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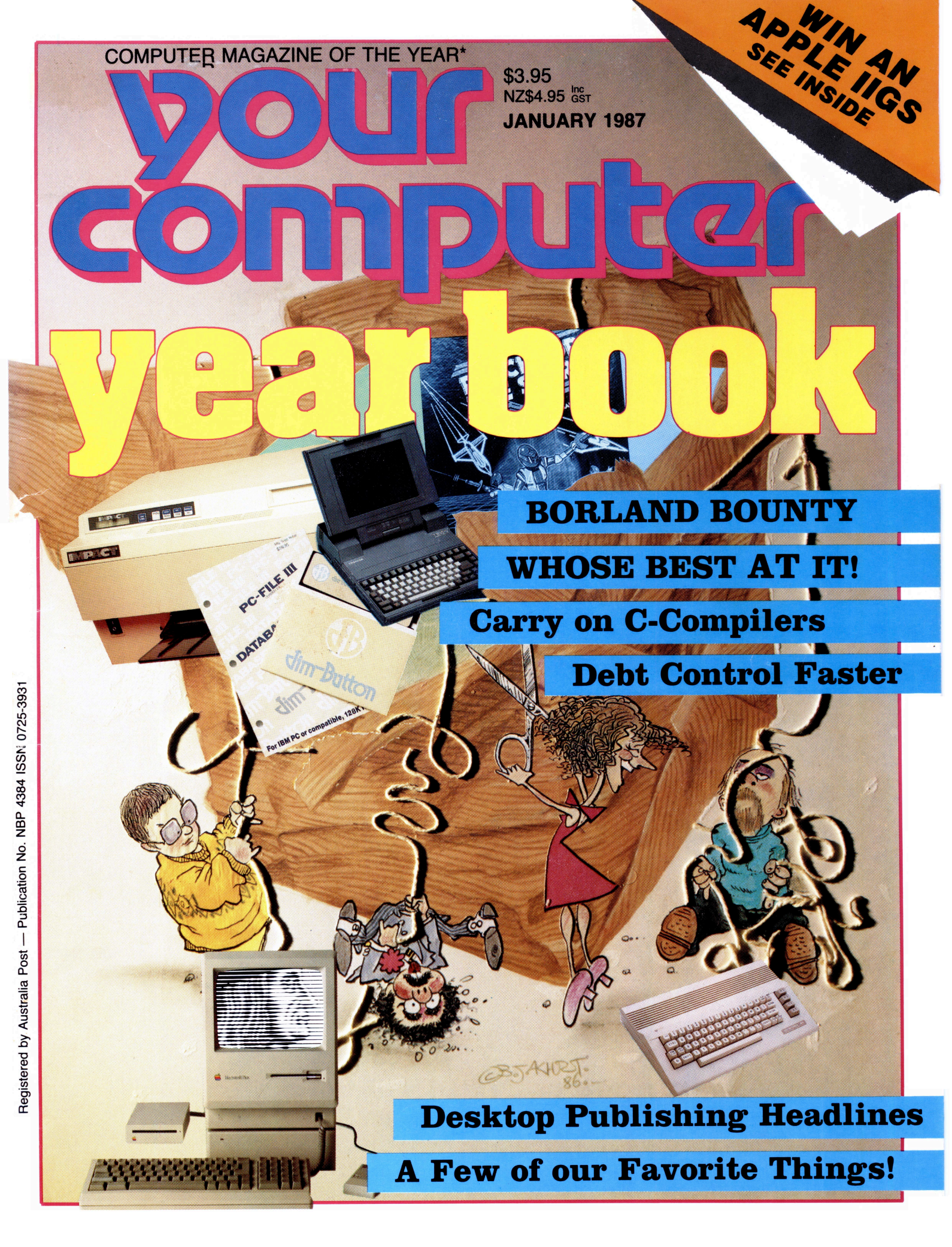

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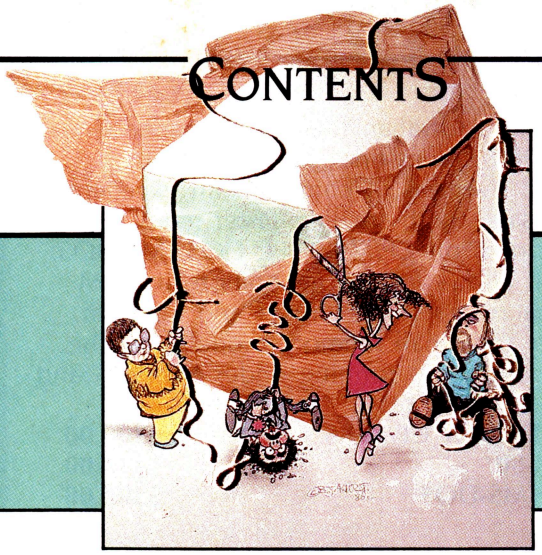

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HI-TECH C COMPILER

The HI-TECH C COMPILER is an all Australian high performance C compiler for the Z80 and 8086/8088 processors. Now in use at thousands of sites in Australia and overseas, it combines an excellent user interface and diagnostic messages with smaller, faster generated code than any other compiler. It runs on CP/M-80, PC-DOS, MS-DOS, CP/M-86 and Concurrent CP/M. It allows for the generation of ROM based code and comes with a macro assembler, linker and librarian. The 8086 compiler supports large and small memory models and the 8087 maths co-processor. A cross compiler running under MS-DOS and producing code for the Z80 is also available.

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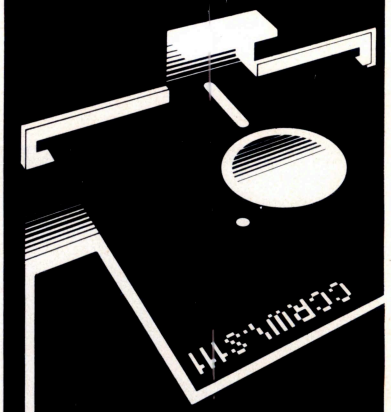

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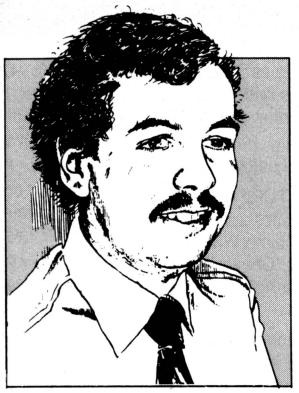

A *Computer Consultant's Catch-up Cry*

PEOPLE OFTEN ASK me: 'How do you keep up with developments in this industry?' These days, dare I say it, the answer would have to be that I don't. Nobody can; even the most diligent dilettante would be hard pressed to read all the product announcements, market research reports and news reports this industry generates, let alone listen to all the rumours and scuttlebut. Anyone who actually has to apply this information in some way, in management decisions or by writing magazine articles, is doomed to fall behind.

My feeling is that in my job it is better to put some effort into applying this information, and to better appreciate the problems and difficulties of the PC user, than to be an uncritical observer and reporter of the masses of (often erroneous) information. Many journalists don't realise how owners of an original-model PC with a standard colour graphics adapter find gushy reviews of the latest model AT clone with multi-standard graphics card not just uninteresting, not just useless, but actually irritating.

However, I still feel some fascination with the developments of our industry, and I still devote considerable time to keeping myself abreast of developments and trying to relate them to practical concerns like getting my work done. One of the best ways to do this, I've discovered, is through the Australian Computer Society's annual PC Conference.

This year, as in previous years, I'm on the organising committee, which gives me an opportunity to influence the choice of speakers and listen to people who are really close to developments in the United States. Last year, for example, we had speakers of the calibre of John Sculley, President and Chief Executive Officer of Apple; Bill Gates, Chairman of Microsoft; Chuck Digate, General Manager of International Sales at Lotus Development Corporation; Cyril Yansouni, Vice President of Hewlett-Packard and General Manager of their PC Group; and Ben Rosen, Chairman of Compaq Computer Corporation. These people are right at the heart of the industry.

This year, it's on again, on March 18th to 20th, and promises to be bigger and better than ever before. We've started signing up speakers from overseas and locally, and can promise that this conference will provide a stimulating mix of practical, directly applicable information, and a conceptual overview of the industry's dynamics.

I can't say too much yet about speakers, until we've got some more definite acceptances (but remember, America is full of people who want to visit Australia and see kangaroos and crocodiles!), but I can tell you we have a really interesting selection of topics: communications, networking, CAD/CAM and graphics on PCs, UNIX on PCs, the impact and practical application of the 80386 processor, future DOS directions, what IBM is up to, what IBM thinks it's up to, and even more.

Put the dates in your calendar now, and watch for forthcoming publicity.

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SOMEONE'S DONE THEIR RESEARCH

XEROX CORP SHOWED IT HAS lost none of its old touch for leading-edge research, by opening a series of centres throughout the world dedicated to work in the field of artificial intelligence.

In Australia, Xerox donated more than $1 million to Victoria's Deakin University, to help fund an artificial intelligence laboratory.

The Centre will offer consulting services to commerce and industry, in refining and developing software environments and applications suitable for the export market.

It will also work on the develolpment of expert 'shells' and knowledge bases, drawing on the knowledge of local experts and transforming it into systems that can be used by novices.

Professor Brian Garner, founding professor of computing at Deakin University, said: "The laboratory could, for example, create a knowledge base used by someone like a specialist mechanic and use it to develop a useful tool for all garages."

In the United States, Xerox announced a program that will use AI to teach workers who lack basic skills. To this end Xerox has injected $US5 million to fund a new non-profit research centre — the Institute for Research on Learning — which is intended to provide the American business community with a labour pool of workers.

American businesses are reported to be hiring more than one million new workers each year who cannot read, write or count, and United States Commerce Secretary Malcolm Baldrige said the country could not compete in the global economy without trained people.

"I like the idea of giving people who have failed before, another chance," added Baldrige.

The Institute will be linked with Xerox's Palo alto Research Center and with the University of California's Graduate School of Education. The resulting AI systems will be designed for use in traditional classroom learning, and training in the workplace.

In the England, Xerox said it would open a facility in Cambridge, aimed at boosting United States co-operation with Western Europe on new ideas in high technology.

"The initial cost of this facility will be approximately one million pounds per year," said Rank Xerox Chief Executive Officer Roland Magnin.

