, for example CUSTOM.PRO, it can be used by specifying it as a parameter on the command line when starting PC-Calc from DOS, the command being —

PCCALC CUSTOM The profile file is a straight ASCII file and may be further modified and extended using your favorite text editor in non-document mode. Additional information which can then be added includes the relevant setup strings for different character and line pitches for an unusual printer (details of some of the most common are built in), default drive, default file extension, and so on.

PC-CALC is the perfect place for most users to get into spreadsheets. 99 per cent of home users would never need to go for anything else.

Menu Choices

There are many choices which can be made from the menu — ARRANGE sorts a range of cells, which can be a block of several rows and columns. BLANK erases cell contents from a range. CONFIGURE was discussed previously. DELETE and INSERT add or remove a row or column. EDIT allows cell contents to be modified without requiring them to be fully re-entered.

FORMAT allows a cell, or range of cells, to be physically formatted or the display characteristics such as number of decimal places selected. GLOBAL selects column-by-column or row-by-row calculation. QUIT is used to exit PC-CALC, and if changes have been made to the spreadsheet which have not been saved, the user is prompted to do so. REPLICATE allows a cell, row of cells or column of cells to be replicated with absolute or relative references. TITLE allocates selected rows and /or columns at the top and left of the screen for titles which remain visible as the screen scrolls. ZAP clears the spreadsheet.

A range of cells is selected by typing the top left and bottom right cell identification after the appropriate command is selected from the menu. For example, selecting the range A1 to C3 would be done by entering A1:C3. 'Pointing' with the cursor to select a range is not supported.

Import and Export

PC-CALC has powerful file import and export capabilities. Selection of LOAD from the menu asks for a file name and allows entry of a drive specification. If <enter> is pressed before entry of a file name, with or without a drive specification, a directory of the default or selected drive is displayed.

File types which can be directly loaded are PC-CALC spreadsheets, DIF files, ASCII files with 'comma and quote' delimiters (Mailmerge format) and PC-FILE databases. The last is a very useful option and allows PC-CALC to analyse a PC-FILE database. Files may be saved in PC-CALC format, and also in Mailmerge or DIF formats. All three may be imported into PC-FILE.

PC-CALC also has another option from the menu — XTERNAL. Here a cell in a PC-FILE database is linked to a cell in another PC-CALC spreadsheet, or to a particular field in a particular record in a PC-FILE database. PC-CALC looks for that other file and links the cell contents in the active spreadsheet to the external file, again a most useful analysis tool.

Printing

A spreadsheet may be printed to paper or disk using the PRINT command. If desired, a range of cells to be printed may be selected in lieu of the entire spreadsheet. The type of printer to be used may be selected from a limited range by use of the CONFIGURE command, or the printer control strings for any other printer may be set by entries in the profile file. Formula entries in cells may be used to change the character pitch to 10, 12 an 17 characters per inch or select 6 or 8 lines per inch.

In addition it is possible to specify a line feed without carriage return part way down a spreadsheet to allow for underlining, bolding and other embellishments. Printing of individual rows in a spreadsheet can be suppressed.

Data Types

A cell may contain text, value (number) or formula entries. PC-CALC interprets the information keyed in and assigns the relevant type to it. When numeric characters should be interpreted as text rather than numbers, preceding them with either an apostrophe or inverted commas will force PC-CALC to follow the user's wishes.

It is possible to create circular references, where a cell depends on the value in another, and another, and eventually▷

back to the value in itself. No error message is displayed for this situation.

Mathematical Functions

Mathematical functions include ABS, ATN, AVERAGE, COS, COUNT, EXP, FIX, IF, INT, LOG, MAX, MIN, RANDOM, RATE, ROUND, SGN, SIN, SQR, SUM and TAN. Operators available are addition (+), subtraction (-), multiplication (*), division (/), exponentiation (^), percentage (%) and modulo (or MOD). Logical AND, OR and NOT are also supported.

A somewhat limited range of financial functions is available including NPV, PAYMENT, PERIODS, PRINCIPAL and STDEV (standard deviation).

The KEYWORD function allows a cell entry which reads the system date and/or time and displays it in a user determined format. It also allows display of the current page number when printing. LOOKUP allows creation of a look-up table, and with it one could create a simple invoicing system or similar requiring only the entry of a series of part numbers and quantities.

PC-CALC is a product of Buttonware Inc, PO Box 5786, Bellevue WA 98006, USA. The price from them, with an excellent 155 page printed and bound manual, is US$59.95 plus $10 shipping. Evaluation copies are available from user groups, and may be copied in accordance with Buttonware's restricted permission to copy. The evaluation versions are full working copies with a quite adequate 33 page manual on disk.

It should be noted that, while extensive permission is granted for copying and distribution of the evaluation edition, only computer clubs and user groups may charge for this service. Individuals and companies who charge for a copy of the evaluation edition are breaking copyright.

Most user groups copies of the evaluation edition for around A$10 plus postage. Try the Sydney PC User Group at Box 5010, GPO Sydney, 2001, if your local User Group library does not have a copy.