Researchers at Cambridge will be given equipment from the Xerox Palo Alto Research Center (PARC) in California. To be known as Uro-PARC, the center is scheduled to be opened early next year, with European, American, Japanese and researchers of other nationalities working together. Projects are likely to include voice-recognition systems and the development of screens sensitive to gestures of the human hand.

"That's the sort of stuff of the 21st Century, but we are beginning slowly to break that barrier," said Xerox researcher Thomas P. Moran, who teaches at Stanford.

According to Roland Magnin, "The new center will enable us to make the best possible use of American research, and at the same time feed off the fruits of European research."

LAPTOPS UP TO OUR CHINS

COMPASS RESEARCH PREDICTED the market share of portable and laptop computers in Australia would increase by more than 60 per cent next year. This is more than double the growth projected for microcomputers — the total micro market is expected to grow by less than 30 per cent next year.

The forecasting was contained in the Compass third-quarter report for Micro Storeboard. Compass Research analyst, Ms Jo-Ann Booth, said laptops and portables had come from a 3 per cent market share in the first quarter to a projected 11 per cent share in the fourth.

"This increase is the beginning of a major shift in personal computing, both in DP and home environments," she said. She is predicting that by 1988 there will be "a convergence of portable and personal technologies".

Laptops and portables are already, in many cases, playing the role of the desktop, Ms Booth said. According to Micro Storeboard, laser printers outsold daisywheels for the first time in August — by more than 60 per cent (400 compared to 250)!

Hewlett-Packard, which was early into this market and has a wide range of models and a bigger dealer base than other contenders, has more than 70 per cent of the market. But, Compass said, NEC and Epson could give HP a fright when their new products start to influence the market early next year.

The market for portables and laptops is apparently very price-sensitive; Compass said no-one was prepared to pay more than $3,000 for a machine. The IBM Convertible, for example, hasmet with limited success — at $4000 it was above the acceptable end user price.

Compass also released results of a survey of the state government computer market, which it said could not be ignored by any vendor since it was 12 per cent of the total Australian market and growing at an average 20 per cent per annum.

Compass warned, however, that computing strategies, growth rates and selection procedures differed so greatly from state to state that vendors needed to analyse each independently.

Victoria was listed as the most important state government market, followed by New South Wales, Queensland, Western Australia, South Australia, the Territories and Tasmania. IBM is the largest mainframe supplier in New South Wales, South Australia, Western Australia and the Territories, with IBM and compatible machines dominating the mainframe market overall.

But, Compass said, government users were more inclined to use mainframes from the non-IBM world than their colleagues in commerce. And DEC was named as the preferred vendor for minicomputers in every state except Tasmania and the Territories, with Prime also rating well.

IBM was given as the most popular supplier of micros everywhere except NSW and Queensland, where Apricot and Sperry have carved out large niches.

State government bodies were also asked about the brands of computer equipment they planned to purchase over the next three years. Most States said they intended buying IBM mainframe and microcomputer systems in the future; DEC was still given as the most popular intended minicomputer vendor.

Various departments said service and support were the most important purchasing criteria.



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- Field type may be alpha, numeric, date or time.
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- Numbers can be up to 20 digits long and have up to 8 significant digits to right of decimal place.
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- TAS – Plus program can exchange standard ASCII data with other programs. Convert Dbase III data files to TAS – Plus and vice versa.

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- Up to 4,500 command lines per program.
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- Structures may be nested 10 deep.
- True recursion capabilities (sub-routine can call itself).
- If command allows true if/then/else programming.
- If comparison types include less than, less than or equal to, equals, equal or greater than, greater than, and not equal to.
- Multiple company capabilities allow up to 1,369 different sets of data files to be accessed by the same programs.
- TAS – Plus has 86 commands (plus several options on many commands).
- Supports date and time arithmetic.
- Context sensitive help messages are easily added to applications.
- Find command can search for exact match, partial match, next record, previous record, beginning of file, end of file or related field between two files.

Compiler

- TAS – Plus compiler converts TAS applications into fast running pseudocode (executable by TAS – Plus run-time).
- Automatically checks program for syntax errors and command usage problems as it is compiled. Helps catch "bugs" before they become problems.
- Automatically checks to make sure files used exist in data dictionary or are defined in application.
- Compiled run-time programs are automatically compacted so they take up less disk space.
- TAS – Plus allows you to create run-time versions of your applications that are separate from the source code (perfect for program developers who intend on selling finished products).

Screen Painter

- Create screens that will look identical to your applications.
- Easily add color or graphic characters to your screen by making menu choices.
- Automatically create programs by "painting" the screen and allowing TAS – Plus to write the program.

Source Code Editor

- Displays all TAS – Plus commands in plain English.
- No need to memorize difficult syntax. The Editor displays all options and makes sure you make all required entries.

Report Writer

- Create and run reports quickly and easily.
- Columns can be totalled.
- Up to 10 different fields may be used as selection criteria in each report.
- Reports may be run over again and again.
- Report programs can be modified using the source code editor.

Other Utilities

- Browse utility lets you display 10 records at once, choosing which fields and in which order to display them.
- Maintain database lets you add change or delete records in a file.
- Create database adds a new database definition to the TAS – Plus dictionary and allows immediate entry of data.
- All utilities are menu driven and require no programming knowledge.

The Accounting Solution

Now solved is the problem of rigidly fixed off the shelf software. Source Code and the powerful TAS – Plus Developers Database are included – so programs can be easily modified as your needs change. Single and Multi User.

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Includes General Ledger, Accounts Payable, Accounts Receivable and TAS – Plus Developers Version. Source code included.

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Developer's Version

For those who need even more power, there's the Developer's Version of TAS – Plus Relational Database. It offers everything that the standard package includes, plus a Programmer's Toolkit. It's the perfect addition for those persons developing sophisticated applications.

The Programmer's Toolbox allows the user to access features not normally available on a database/language. Primary among these are the ability to access additional blocks of program memory (up to 96K), to access files using variable file numbers (even if file names are unknown), and to directly control the memory stack (pop the stack). You can also have up to 17 million records per file and 32 Indexes per record.

Developer's Version also includes a Trace Utility that lets you place break points in your source code (for easier debugging). The Trace Utility includes: set break points, examine/change field value, and single step execution and Enter other character to continue normal operations.

For those who want to use a standard ASCII editor, the Developer's Version provides a complete cross listing of TAS – Plus commands plus a straight forward method of manually writing code. This includes a way of incorporating both screens and reports into the actual code.

Developer's Version includes these additional commands:

binary character
close variable file
display memory
file name search
fill memory
find rec var file
memory ptr update
memory space update
move string
open variable file
pop stack
print screen
ready find field
trace enable

TAS – Plus	**$199**
Developer's Version (Multi user $869)	**$569**
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KILLERS

with a disk drive or dual internal drives. And all of this comes at a price that makes all other business computers as over-priced as they are over-sized.

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NEW!



What would you say to effortless professional presentations?

It not hard to imagine the benefits of such, be it your reports, promotional material or whatever. And it's not hard, or time consuming, nor do you require any particular talent. It takes very little time, effort or imagination to produce superbly presented editorial. After all, when you consider how much time you spend writing and compiling your information, it's a pity that it's not professionally presented, especially when it only takes a few minutes. The answer is Spellbinder Desktop Publisher!

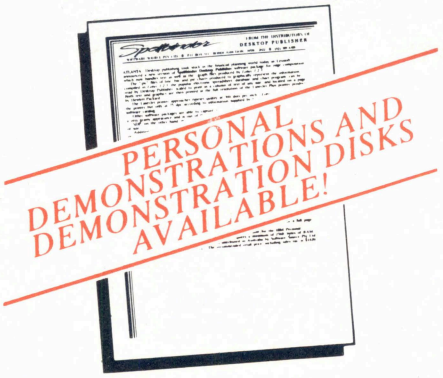
The new Spellbinder Desktop Publisher is much more than just a word processor. Desktop Publisher has the distinct advantage of being able to compose pages, using text as well as graphic images from other programs.

For example, Line, bar and pie charts produced by Lotus 1-2-3 can be read by Desktop Publisher, and scaled to print in any defined area. Other features in the area of graphics include integration of files produced by scanners and paint programs, such as Datacopy and Microsoft PC Paintbrush. This makes it possible to print the output from graphics programs or reproduce custom images, such as your company logo, through Desktop Publisher.



Textwise, Desktop Publisher allows style sheets to be added to a library of style sheets. Unformatted text can be poured into a specific format, page after page. While any document can contain its own style sheet, the separation of text and style allow specific text to be printed in any style simply by choosing one. It also allows text from any source, such as that produced by another word processor or from an on line database to be printed in any style immediately. On any page, exceptions or exclusionary areas can be established for diagrams or graphics. The text will automatically fit itself around those areas. A "what you see is what you get" view on screen is available at a single key stroke. Both text and graphics are then printed in a single pass at the full resolution of 300 dots per inch by the laser printer.

Spellbinder Desktop Publisher is suitable for the IBM PC and compatibles. The program requires a minimum of 256K bytes of RAM and a graphics display card. The new Spellbinder Desktop Publisher is available ex-stock from Software Express. The price is $1,420
(Demonstration programs are available.)





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A GROWING CONCERN

The Minister for Industry, Technology and Commerce, Senator John Button, recently told Parliament our software industry was growing by 50 per cent every year.

The figures were drawn from a government survey which showed that 10 per cent of total software sales of $600 million during 1985-86 had been for exports.

The industry now employs 16,500 people, but, according to Button, is still dogged by a series of problems, including lack of finance, skilled staff, and a knowledge of overseas markets.

IT WAS THE ZEN THING TO DO

The copyright battle continued on the Lotus front, with Lotus Development Corp knuckling down and agreeing to remove the copy-protection schemes from software it sells to the US Department of Defense.

Lotus will ship special unprotected government editions of Lotus 1-2-3, and will probably also deliver unprotected versions of Symphony and its new technical word processing package, Manuscript.

United States Government regulations require the Department of Defense to purchase unprotected software, so it can be installed on a hard disk and easily transferred.

Lotus is the last of the big three American software makers to deal with the copy-protection issue, since Ashton-Tate and Microsoft recently announced they would remove protection from all future software releases.

NORTY, NORTY

The United States recently claimed Japan has been selling microchips to third countries at cheaper prices than those set in an agreement between Washington and Tokyo.

The two sides had failed to reach any agreement after three days of negotiations on ways to prevent sales of Japanese semiconductors to third countries.

The United States negotiators said Japanese makers were selling microchips to third countries below prices set under a July 31 agreement and, should such a practice be left unchecked, cheaper Japanese products might flow into the United States market through those third countries. They urged Japan to improve its price-monitoring system on its semiconductor exports to outside markets.

In response, Japanese negotiators said there were differences between the two sides in monitoring Japanese makers' costs, and ways to compute their sales expenses.

The United States had suspended legal proceedings on dumping charges against Japanese semiconductor makers, in return for promises by Tokyo under the July agreement to prevent sales below "fair" prices.

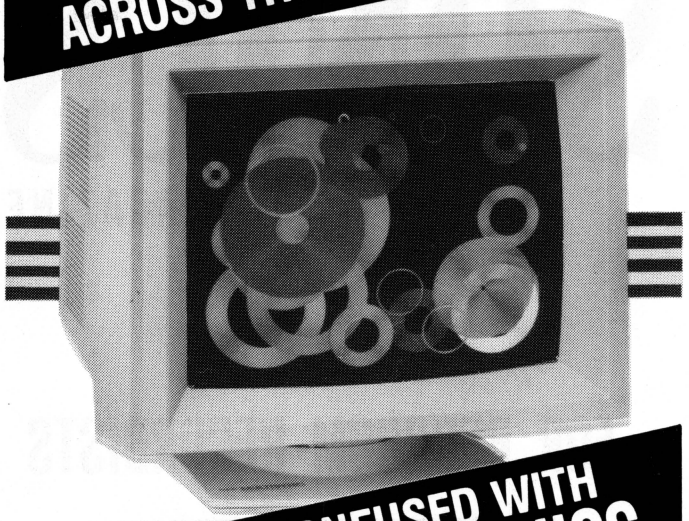
EHH, WOT'S UP DOC?

Warner Communications has won the lion's share of $US51.8 million harvested by Atari as a result of its sale of public stock on the American Stock Exchange.

Warner Communications is the entertainment conglomerate that sold Atari to Mr Jack Tramiel in 1984.



NEC HAS EVERY COLOUR MONITOR BEAT ACROSS THE BOARD



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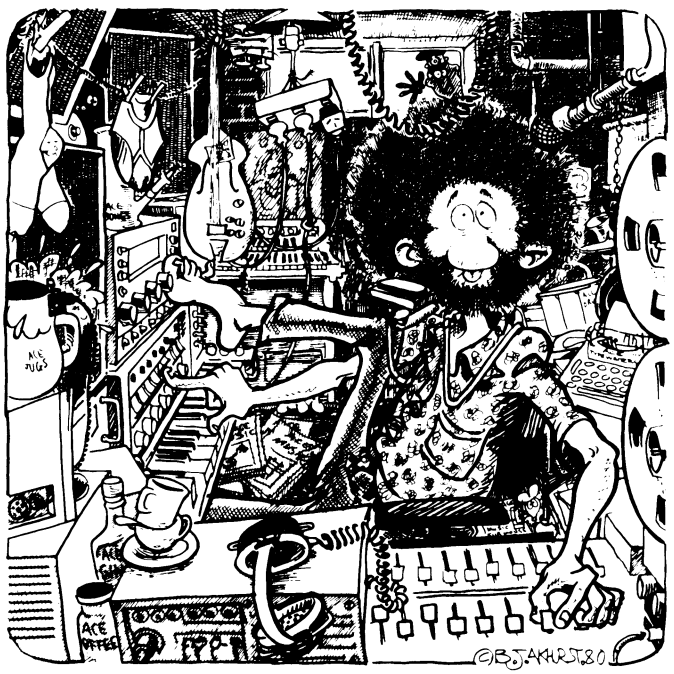

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NEWS

A BAD YEN FOR PROFITS

The Japanese manufacturing industry reported a 24.1 per cent profit decline in before-tax profit during the April-to-September period, which it attributed to the sharp rise in value of the Yen.

Export-oriented industries were particularly hard hit, with leading electronics companies showing a plunge in profits because of declining exports and semiconductor prices.

Meanwhile, electronic equipment maker, Hitachi, predicted a serious 42 per cent pre-tax profit drop for the business year ending next March.

PCS FAIL TO REACH THE TOP

A study by the Stanford University Graduate School of Business said American executives were using PCs more, but that the PC had failed to find a place in the top levels of the country's biggest corporations.

Chief executive officers and company presidents were said to be using computers primarily to review management reports. Chief financial officers and marketing executives use theirs for analysis, forecasting and other decision-making functions.

BURROWS + SPERRY = UNISYS?

A 36-year-old Burroughs Corporation employee, Lee Machen, won $5000 for choosing a new name for the giant United States company created through the merger of Burroughs and Sperry. The two companies agreed to the $US4.8 billion merger five months ago.

The name — Unisys — was selected from 31,000 entries from the 120,000 employees of the combined worldwide Sperry-Burroughs organisation.

Its announcement by Chairman Michael Blumenthal marked the end of months of speculation, and was accompanied by the launch of a $25 million advertising campaign aimed at creating a new image for the born-again company, now the second biggest computer maker in the world after IBM.

Major restructuring of the conglomerate, announced during November, includes plans to sack 10,000 employees, mostly from administration areas; the decision by the Sperry division to sell its aerospace operation to Honeywell, for $US1.03 billion; and the decision by the Burroughs division to hive off part of its Memorex subsidiary.

Commenting on the aerospace purchase, Sperry's chairman and chief executive, Edson Spencer, said, "This important acquisition will make Honeywell an important supplier for the cockpit of the future."

The sale, for US$550 million, of part of the Memorex subsidiary will create a new company for a group of Memorex executives and a New York investor. Their purchase includes the worldwide plug-compatible (PCM) sales and service organisation, the communications engineering and manufacturing organisation and the media-products business. Unisys retains "key technologies", the Memorex headquarters in California, the design and manufacturing operations for large disk drives, and all other operations concerned with the manufacture of Unisys peripherals.

The new company, with 6000 staff and estimated revenues of $900 million, will continue to use the Memorex name.

NOT QUITE WORDPERFECT

In our November issue, we misquoted the price of the Wordperfect word processing package. Our apologies to those of you who took Les's advice and rushed out to buy the product, only to be surprised at what it cost ... Will the real price please stand up ... It's $870 — and Les says it's still well worth it. □

EXPO IN THE SUN

WHEN THE DOORS CLOSED on the Fourth Annual Queensland Computer Expo, exhibitors declared it to be the most successful yet — and took it as a hearty sign that the computer industry is alive and well in the Sunshine State. Over 13,000 visitors were attracted by over 70 vendors during the exhibition's four days at the Mayfair Crest in Brisbane in early November.

Contrary to the gloomy predictions that are rife in the local industry, exhibitors reported healthy sales and a very high level of general consumer interest. Attracting an especial amount of interest were the new desktop publishing systems launched by Apple Australia and local-manufacturer President Computers. IBM compatibles featured strongly with the latest on show from Amstrad, Hypec, Multitech and Queensland's own Cleveland Computers.

Local dealers Pacific Data and Kaye and Associates reported strong interest in demonstrating their CAD packages and hardware — especially amongst small businesses, showing that this is another software area that should soon be accessible to the general user.

As the organizer, Robert Woodland pointed out, the number of 'first releases' at the show, indicated that the Queensland Computer Expo has become a major event on the industry calendar and the 1987 show (Mayfair Crest, Nov 4th to 7th) — the 5th Annual — will be even more successful. □











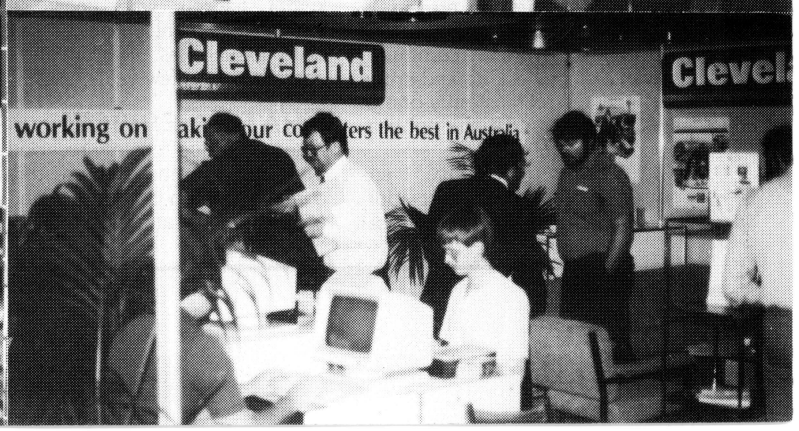

AMERICAN GRAFFITI

BY HOWARD A. KARTEN

I SAT DOWN at my word processor fully intending to tickle the ivories, as it were, when my combination database syntax-checker and pop-up calendar checked through past columns and reminded me it had been some time since I banged my spoon on my high chair.

Some experiences I've had recently cause me to wonder about the value offered users by some computer-connected products and services. For example, there's an American service called Newsnet, which offers online access to some conventional (though highly priced) newsletters. In an effort to familiarise potential users with its service, Newsnet recently offered a day's access to it, entirely free. I took the company up on it and spent a day downloading around 1.5 megabytes of information. (That's right — 1.5 megabytes. At 1200 baud, and with only occasional pauses to input or output coffee, it took several hours.)

I'm sad to have to relate, most of these newsletters were boring. Almost all were expensive in hard-copy form, and priced even higher in electronic form. Several simply reprinted the press releases vendors use to communicate with the media, and there seemed to be an awful lot of "I" in them. (One editor, famed mostly for his ego, has taken to writing 'open letters' to various vendors, telling them why they are having problems.)

On the same day, one of my favourite newsletters arrived in the mail. It costs only $10 for six issues, and covers the communications hacking-and-crime scene, and is consistently one of the most interesting publications I know of.

In another recent case, I enquired about the price of additional memory chips at the local store, which is part of a major regional chain of computer stores. These stores are aimed at business computer users, and strive mightily to be non-intimidating to would-be customers.