Performance

I tested PC-CALC version 3.0. It is very much an entry level spreadsheet, with good reliability and a more than adequate range of functions. It is considerably slower than, say, Lotus, and does not have the features or graphics of Lotus, of course — PC-CALC is, however, far, far cheaper.

PC-CALC is the perfect place for most users to get into spreadsheets. 99 per cent of home users would never need to go for anything else. For those who do find a later need for a more powerful spreadsheet, this economical introduction to the subject is the best way to understand the concepts and determine which features in the various more powerful packages are appropriate. Get a copy, try it, and register with Buttonware to get the manual.

I like PC-CALC and recommend it to all who are starting out, feel they should have a spreadsheet and cannot decide which one to buy. □

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I RECENTLY HAD the chance to try out the Premium Microbee with Simply Write. Now my own sturdy machine comes from Before Premium eras and it works well and fast at all the work I set it. I rarely have need for graphics: All I demand is a clear and steady script. Thus I have held off getting an upgrade to Premium status.

Simply Write

Simply Write is the new Microbee word-processor that only works on the Premium — and it is the first program to tempt me to go Premium. It's on-screen italics, bolding, fonts galore — and colour(!) — are superb. It is not perfect, but more about that in a later column.

What particularly intrigued me was that it has certain things in common with a program I already had — Graphics Wordbee. In particular, Graphics Wordbee allows the limited (2 per file) use of fonts that users can edit and load.

I promptly raided my Wordbee disk and loaded some of my own fonts into Simply Write. They worked perfectly. So did Esperanto and Greek. (Although I haven't used them in Simply Write for long so there could be some bug I haven't yet found.) The Music.Fon. worked perfectly, but the whereabouts of the notes on the keyboard cannot be seen in Fonthelp unless you depress the Shift key.

Fonthelp is a Simply Write facility which will put a representation of a keyboard in the bottom half of the editing screen to help you locate characters in a font. This help is vital — with the Greek font in particular.

Then I tried to load some of the cartoons and their fonts that come with Graphic Wordbee. The fonts load with no problem, although the Fonthelp facility doesn't always show all the graphic blocks. But when I tried to load the Cartoon itself, the program hung itself and refused to come down until I reset it. So, unfortunately, it seems Simply Write can't merge cartoons and sketches with its documents unlike Graphic Wordbee.

From mid-March, Simply Write rather than Wordbee, will be the word processor included with Microbee System. Simply Write is by far the better program in most ways — so you are going to be better off.

However, if you want to be able to put drawings in with your documents and on the same page as text, then you are going to have to buy Graphic Wordbee separately — that is, until Microbee solves the problem of getting the cartoons into Simply Write!

The Simply Write FONT.COM is far better presented and easier to use with its drop down menus and graphically overlaid alternative editing sheets — even if, underneath all this, it is basically the same creature — a dot by dot re-editor of characters.

These software developments put a nail in the coffin of daisy wheel printers. Daisy wheels *still* give you the best quality printout (unless you can afford a laser printer), but they are totally incompatible with these new fonts — and cartoons.

I should mention that FONT.COM with Simply Write is *not* the same program as FONT.COM with Graphics Wordbee. Take care to rename one of them if you have both programs or you might find one of them saves itself over the top of the other, annihilating it!

The Simply Write FONT.COM is far better presented and easier to use with its drop down menus and graphically overlaid alternative editing sheets — even if, underneath all this, it is basically the same creature — a dot by dot re-editor of characters.

Write Hand for Simply Write

Incidentally, I tried to load Write Hand Man and Simply Write at the same time. They work fine together as far as I can see. This means you can have a diary, notepad, phone-book, calculator and more hidden away behind your screen instantly available without having to exit from your editing (see YC, Jan.'87, for my review of Write Hand Man: *Keeping the* 8-Bit CP/M *House in Order*).

There could be couple of snags. It may not work if you call it up while on the initial menu screen. Experiment with it with caution (not with a document in Simply Write that you cannot afford to lose). Glyphic Software, the suppliers here, were surprised it worked. They had heard it had a problem — but only after you exit from Simply Write.

Since I usually switch off my machine after a session of word processing, a snag with WHM and subsequent programs would not easily come to my attention. I still have not checked it out.

For all practical purposes, Write Hand Man is a valuable adjunct to Simply Write. I does not work, however, with Graphic Wordbee.

New Developments

No sign yet of the Gamma, although it was on show again at PC '87: It's development seems to be shrouded in secrecy. *Online*, the Microbee magazine, can tell me nothing more and neither can the Melbourne shop. So I phoned up Microbee's Headquarters and a sales representative told me 'the Gamma has been temporarily shelved as not enough people were interested in it, but some of the best points in the Gamma will be put into a new machine to come out later in the year.' (I presume this will be called the 'Delta.')

I await new developments with bated breath. Actually, I for one was interested in the Gamma — although I had not told the Sales department this, and I gather the Melbourne shop had been pestered with inquiries since *Online* said the Gamma was going into production last December. The Gamma is actually in the current Microbee price list which arrived in the Melbourne shop in mid-March.

I know it is a pretty risky business releasing a high tech computer that will be competing against the Amiga and the new Atari. At nearly $3,000 the Gamma would have been priced too high to really compete unless it could offer a lot more. For my wallet's sake, I hope the new Delta(?) is much cheaper.

I really want a machine that can happily run all existing Microbee software *and* 16-bit software *and* has an excellent screen *and* is a lap-top with built in drives that can run either a high-res portable screen or a desk-top monitor! I would also like to be able to drop a hard-card into it to make it a hard disk machine. It should also have

a megabyte of RAM and be priced under $2,000!

OK, Microbee engineers? If necessary, I will compromise on the software with some reluctance. I will but only if the price is right and only if it runs existing or 16-bit software!

There is one new Microbee that definitely *will* be out before you read this. It is the Telecomputer which will have a disk drive in its keyboard unlike the Teleterm.

Colossal Caves

This is the world's biggest computer Adventure game — and probably the best written. It is 193 Kbyte in size.

A number of clues have been sent to me. One of the most valuable was a clue as to how to decipher domain bulletin boards — but it has been put into code by use of another public domain program. To unravel it you have to find the password. It tells you it is a magic word found within the game.

These software developments put a nail in the coffin of daisy wheel printers. Daisy wheels still give you the best quality printout (unless you can afford a laser printer), but they are totally incompatible with these new fonts — and cartoons.

Well, A Breffit up in outback Queensland tells me that this is highly misleading. In fact the word needed is the name of a place where I had been in the game.

His clue was all I needed. Thanks! It is an eight-lettered word and you have to travel through it sometime after you have got past the snake and certainly before you find a precious Ming Dynasty vase. Well, I have now told you more than he told me so you should be able to get it.

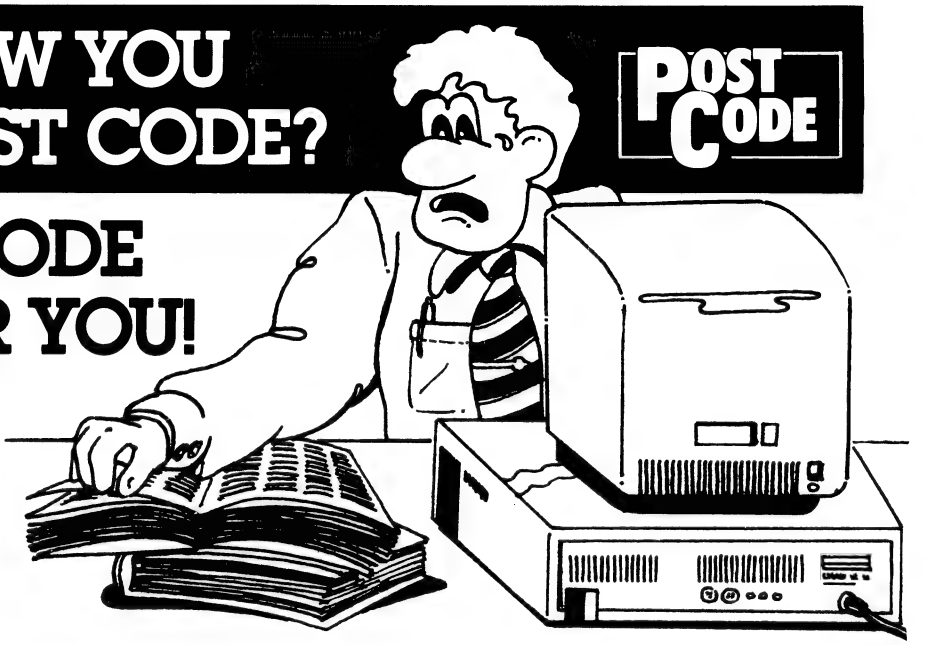
To all those Colossal Caves addicts out there: I am certainly not an expert on the Game; I have only just passed out of the official Novice class with my own score. I have had lots of letters asking me for solutions — more than I can answer especially since I have been overseas a lot. So I will try to give what answers I can in my articles — while not letting the cat completely out of the bag.

But I do not know yet where to find the trident or how to get rid of the thieving pirate or use a wrecked dingy. I don't even know where the dingy is! You have to throw something at the ogre to magic him away.

So — have fun — and don't get caught by an ogre! □

IS THIS HOW YOU FIND A POST CODE?

POST CODE



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THE ARTWORKS 222MAR7

BY GREGG FAULKNER

THE PAST FEW MONTHS have been an exciting time for Amiga owners with the release of several new software packages, an updated operating system, and new hardware items. First things first — the big news is the release of Version 1.2 of the Amiga operating system.

The original Version 1.0 of Kickstart and Workbench had all sorts of bugs and performance problems; fortunately it was never supplied in Australia. Version 1.1, which has been supplied with all Amigas sold in Australia to date, was a big improvement, but still contained a few quirks and was well below optimum speed. The good news this month is that Version 1.2 appears to have solved all the previous problems and has greatly improved performance. As well, Version 1.2 has added some useful commands to AmigaDOS.