I had called to test a hunch — that the folks in the store had little or nothing in the technical knowledge department. The store I called proposed to charge $30 for a set of nine memory chips; the price through mail-order is around $9. Normally, a store's justification for charging 'full price' is that it (the store) somehow adds value to the product. In this case, apparently, the 'value added' is that the staff doesn't bother the customer with silly stuff like technical specs: I had to speak with three employees before I found one who had any idea that chips have rated speeds, and that chips rated at the incorrect speed would not work.

We've all experienced this kind of ignorance and lack-of-value so often, and heard similar tales so frequently ... I'm convinced it must be a world-wide phenomenon. It almost seems as though there's some sort of inverse-square law (remember those from high school physics?) governing what's happening: as the price of software and hardware go down, the amount of ignorance surrounding them seems to be rising in squared proportion.

In the good old days, a lot of computerstuff was sold by unkempt hackers who knew all manner of technical arcana, but little about sales. How far we've come in just a few years ...

THAT'S SERVICE!

A communique recently received from IBM contains an interesting commentary on computers and electronics — and possibly on IBM as well.

IBM is dropping prices for maintenance of IBM PCs — in some cases, significantly. And the prices apply even to older IBM hardware. The move is significant for several reasons. First, it's a bottom-line commentary on how (apparently) reliable IBM hardware is. What IBM is saying is that even older hardware — the Dsystems put together at the beginning of IBM's manufacturing cycle, when, presumably, it was still riding the learning curve — has withstood the ravages of aging with some grace.

Why did IBM do it? I find it very curious (though, I hasten to add, not at all sinister). IBM is very much bottom-line oriented, probably more so than many other companies. And it undoubtedly knows better than anyone else what the failure rate is on all its products. And, although IBM does lower prices for competitive reasons (and probably only for competitive reasons), it's hard to imagine that the company felt beset by its competitors, or that it hopes to generate business by lowering prices. Another IBM mystery.

TO MARKET, TO MARKET

One of the more consistent phenomena of the microcomputer era has been the demise of companies attempting to compete with Big Blue. Corona, Eagle, Hyperion, and a score of others have gone under in the PC-compatible arena. And the classic reasons for failure (under capitalisation and poor marketing) are not committed only by small companies; as I mention elsewhere in this column, AT+T has not fared especially well against IBM, either. And AT+T is nothing if not *a*) an organisation with a well-deserved reputation as marketeers, and *b*) well-financed.

These musings come to mind because of announcements of microcomputers by two companies which have thus far done well in this business. NEC Home Electronics (USA) recently introduced an under-$2000 MS-DOS-compatible portable with an LCD screen and two 9 cm floppy drives. (The machine, called the MultiSpeed, uses NEC's proprietary V-30 chip.) And AST Research introduced a machine it's calling the AST Premium/286, an Intel 80286-based machine which operates at 10 megahertz and has all sorts of Dgoodies (12-month warranty, attractive price, lots of factory-installed memory).

It will be interesting to see, six months from now, whether these two vendors have succeeded in securing a healthy share of the compatible, marketers market.

SHORT BYTES

■ Maynard Electronics of Casselberry, in the state of Florida, recently announced a disk controller card which the company says will double the capacity of many fixed disks now in use. Maynard plans to release a list of drives compatible with its product, but has not yet disclosed the price.

■ A recent court decision in San Francisco may spell trouble for would-be developers of software clones — software that 'looks' the same (that is, presents the same user interface) as original software. A Federal District Court in San Francisco held that a clone of Broderbund Software's Print Shop graphics program violated Broderbund's copyright. Lawyers for Unison World, the company which lost the case, said they would appeal. □

Toshiba's new PC portables really mean business

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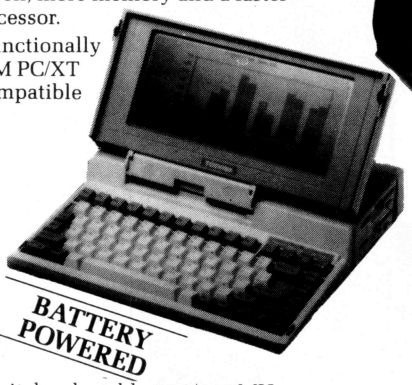

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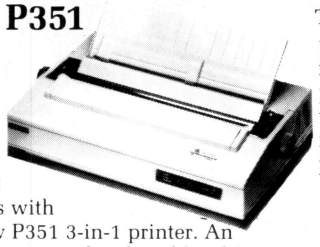
-2 x 720K 3.5 inch floppies

Toshiba P351 /351C



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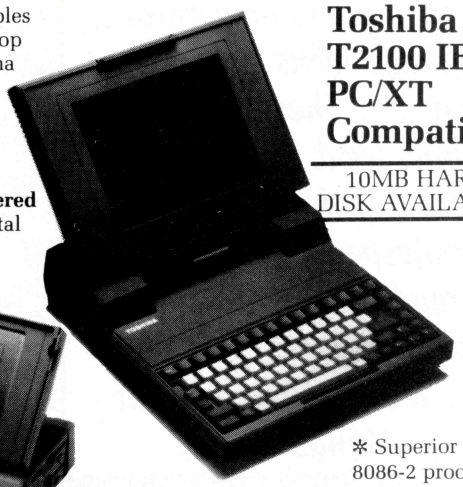

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* 256K RAM standard, expandable to 640K
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* Plasma display 640x400 pixels
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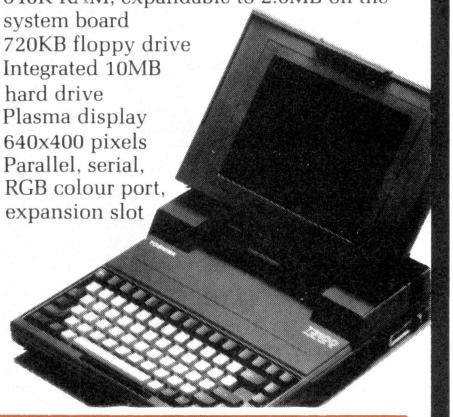
* Parallel, serial, RGB colour port, expansion slot



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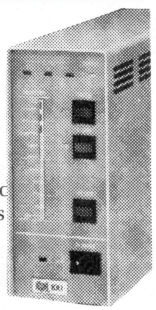

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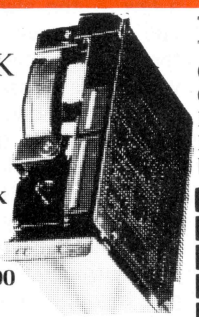

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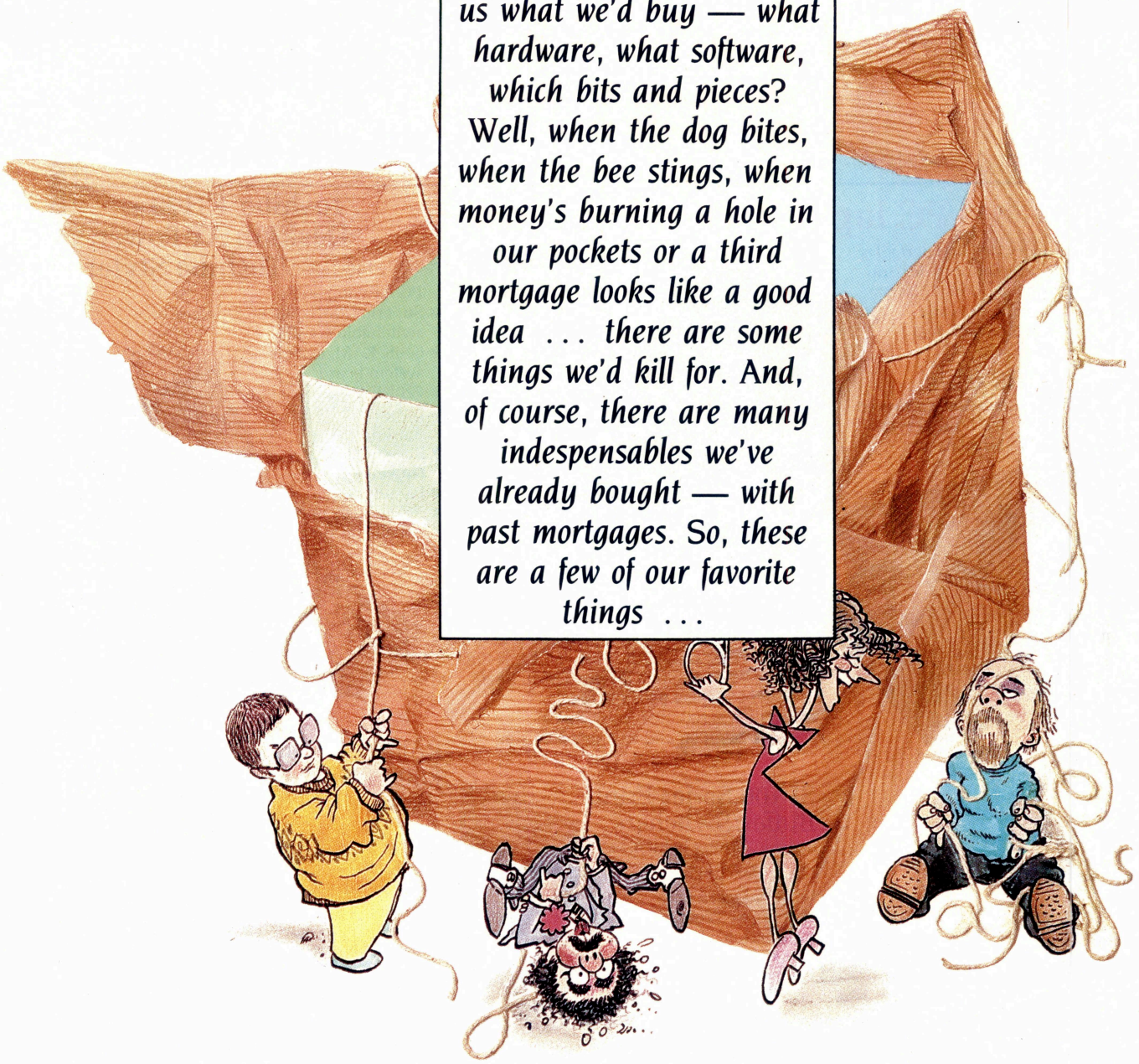
People are always asking us what we'd buy — what hardware, what software, which bits and pieces? Well, when the dog bites, when the bee stings, when money's burning a hole in our pockets or a third mortgage looks like a good idea ... there are some things we'd kill for. And, of course, there are many indespensables we've already bought — with past mortgages. So, these are a few of our favorite things ...