The Good News

A major advantage that the Amiga has over its rivals is that Commodore wisely chose to retain the operating system, Kickstart, on disk. It may be a trivial nuisance to boot from disk at the start of a session, but the big plus is that updating the operating system is as easy as changing disks. From the user's point of view several things are noticeable about Version 1.2. When you select the Workbench disk icon, the window appears and fills much more quickly than with V1.1. You will also notice that there is no CLI icon in the primary Workbench window. CLI is now selected from Workbench by choosing the System drawer in the first window, and then selecting the CLI icon from within the System window.

Grabbing a sizing gadget and pulling it down will reveal another bonus of V1.2. Australian and European Amiga owners with PAL standard systems can now use a full 256 screen lines which allows your windows to take up full screen height.

Version 1.2 handles disk space allocation differently which speeds up disk access considerably. Your existing disks are fully compatible with V1.2 and will be handled at the old speed. To improve efficiency you may like to copy your 'old' disks under CLI 1.2 using the COPY ALL command. The new copies will have sectors allocated differently and will perform much more efficiently under V1.2.

For those readers lucky enough to have extra memory or a hard disk drive, there is even more good news. V1.2 has been designed to automatically configure to expanded memory and extra drives, whether they be 3½ or 5¼ inch floppies, or even a hard disk. The V1.2 Workbench has a drawer called 'Expansion' into which device driver files for any of the auto- configure hardware items are placed.

All in all, Version 1.2 of Kickstart and Workbench are a big improvement on 1.1. They now allow the Amiga to perform at its intended speed with a lot more reliability. The dreaded red GuruMed box rarely appears while using V1.2.

And the Bad

The bad news is that some software which was written to run under V1.1 may fall over if run under V1.2. The only answer is to keep your V1.1 Kickstart and Workbench disks so you can run V1.1 whenever you are using this software.

Version 1.2 AmigaDOS contains several new commands. One of which can save a lot of anguish is DISKDOCTOR. Now and then, it is possible for a disk to become damaged (magnetically, not physically) and the Amiga will have nothing to do with it. Previously there was nothing you could do, and any files on the disk were a total loss. The DISKDOCTOR command will start a process which attempts to retrieve all possible data from the damaged disk and it keeps you informed of its progress. Very useful!

Another new CLI command is PATH. In previous versions, when you entered a command to CLI, the operating system would look first in the current directory and then in the C: directory on the default drive for the command. If the command was not found in either place, you would have to specify the full address name for the command. The new PATH command permits you to specify a search path showing DOS where to look, and in which order, for your command. Adding the parameter SHOW to the PATH command, PATH SHOW, for example, will instruct DOS to display the search path which is currently being used.

There are several other new commands which I'll try to cover in a later column.

Workbench V1.2

The V1.2 Workbench Utilities have been upgraded. The Notepad in particular now has much improved capabilities and it can also be used from DOS. Selecting the System option from Workbench causes a window to open displaying, as well as the old DiskCopy, IconEd and Format icons, several new options including Say, GraphicDump, SetMap and CLI.

SAY gives immediate access to the Amiga's speech synthesis capability, SETMAP allows selection of foreign language character sets, and CLI is self-explanatory. The GRAPHICDUMP option, when selected, allows the user about ten seconds (doesn't sound much, but in practice it's plenty) to arrange the displayed screens and then performs a screen dump to a graphics-capable printer.

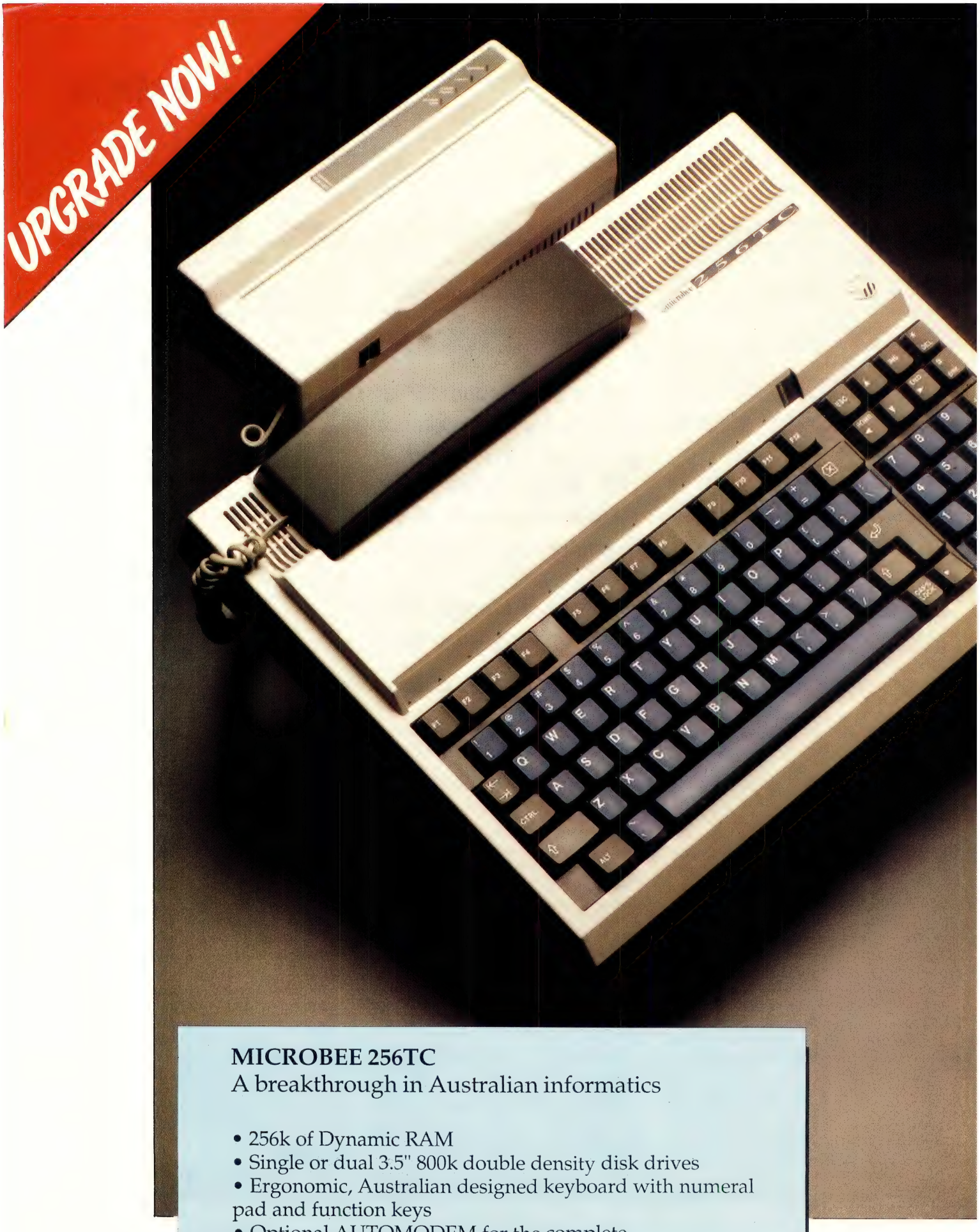
The preferences screen has one addition, the ability to select Workbench Interlace Mode on or off. My Amiga seems to have a problem with this one. If I select interlace ON, my Workbench screen shrinks to about half height and flickers something terrible. I'm not sure what is behind this but I'll try to get an answer from Commodore by next month.

Version 1.2 provides a nice touch on the Workbench screen with a disk icon now to represent the RAMdisk when it's being used. As with all the other icons it can be redesigned if you like by using the IconEd utility.

All in all, Version 1.2 is a big improvement on 1.1 and it allows the Amiga to perform at its intended speed with a lot more reliability. The dreaded red GuruMed box rarely appears while using V1.2. Upgrade kits containing a Kickstart and a Workbench disk along with documentation are available from your friendly local Amiga dealer for around $25.00.

RAMdisk

Some newcomers to personal computers may be confused by the term RAMdisk. ▷



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Personal computers with substantial memory such as the Amiga, A—ri, wet raincoat and so on, often have 'spare' memory available even when running various applications. It is possible to organise some of this memory as a Virtual Disk Drive. In other words, the operating system will treat a block of memory as if it were an extra disk drive. Because data can be written to and read from memory much faster than it can to a disk, there is a real speed advantage in storing frequently used data or routines on a RAMdisk.

The Amiga operating system allows the user to address the RAMdisk as RAM: in the same way that the real drives are called DF0: and DF1:. I have found that when I am carrying out maintenance on my disk library it is very useful to copy some of the most commonly used CLI commands, like COPY, LIST, TYPE, and ED to RAM: and then use the CD or PATH command to establish RAM: as the current directory.

For Amiga users with only the inbuilt disk drive, the RAMdisk can be used to hold data during transfer from one disk to another. In fact, this very procedure is used by the system software whenever you use the DiskCopy facility from Workbench. Be aware though, that any contents of the RAMdisk will be lost if you re-boot the system or if power is lost.

I mentioned last month the need for a real-time clock on the Amiga. Such a device is now available in Australia. Produced by a company in the USA called 'Byte by Byte', the device is marketed as the 'Tic.' It is a battery powered clock module about the size of a matchbox, which plugs into the rear (number 2) joystick port of the Amiga. On start-up, Workbench automatically reads the current time and date from the Tic so all files will be created with the correct date and time. Priced at around $110.00, the Tic is a very useful addition to the Amiga.

Last month I briefly mentioned the ability to connect the Amiga to a video-cassette recorder and to record images and animation sequences from the computer. Well, the wonderful world of computing has come up with yet another buzz-word. The word is 'Desktop Video' and my next column will be a feature devoted to Desktop Video and the Amiga.