Matt 'Go-Faster Mastermind' Whelan

I HAVE HUNDREDS of favorite pieces of compuphernalia, but most of them belong to someone else — like several of the high-performance ATalikes we've reviewed, wondrous graphics and music machines, hotrod 386-powered devices like the Compaq, or even zippy laser printers like the 26-pages-a-minute Dataproducts LZR 2665.

When we get down to the things we own (yes, we *do* buy things) there are still quite a few — the always-excellent Compupro 286 systems we drive at work and home, the versatile Hardcards that make our travelling life so much easier, the cabinets filled with public domain software collections that hold the answer to most programming questions, and the superb software (we wrote it!) that organises our lives (as much as they can be ...).

So what makes it to the 'final five' list? Mostly things we own and use every day, plus a couple of 'desirables' from the test items that have passed through the office lately.

Impact's Wisdom

Our Impact laser printer has proved one of the most welcome high-tech additions to the YC office in recent years.

The speed and quality of laser printing are well known — and in themselves justify the purchase — but there a couple of factors which are less-often recognised as advantages. The most significant, as far as we are concerned, is the noise level — there isn't one! It's not unusual to see one of the staff walk to the printer with hand cupped behind ear to see if it's working.

Occasionally I sit back and watch an article or program listing being ejected at eight pages a minute and think of the days when the high-pitched scream of a 'letter-quality' dot matrix printer used to interrupt my phone calls. Or of the times our Diablo daisywheel sent visitors diving to the floor with its takatakatak-machine-gun clatter.

Favorite Things

I remember, not at all fondly, the extra problems introduced by the expensive sound-proofing hoods we eventually had to buy — the folding and jamming of paper, the problems of paper-feeding generally, and the sheer space-eating bulk of the unsatisfactory combination.

Our machine started life as a Hewlett-Packard Laserjet, but we quickly converted to Impact Systems' controller board, as it allowed far simpler control and drastically increased flexibility with fonts. Whether that was the right move in light of coming desktop publishing developments (a subject dear to our hearts) remains to be seen, but in the meantime the Impact has served us in an outstanding manner . . .

PC Screen, Real Computer!

We've held out against the IBM march (in our own work, not the magazine) for a long time, running Compupro machines which provided speed, reliability, disk capacity, multi-tasking and multi-user operation, but there were a few problems.

Every now and then we'd need to run a PC-based application, so we would have to switch to using an IBM (or near offer). And people would often challenge our praise for the Compupro by asking "Can it run Lotus?".

Mr Compupro solved our problems this year, with the PC Video Board, an S100 'IBM clone'. It slots into our machine and, with an IBM keyboard and monitor attached, becomes the system terminal. Now — thanks to the video board and the Concurrent DOS operating system — we have our cake and large tummies, too. We run up to four PC-dependent tasks at once on this console, and still have our multi-user operation and all the other benefits.

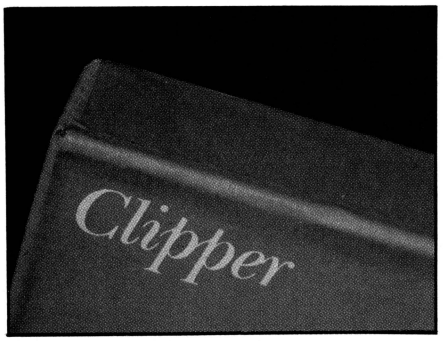
We can run DOS-based software on our serial terminals as well, but use the video board for applications which want to drive a PC screen directly.

Now, when people ask, we can show them Lotus running on the Compupro. We never use it, of course, but keep a copy there for the infidels . . .

Clipper Has Wings

We love dBase. We love it despite its problems, despite the evil things it has done to us, despite the four-in-the-morning shouting, screaming, swearing sessions in which we beg for five minutes alone in a dark alley with author Wayne Ratliffe.

We love Clipper because it takes dBase III programs and makes them into standalone applications that do all the dBase



things without the dBase sluggishness.

Clipper is a dBase compiler (many say *the* dBase compiler) — it takes the text files of instructions that make up a dBase program and turns them into directly executable machine code. Once you've done that you don't need dBase any more (in fact, you don't need it to start with), so you can sell, lend or give away your programmed systems without the recipient having to buy a copy of dBase.

Clipper also has extra features over the product it 'clones', so finally we can do useful things with one of dBase's biggest features, the variable-length memo fields.

In case you were wondering, our Clipper-compiled systems run, on average, three times faster than the same system running under dBase. Heavily processor-intensive applications involving loops can run up to 100 times faster!

NEC's 'Mazing Multisync

The man from NEC home electronics recently talked us into looking at his latest monitor, despite our disinterest. He was right, and now we want one!

We loved his new multisync monitor (model JC-1401P3E/EE/R, or "The Intelligent Monitor" for short). For those who haven't run into the problem it solves, we should mention that the various standards of IBM graphics cards — the Colour Graphics Adaptor (CGA), the Enhanced Graphics Adaptor (EGA) and the Professional Graphics Adaptor (you guessed it, PGA) — run at different frequencies, and require different monitors. Switching graphics cards can turn out to be an expensive pain.

The NEC multisync automatically scans all the frequencies from 15.5 KHz to 35 KHz, and adjusts itself to suit. It offers resolution of 800 by 560. It's just the thing for moving from machine to machine, as we often have to do.

It offers both TTL and analog inputs, and has a Text Switch which allows a choice of one of seven colours for a monochrome word processor or spreadsheet display. The screen is a crisp, clear 36 cm diagonal, with a large viewing area.

It's just the shot for buyers who want high-resolution graphics from packages like Autocad and so on. Unless you're convinced you'll never need graphics, you should be investing in an EGA card and a monitor like this, straight off. If nothing else, it makes the IBM easy on the eyes instead of the 'ugly' provided by the CGA.

Make Pages With The Multisync

The NEC monitor is just the shot to go with our next 'desirable', the IBM version of Aldus Pagemaker.

Pagemaker is a long way out in front in the desktop publishing market, but so far has been available only for the Apple Macintosh. We have one of those (thanks to Les Bell, who traded down from his Lisa), but it tends to get overworked . . .

We want PC Pagemaker, and we want it now! It's great fun (we have a pre-release version to play with, so we know), as long as you run it on high-performance hardware. It really needs processor power and disk speed because the IBM, unlike the Mac, has no inbuilt graphics support — the CPU has to do all the work.

The ideal Pagemaker set-up is a fast AT with a RAM disk and an EGA card — at that level, it leaves the Mac for dead. And we're talking about a version of Pagemaker which hasn't been seen on the Mac yet — it includes kerning, hyphenation and other vital but previously unsupported features which kept desktop publishing out of the 'professional' league.

On the IBM, Pagemaker also shows a double-page spread at a time — just what we need for magazine work.

Okay, Aldus distributor (whoever you are, and if the war is over) — we want PC Pagemaker NOW! □

'Commodore'
Ian Allen

MY FIVE MOST useful computer purchases? Hmmm. I guess number one would have to be the humble Commodore 64. (Sure, I own one, so I'm biased, but on the other hand I'm still using it after four years). Why? Because the C-64 is a bit like a Toyota. It's no sports car. It's not designed to be driven on the limit, but as a

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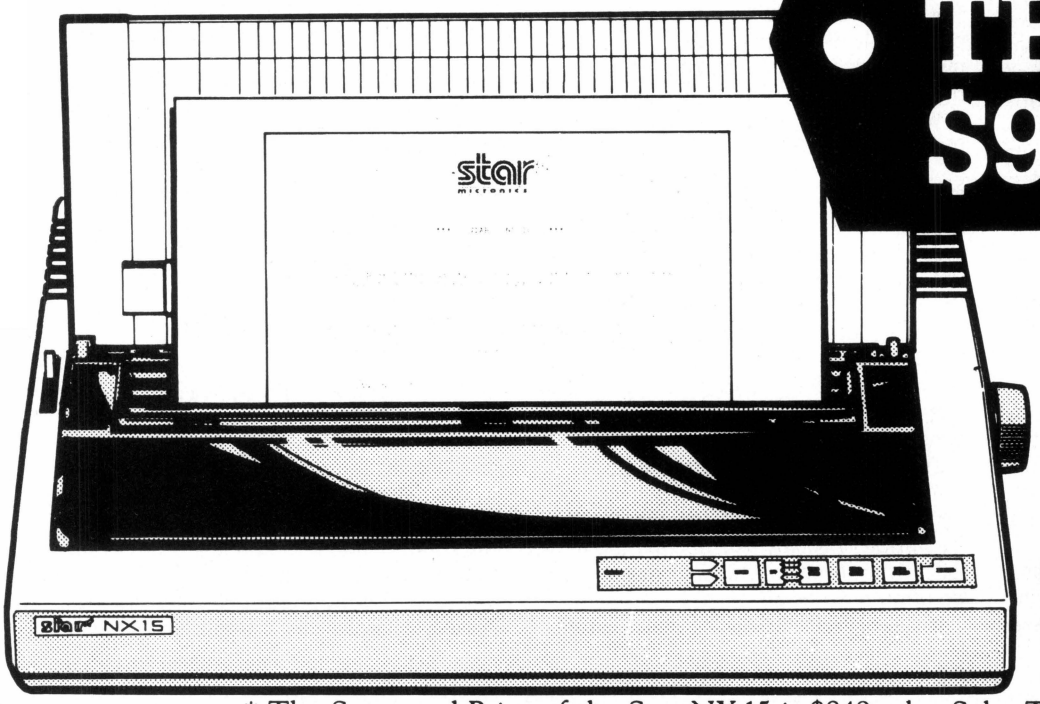

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practical everyday tool it's got all of the right qualities. It's inexpensive, it's reliable, and it's got tons of support.

A lot of writers dismiss the 64 as a toy — something only useful for playing games. It does have a big weakness in that its disk drive access is slow. In its standard form it's not suitable for extensive database use, but there are 'hot-up' kits which will fix the problem if that's what you want to do. As a games machine it's *excellent*. It's got a very good combination of graphics, colour and sound — qualities which have been well exploited by software developers. The other big plus is that 64 owners not only have a wide choice of games, they usually get them sooner — the 64 version is invariably among the first to be released.

Several of my friends have recently become first-time computer owners by purchasing an Amiga. They wax lyrical about its animated graphics and music (not much talk of games), but when I ask them what they are using it for, the standard answer is always 'word processing'. I have to agree with them. I've always found word processing to be the most consistently useful thing I do with my computer, but I've done all of mine on the 64,with a complete system which cost about a third of that of an Amiga!

Porsche *vs* Toyota

That brings me to my second 'best' buy, the 'Easyscript' word processor. It's also in the Toyota mould. It's not the most feature-packed word processor around, but it's got far more features than I would ever need, with perhaps one exception — a spellin checkka. Easyscript retails for around $30, and in my experience is totally bulletproof. I've never had any reliability problems with it in four years of constant use. It's well documented (I wrote my first page after half an hour), and it supports all the useful things like pagination, left/right justification, search and replace, move text, center, underline and so on. It can hold about 10 A4 pages in memory, but it's possible to chain files together to write a novel if you like!

Easyscript even has a preview option, so you can see what your words of wisdom will look like before you print them out. It is not brilliant at mailmerging, or at tabulating columns of figures, but these are features I rarely need. Why buy a Porsche when you only need a Toyota?

My third best buy is probably my greatest folly. It's a game, but no ordinary game. I have probably wasted more hours of my life on this game than any shrink would declare sane. It's called 'Reach for the Stars', and was developed by an Australian mob called the Strategic Studies Group. (Which is why it's one of the few games that cost less here than in the United States.) It's a space strategy game, in which you explore star systems, colonise and develop planets and so on. The only catch is that you're not alone; there are three other players, usually managed by the computer, but they can be played by humans as well.

Invariably there is conflict over who gets what in the space stakes. That's where the strategy comes in. What makes it so compelling is that the computer players employ 'expert system' software. They are smart. They anticipate. They react. But they don't have any special advantage; they play with the same resources and by the same rules as you do. Each game is different because the universe is randomly created, but you can add and remove a variety of features to create further variety. For example, you can vary the intelligence of the computer players; you can change the economic cost of things like starships or factories; and you can vary the length of the game and you can assign different weights to the factors that are counted in the victory scores.

I've owned this game for two years and I'm still playing it. That makes it $45 well spent. Reach for the Stars is available in versions for the Apple II and Commodore 64/128, and SSG is now developing a Macintosh version.

Item number four on my modest list of favourites is a modem. I bought the Cicada 300 about 18 months ago. It's a 300 baud, dumb modem, and has since been superseded by a Viatel-capable version. I'm still happy. My modem has opened up a completely new world of communication. It's absolutely fantastic to be able to ring up a bulletin board and leave a message asking for help on a particular problem. Nine times out of 10 someone has come across the same problem and has the answer. I also find it satisfying to be able to use my experience to directly help other people. Telecomputing can be a very rewarding pastime, and you don't need to be on Viatel to reap the benefits. Just find yourself a local bulletin board! (*Larry Lewis gave a good run down on* Bulletin Boards *in his column 'The Prophet Speaks' in our October and December* 1986 *issues.*)

Club Bit

My final favourite thing stems from the same sorts of social tendencies that make owning a modem so exciting. There is only so much you can do by yourself. If you really want to get the most out of a computer you should join a club. Most of them are cheap to join — around $30 — you'll meet other people with similar interests and problems, and you will learn a lot of short cuts. Most clubs have heaps of public domain software, utilities and people who can advise on the merits of different hardware and software. As with bulletin boards, you'll get much more out of a club than you put in, but if you can contribute just a little you'll be doing your bit to keep the whole process going. □

Tim 'I've-Written-a-Book-About-It' Hartnell

IN 1985 I STRAYED from the straight and true path. After years of spending my days tapping on the keys of my IBM PC, I succumbed to the lure of Apple, and bought a Macintosh and Laserwriter.

Without doubt, of all the computer products I used in 1986, the Mac stands out as the most important for me. Shortly after it was launched, I saw the Mac in operation at the West Coast Computer Faire in San Francisco. Although I duly admired MacPaint in operation (the model we were allowed to play with had been set up with 'brush mirrors', which meant it was extremely easy to produce kaleidoscopic designs), I was struck by the fact that the Mac was a 'closed box'. Just like you'd prefer the crummy little cubby house you were able to build for yourself as a kid, in preference to the much more professional one your dad could build, I felt then that a computer which was virtually impossible to program (when the Mac was launched, there were no higher-level languages available for it at all) was not very inviting.

Forum a User Group?

(Sinclair users take special note!)

JUST ABOUT THE MOST frequent request we hear from readers is a variation on "How do I contact a User Group?" They may be having a problem with some esoteric version of software, or maybe their computer doesn't want to talk to their second-hand printer, or maybe they just want to explore the possibilites of computing . . . They all come down to the same thing: How do I contact other computer users with the same interests and problems as mine? How do I get the most from what I've got — software, hardware or just an idea?

In most cases we can offer help in the form of a referral to a specific user group — we currently have over 800 on file (and, more interesting — they're on the YC Bulletin Board, (02) 953 8074). In fact, we can't think of any more appropriate advice to give — no dealer or distributor can offer the wealth of practical experience that even a small group can build up over a short time (or be so much fun).

What are we on about? Just this — We'd like to offer Your Computer magazine as a venue for your group to address other groups (and, of course, the 100,000-plus readers who aren't members of any group). If you've got something to say that might be of interest to a wider audience than you'd normally reach — a nifty solution to a problem, a fudge around a software bug, a great little utility, or a useful bit of home-grown hardware — or maybe you've got a problem that you know damned well someone else has already solved . . . but how to contact them? Get the idea? Short articles, quick-and-easy projects, questions, answers . . . and we'll even tolerate a bit of someone else's editorialising. The pages we are offering will be what you can make of them — and we think they're going to be interesting! (Any suggestions for a title for those pages?)

Start thinking about it now because we'd like to get started as early in the new year as we can. Send your ideas to User Groups, Your Computer, PO Box 227, Waterloo 2017 NSW — refer to the Services page for details on submissions for publication.

And we did say Sinclair . . .

And what prompted all this, you might well ask? And you might guess it was one of those reader's enquiries, only we don't know of any group to refer him to so . . . Vadim Kuchin is interested in forming a Sinclair QL User Group in the Sydney area. Right now he'd like to hear from anyone interested in exchanging ideas about forming the group and deciding what direction it should take; any suggestions for a venue would be welcomed, too. Got a Sinclair you'd like to get more out of? Then, drop him a line: Vadim Kuchin, PO Box 729, Parramatta 2150 NSW — now! (Please include a SAE envelope for his reply.) And by the way — he told us about a group in WA: The Australian QL User Assoc, 12 St Michael Tce, Mt Pleasant 6153 WA; Graeme Ashford is the Secretary. □

#&*(&)@*||!

But now, with lots of programming tools, and the fact that virtually all Mac software follows a common set of rules, so you can run most of it, to some extent, without even opening the manual, the Mac is almost a total joy to use. I say 'almost' because I feel Apple has made a serious mistake with the keyboard. In contrast to the lovely clackety-clack of my PC keyboard, I feel the Mac keyboard is soft and squishy, and it is too high off the desktop for proper use. I fear it was designed by the RSI Promotion Board. And this is not just my opinion. I belong to the grandly named Society of Technical Communicators, and when I voiced my opinion on the Mac keyboard at one meeting, a chorus of agreement arose.

But despite the keyboard, the Mac is a great machine. For general business use, I feel most people would be better to buy an IBM clone, but for specific uses — most obviously in the graphics/desktop publishing area — the Mac is number one in my book.

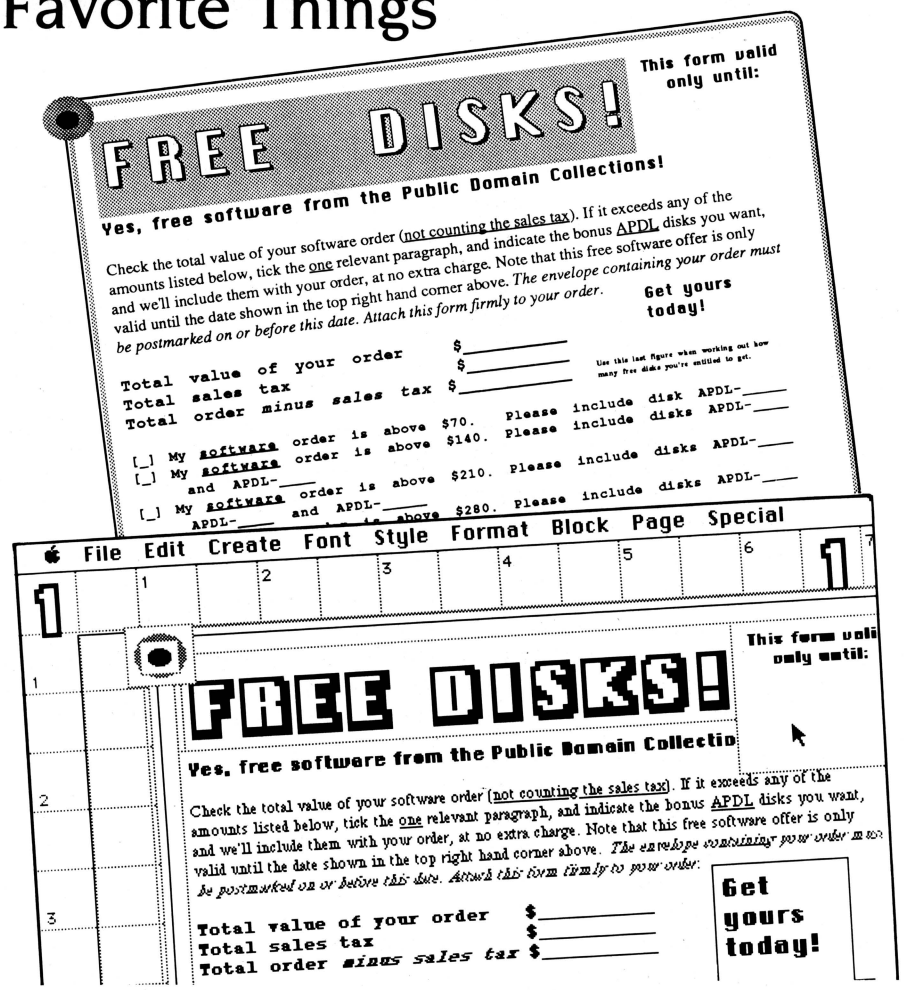
My second favourite product for 1986 would have to be the Laserwriter. It's an expensive beast, but the output is magnificent, and I recouped at least half the cost in the first six months of owning it, partly through typesetting which I did myself instead of paying someone else to do it, and partly in the typesetting work which came my way virtually unsolicited.