We are still very, keen to hear from Amiga users and User Groups. Queries, hints, suggestions, even corrections, are always welcome. Write to me care of *Your Computer* — we would especially like to hear of any unusual or interesting uses you've found for the Amiga. □

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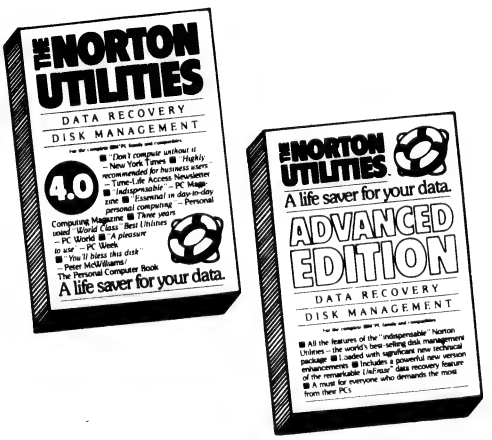

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Peter Norton
COMPUTING

BY LARRY LEWIS

The Prophet

FIRST, THE GOOD NEWS — *Your Computer* has agreed to help keep everyone informed of the latest changes to the Australian PAMS Listing by offering Sysops a free, one-year subscription to the magazine. This greatly enhances the support the Listing is already receiving from AED System Developments.

All System Operators who complete registration details and forward them to the registry qualify for the offer. Note that *electronic registrations do not qualify*, only those who complete the form below and post it to: Australian PAMS Co-ordinator, PO Box 41, Emerton 2770 NSW, are eligible. Do not forward the form to *Your Computer*.

If you are already a subscriber, send your renewal notice (when you receive it) along with the completed registration form to the address above (this applies to those taking up this offer, too). Changes of address must be reported to the registry which will advise the magazine. Allow 6-8 weeks after forwarding your form, before expecting your first copy.

Now who said you can't get something for nothing!

FIDOnet

A lot of users have been asking what FIDOnet is all about — it's a network of bulletin boards that exchange mail and news. Systems accessible via FIDOnet will have their Net and Node numbers included in square brackets [net/node] in future PAMS Listings. For more information logon to a Fido system: Most have full details of the network online for browsing.

PAMS Registry

This month we have a new PAMS Listing format. It will be a little while before the system is fully operational, but on-line PAMS enquiries will be a reality as soon as we can fully develop the program. The new maintenance program is the work of Rodney Creer (a user of Prophet). He has already spent many hours on it (and still has a lot of features to add) — *good on you Rodney*!

Please encourage everyone to use the latest PAMS Listing if they are seeking information on Australian bulletin boards. The more *you* encourage its use, the quicker we'll have a definitive Listing. And Sysops: it is not up to your users to notify the Registry if any of your details change — it's your responsibility.

Prophet should have a Fido interface soon, so electronic notifications will be possible for those similarly equipped.

Thanks to Nick Andrew (Sysop of Zeta), we should have a new compression tool soon instead of en/dehuff (pack/unpack). But, we still need a machine independent version of ARC for CP/M80 and CP/M86 anyone got one hanging around? □

```
AED-Prophet Australian PAMS Listing
Changes with Release: 8703

AUSTRALIAN CAPITAL TERRITORY

  PAMS List INFO: *** AMENDED ***
           System: ACT Amiga Users Group
            Phone: (062) 59-1137
             Baud: V21.V22.V23

  PAMS List INFO: *** AMENDED ***
           System: Comtel BBS
            Phone: (062) 26-1383

  PAMS List INFO: *** Status Changed ***
   System Status: ** OFFLINE **
           System: Fat Cat

  PAMS List INFO: *** Status Changed ***
   System Status: ** OFFLINE **
           System: Gateway AIBBS


NEW SOUTH WALES

  PAMS List INFO: *** AMENDED ***
           System: ABCOM
            Phone: (047) 36-4165
             Baud: V21.V22

  PAMS List INFO: **** NEW System ****
           System: Amstrad ABBS
            Phone: (02) 981-2966
             Baud: V21.V22.V23

  PAMS List INFO: *** Status Changed ***
   System Status: ** OFFLINE **
           System: Blackboard BBS

  PAMS List INFO: *** AMENDED ***
           System: Dingo's Den
            Phone: (02) 888-2203
             Baud: V21.V22.V23

  PAMS List INFO: *** AMENDED ***
           System: Dungeons and Modems C-64 BBS
            Phone: (02) 636-9027

  PAMS List INFO: *** AMENDED ***
           System: Fantasy C-64
            Phone: (02) 93-5225
            Hours: 2100 - 0730 Daily

  PAMS List INFO: *** Status Changed ***
   System Status: ** OFFLINE **
           System: Metebeelus RBBS

  PAMS List INFO: *** AMENDED ***
           System: Micro Mart C Users
            Phone: (02) 560-3607
             Baud: V21.V22.V22bis.V23

  PAMS List INFO: **** NEW System ****
           System: NABA-Prophet BBS
            Phone: (02) 628-7030
             Baud: V21.V22.V22bis

  PAMS List INFO: **** NEW System ****
           System: Playground BBS
            Phone: (02) 53-9688

  PAMS List INFO: *** AMENDED ***
           System: Prophet (Old Name)
            Phone: (02) 628-7030

  PAMSList INFO: *** AMENDED ***
           System: RUNX
            Phone: (02) 487-2533
             Baud: V21

  PAMS List INFO: *** AMENDED ***
           System: Sentry
            Phone: (02) 428-4687

  PAMS List INFO: *** Status Changed ***
   System Status: ** OFFLINE **
           System: Texpac Electronic Magazine

  PAMS List INFO: *** AMENDED ***
           System: Zeta RTRS
            Phone: (02) 627-4177
             Baud: V21.V22.V22bis.V23.B103.B212
            Hours: Weekdays: 24 Hours
                 : Weekends: 1900 - 0700
```