PCMac

My third favourite product for 1986 is related to the Mac, and my feelings about its keyboard. The product is called MacLink. It consists of two disks (one for the Mac, and one for the PC), and a cable to join the Macintosh and PC together; and is used to transfer files from one machine to the other. I have a great deal of text created in Wordstar on the PC, which I like to be able to manipulate on the Mac, adding different-size type, and so on, before printing it out on the Laserwriter.

Because I don't like working on the Mac keyboard, whenever I have a project which is more than one page long, I write it on the PC, where I can work swiftly, with proper control, and without being forced to take my hands off the keyboard to manipulate the stupid mouse just to erase a line or move a paragraph to a new position. It takes only a few minutes to transfer a file from the PC to the Mac or vice versa.

When I bought MacLink, I expected it would be a pig to actually get going. Set-



YOUR COMPUTER DESKTOP PUBLISHING

Yes, now that hardened old hacker (as he was unkindly described in a recent issue of the magazine), Tim Hartnell, leaps into the waters of Le Print, just for

Your Computer

Showing off its skills, Mr Hartnell printed the following samples of various type styles:

Natalie
Les Bell
Matt Whelan
JAKE KENNEDY
Leo
Damien Prins
Federal
Publishing
Your Computer
Rules
very O.K.

Le print also caters for Greek, Mathematical or Special characters such as

ΑΒΓΔΡΕΖΗΘΙΚΛΜΝΞΟΠΡΣΤΤΦΧΨΩαβγδεζηθικλμνξοπρστυφχψωαϑϑϛφ

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ting baud rates and getting the package to work properly would take me, so I thought, an afternoon of frustration — such has been my experience with similar products in the past. But no. The program worked the very first time. I left everything on the default settings (with a transmission rate of a quite respectable 9600 baud), and just clicked on the 'Go' box on the Mac — and it did. The data transmission is, in my experience, 100 per cent accurate; I do not recall even a single letter being garbled while travelling from the PC to the Mac, or back. After Wordstar, MacWrite and Ready Set Go, MacLink is my most often-used software. MacLink was created by Dataviz, and is distributed in Australia by Software Corporation of Australia, (03) 699 7255.

Integrated Goodies

Just as MacLink worked first time, I had good luck with my next 'choice product'. In 1986, I bought my PC a present, a complete modem/access package from Information Solutions. The Microtex 666 package was just what I was looking for — an integrated set of goodies to enable me to access Videotext, Microtex 666, bulletin boards and other computers.

I couldn't face the hassle of trying to decide which modem and so on to buy, and then have to try and get the thing working, so the Microtex 666 package seemed a godsend. For around $499 (the BBC Micro version is the same price, and the Commodore 64/128 package costs $100 less), I got the following: a natty little extension phone (one of those with push-buttons built into the handpiece, so it's all one unit); a modem (allowing access at 1200/75 to services like Viatel, and 300/300 for talking to other computers); cables; software to drive the thing; and a year's subscription to Microtex 666.

The software converts a standard PC into a videotex terminal, with an additional program provided to enable communication with other computers. Two display modes are provided. One gives full seven-colour foreground/background, flashing and conceal, but with limited graphics (an optional ROM is available to give full graphics in full colour). The second mode is a full implementation of all Viatel features, including double height, flashing and so on, with continuous graphics in restricted colours. The software download facility is fully compatible with Telecom's Viatel Telesoftware Recommendation, as implemented by Microtex 666, which allows the downloading of text or executable programs of any size from Viatel. There are two hardcopy functions, with a full high-res graphics dump for GX80-type bit-map printers, and a speedy text-only dump for all printers.

If you wanted to get into the communications field, you may well find, as I did, that the Information Solutions package is a simple and neat way to do it. Information Solutions is on (03) 419 0300.

My final two favourite products are both software, and relate to graphics production; one is for the Mac, the other for the PC. Despite all the excitement over Pagemaker on the Mac, I must confess that I use Ready Set Go for preference, as I tend to produce fairly short documents (say up to four pages); or I find that I prefer working with MacWrite and then physically pasting up my output afterwards (this is how my book on desktop publishing was done).

More Ads

Ready Set Go is great for producing advertisements, newsheets and so on. Like most other Mac graphic design packages, it is easy, almost intuitive to use, and I found little need to consult the manual. When working on a Ready Set Go document, you create a series of text, frame, or solid rectangles, putting text or patterns in them as you wish, and overlaying them to almost any degree of complexity. Although some complicated documents take a long time to print (I did a newsletter which took 25 minutes for the first page to appear from the Laserwriter), subsequent copies pour out rapidly, one after the other. Ready Set Go is distributed by Imagineering, (02) 662 4499.

My final favourite is Le Print, a means of producing 'typeset' output from Wordstar files (or straight ASCII files) on a dotmatrix printer. You simply embed 'dot commands' in the document, and it prints up in quite adequate quality (as the sample, which was produced on the IBM Graphics — an FX-80-type dot matrix printer, shows) in a variety of typefaces, and in virtually any size, from a fraction of a centimetre to around 25 cm high. The proportionally spaced text can be flush right or left, and a wide variety of other printing control options is available.

The basic Le Print package costs $310.80, which includes five fonts. Additional fonts are $38.40 each, or you can buy all nine at a discount of 20 per cent. The optional typestyles include Liquid Crystal Display, Old English, Greek Characters and Helvetica. Le Print is distributed in Australia by Optsoft, (02) 680 3930. □

'True-Blue (with shades of Toshiba)' Hepworth

WHAT COMES FIRST? Chickens or eggs, hardware or software? In the end, it isn't important, since both are essential, but while one computer can run a host of programs, having one piece of software and a host of computers is nonsense. My favourites are based on the one computer which will do all the things I need, and four software packages I use more than any others.

The choice of a computer is easy. I want a fast, powerful machine that will go wherever I go, and run wherever I am. That means a laptop, with a screen better than the average LCD, an internal hard disk, a fast processor and heaps of memory.

Chickens . . .

The Toshiba T3100 fits that specification perfectly, with a 80286 processor, an 8 MHz clock, an internal hard disk, over 2 Mbytes of RAM and a superb plasma screen. It is the perfect tool, provided a power point is in reach. It can be balanced on a knee or propped on a desk, and is generally unobtrusive until needed.

Now for the brains of the operation. The four software packages I find I use more than any other are Microsoft Word 3, PC-File III, Norton Utilities and Xtree. That's right — one commercial word processor, one user-supported database, and two indispensable utilities.

. . . Eggs

Xtree is one of the most useful utility programs ever released, allowing inspection of the tree structure of a disk with a visual display, and enabling you to alter file attributes, copy, move, rename and delete files. Creating, deleting and renaming subdirectories is a snap. Xtree is an absolute necessity for any hard disk user.

The Norton Utilities were one of the first to offer a way of un-erasing a file. This alone is a good enough reason to make sure a copy is right next to every machine. In addition, the ability to recover text from disks, to patch any file in ASCII or hex, to

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

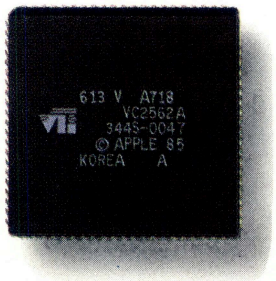
The new Apple IIGS.



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.

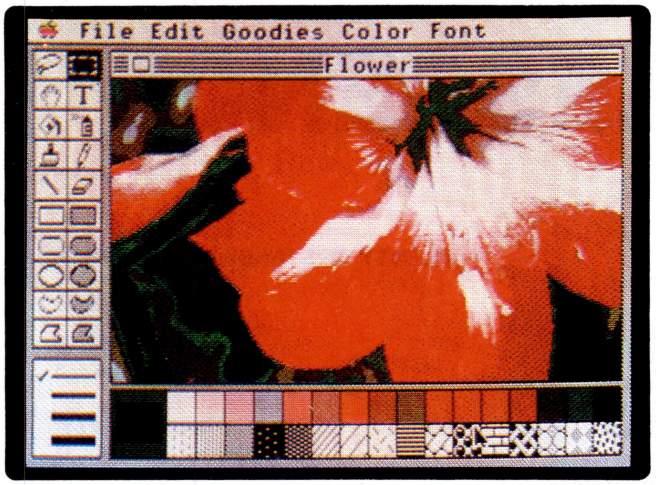
The IIGS has 4,096 in all. From delicate violet to electric red.

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.

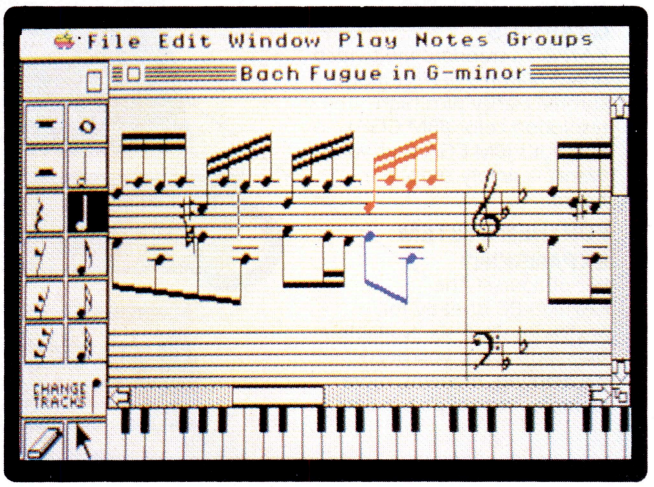
There are eight expansion ports at the back of the machine where you can plug in peripherals.