VICTORIA

PAMS List INFO: *** AMENDED ***
System: Colour C-64 BBS
Phone: (03) 579-2147
Hours: 2300 - 0800 Daily

PAMS List INFO: *** AMENDED ***
System: Eastcom RBBS
Phone: (03) 288-0775

PAMS List INFO: *** AMENDED ***
System: Macboard BBS
Phone: (03) 435-9152
Baud: V21.V22

PAMS List INFO: *** AMENDED ***
System: Midnight Frog BBS
Phone: (03) 596-1589
Baud: V21.V22.V22bis.V23

PAMS List INFO: *** AMENDED ***
System: Omega BBS
Phone: (052) 22-1670
Hours: 1900 - 0200 Daily

PAMS List INFO: *** AMENDED ***
System: PC-Domain BBS
Phone: (03) 789-8918
Baud: V21.V22.V22bis.V23

PAMS List INFO: *** AMENDED ***
System: The Magic Pudding BBS
Phone: (03) 428-2178

PAMS List INFO: *** AMENDED ***
System: VIDEOTEX 4000
Phone: (03) 329-2936
Baud: V23

QUEENSLAND

PAMS List INFO: *** AMENDED ***
System: Brisbane Experimental RCPM
Phone: (07) 395-1809

PAMS List INFO: *** AMENDED ***
System: Cairns & District IBBS
Phone: (070) 51-1360

PAMS List INFO: *** AMENDED ***
System: Hotline
Phone: (07) 353-3718
Baud: V21.V23.B212

PAMS List INFO *** AMENDED ***
System: Mackay High School BBS
Phone: (079) 51-4815
Hours: Weekdays: 1600 - 0730
: Weekends: 24 Hours

PAMS List INFO: **** NEW System ****
System: SVI-RBBS
Phone: (075) 46-3252

PAMS List INFO: **** NEW System ****
System: The Focus BBS
Phone: (07) 285-5814

PAMS List INFO: *** AMENDED ***
System: Toowoomba Computer Centre
Phone: (076) 32-7542
Hours: Weekdays: 1800 - 0800
: Weekends: 24 Hours

SOUTH AUSTRALIA

PAMS List INFO: *** AMENDED ***
System: Multiple System BBS
Phone: (08) 255-5116
Baud: V21.V22.V22bis.V23
Hours: 2100 - 0900 Daily

WESTERN AUSTRALIA

PAMS List INFO: *** Status Changed ***
System Status: ** OFFLINE **
System: Omen Mini BBS

PAMS List INFO: **** NEW System ****
System: Streamline BBS
Phone: (09) 387-8097
Baud: V21.V22.V22bis.V23
Hours: Daily: 1800 - 0130
: 0330 - 0900

PAMS List INFO: **** NEW System ****
System: The Apple Board
Phone: (09) 378-3258
Baud: V21.V22.V22bis.V23

PAMS List INFO: *** AMENDED ***
System: The Gathering BBS
Phone: (09) 272-4711
Baud: V21.V22.V23

PAMS List INFO: **** NEW System ****
System: Z-Node 62
Phone: (09) 450-0200

Just a few notes to help with you use the PAMSLIST information -

---- Access information ----

Mem - Membersip required for full access, cost and other details shown if available.
Reg - Registration required, details show if known.
VA - Visitor access Available to most functions.
LVA - Limited Visitor Access available.
Pulic - Public board, open to all.

Baud information: V21 - 300 Tx / 300 Rx CCITT
V22 - 1200 Tx / 1200 Rx CCITT
V22bis 2400 Tx / 2400 Rx CCITT
V23 - 1200 Tx / 75 Rx CCITT
V23ORG - 75 Tx / 1200 Rx CCITT V23 set to originate
B103 - 300 Tx / 300 Rx Bell (US)
B212 - 1200 Tx / 1200 Rx Bell (US)
Unless otherwise shown all systems are 8 bit bytes, 1 stop bit, no parity V21

Bulletin Board Information

Type: New System / Change

System Name: _____

Short Name (11 character Max): _____ Operating System: _____

Board Telephone number: (____) ____-_____

Online Sysop Name: _____

Machine: _____ Operating System: _____

BBS Software: _____

Hours of operation: 24hours / _____

Modem Type: _____ [V21/23 etc]

User Access: Member / Registered User / Public / Visitor / Limited Visitor
[Delete as required]

Other Online Info _____

Fido Address: [_____/_____]

Confidential Information

Sysop Name: _____

Telephone number BH: (____) ____-_____ AH: (____) ____-_____

Address: _____

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_____Postcode: _____

Please forward changes or new listings to: Australian PAMS Co-ordinator
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Electronic address: BBS (02) 628-7030
Fido [/]

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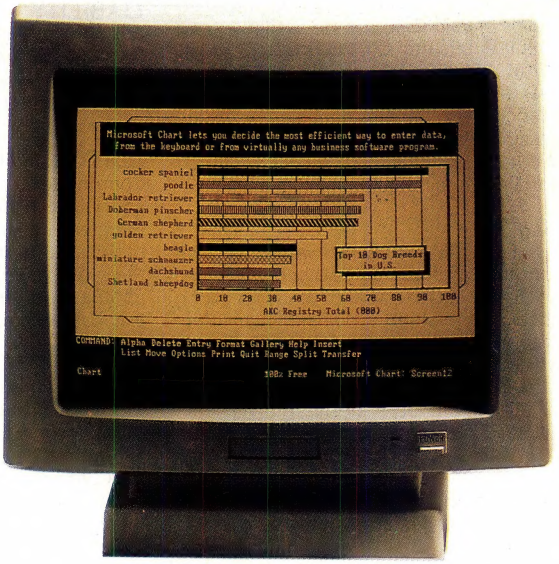

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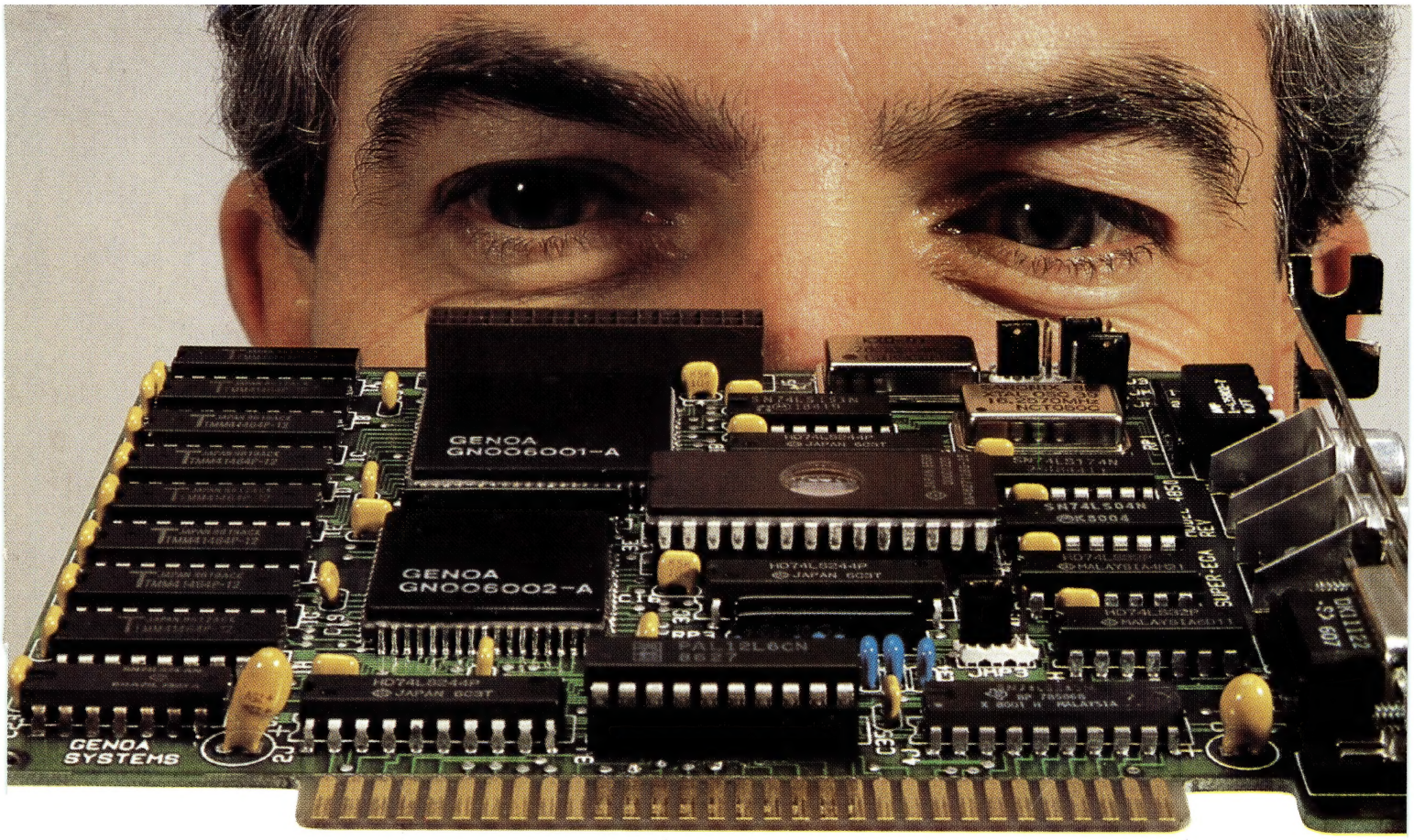

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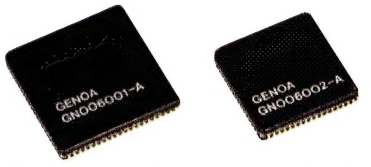

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