Anything from disk drives to modems, joysticks to printers.

You can share a LaserWriter with up to 30 other computers, thanks to AppleTalk, built into every IIGS.

Not only can you plug in a cord, you can plug in a card.

Take off the top of the IIGS and you'll find eight expansion slots where once again



it's easy to make the IIGS smarter, faster or more powerful.

As improvements become available, you'll also be able to plug them in. So your IIGS will never become obsolete.

The new Apple IIGS.

It's even greater than the two computers inside it.

Apple

AP320/Palace 3

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Simply exchange the existing mulit-function board 768 K standard for any configuration of memory, I/O, and controller boards.

HIGH-RESOLUTION GRAPHICS?
KAYPRO's standard multivideo board features perfect mono-chrome clarity plus high-resolution color (IBM CGA). But, if it's IBM EGA that you want? – simply snap in a board.

FURTHER SYSTEM EXPANSION?
But of course! The KAYPRO PC is ready for anything. With six available slots, add what you need – networking, modems, more memory – the sky's the limit.



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Kaypro's new "Snap-In" technology lets you exchange or update all vital system components in seconds.

Computer technology changes with lightning speed. In the time it takes to read this, there will be dozens of new products on the market that make their predecessors obsolete. With that in mind, we'd like to give you a bit of good news. The fully IBM PC/XT compatible KAYPRO PC has been designed to eliminate computer obsolescence. That means it's a snap to update all vital system components – right down to the system's microprocessor.

And, if it's topnotch features you want, look no further. The KAYPRO PC delivers: IBM PC AT-style key-board, two disk drives, dual speed board, built-in color capability, and 768K of standard RAM. The culmination of Kaypro's 33 years of electronics engineering innovation, the American-made KAYPRO PC just may be the last computer you'll ever need.

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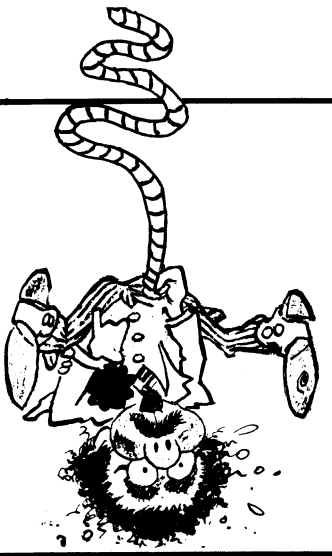


sort directories, change screen colours and test system processor speed (the SYSINFO program so widely used as a benchmark) are sheer magic. The Utilities even offer a little program to print out source code files with a left margin and pagination.

How long do you want to spend setting up a personal or business database before starting to use it? A year? A week? A day? How does 10 minutes sound? PC-File III can help you achieve this feat. A piece of what is known as user-supported software, it is available through user groups for a nominal sum, and satisfied users are asked to send a donation to the author.

Using PC-File III is really simple. Define a database with up to 42 fields, then define a report format. Subtotals and totals on numeric fields are supported, and the database size is limited only by the size of the disk. Data security is good, as PC-File III writes all additional or amended data to disk immediately.

I have intentionally left the best for last. Microsoft Word Version 3 has been my salvation over the past four months, making the writing of a 400-page manual, and typesetting it on a laser printer, possible in a minimum amount of time.

And an Omelette

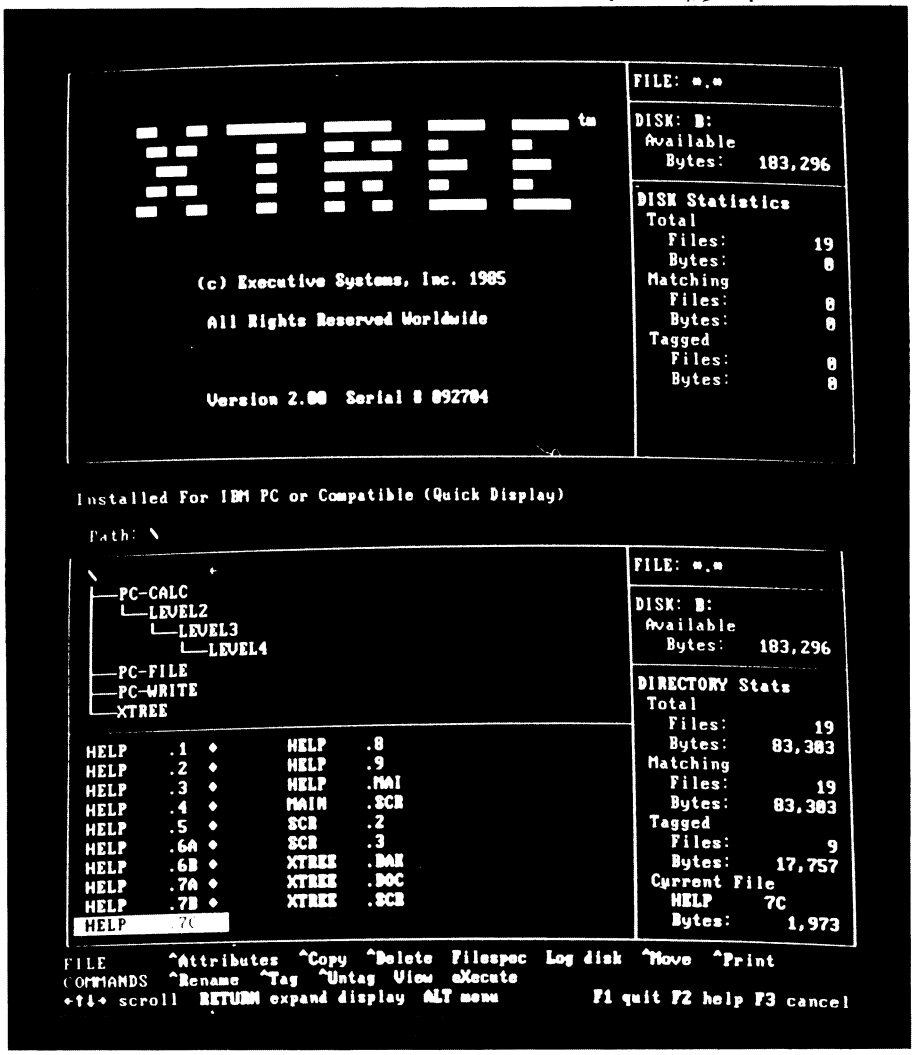
Word processors tend to be either easy to learn and limited in function, or very powerful and hard to learn. Microsoft Word 3 bridges the gap. It is one of the most powerful word processors available, but is also easy to learn. A beginner can just scratch the surface of the list of features and get on with the job of creating documents — no difficulty there. Each new skill can then be added to your repertoire, one at a time, until all are mastered; the user interface is always consistent.

The features I really like most have to do with printer control. Word comes with drivers for a host of dot matrix, daisywheel and laser printers. The typefaces and type sizes for each printer are known to Word via that driver, and the user can choose fonts for the selected printer.

If you change the selected printer (a task needing only a few keystrokes), Word can determine which fonts on the new printer are closest to the fonts for the old printer, and adjust output to screen and paper accordingly. Unless some really fancy page layout work is required, say, with columns wrapped around graphics, Microsoft Word would be all many in-house-publishing operations require.

Word's inbuilt outline processor, style sheets, side-by-side paragraphs, automatic indexes and tables of contents, multi-line headers and footers and side-by-side paragraphs are indispensable.

There they are: four software packages I use every day, and the computer I would love to own ... maybe next year. □



Les 'I've-Got-My-Priorities-Right' Bell

IN RECENT YEARS, there has been a boom in the popularity of spreadsheet programs — especially the ubiquitous Lotus 1-2-3. Accountants, in particular, have been quick to see how many business problems can be translated to spreadsheet solutions, and this has spread to the adoption of spreadsheets for many other business-modelling and analysis tasks.

Not so with the database. While row-and-column analysis is familiar to most business people, the idea of a relational spreadsheet is strange and awkward, so these products have not gained in popu- ▷

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SMARTKEY

SmartKey does one thing. It lets you take any long, boring, repetitive or difficult-to-remember set of keystrokes and assign them to a single key. Sophisticated programs like Symphony give you a "macro" facility. SmartKey gives you macros for all your software in a single easy-to-use package. Any word, any line, any paragraph — even a whole page of "boilerplate" can be allocated to a single key and permanently saved. The uses of SmartKey are limited only by the imagination.
Available for IBM and compatibles (SmartKey 5.1), MS-DOS and CP/M-86 (SmartKey II Plus), CP/M-80 (SmartKey II). **Price: $81*.**

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An easy to use program that lets you read, write, and format disks from different CP/M and MSDOS machines! Speak to more than 220 other computers.
If the disk format you need to access is not included in the current menus in PC-Alien, just send us your formatted CP/M or MSDOS diskette containing more than 50% readable ASCII text and we will try to add that format to PC-Alien's comprehensive list.
With the appropriate hardware, PC-Alien will allow you to read 3.5 inch, 80 track and 8 inch formats in CP/M-80, 86 and MSDOS.
Available for IBM and compatibles. **Price: $104*.**

SMARTSTUFF

A collection of "pop up" desk tools which you can tailor to your needs. A full featured resident screen editor/notepad. A programmable calculator. A sophisticated financial calculator. A calendar alarm clock. A telephone dialer. A DOS menu which lets you use common DOS commands. Also includes a program which lets you interrupt an application, run any other program and then return to the application just where you left off.
Available for IBM and compatibles. **Price: $104*.**

SPATH

A terrific hard disk space-saver which eliminates the need for multiple copies of overlay and other program files on disk. Run any program that uses overlays, help, or other auxiliary files from any directory, sub-directory or disk drive. Group documents or data files into separate directories and subdirectories without keeping copies of your software on each one. SPATH is easy to use and once installed it may be autoloaded and forgotten.
Available for IBM and compatibles, other MS-DOS. **Price: $33*.**

PC-EIGHTY

Don't throw away your old favourite CP/M-80 software! Now you can run it at full speed on your IBM-PC or compatible. By simply exchanging the 8088 CPU chip in your machine with the latest state-of-the-art NEC V20 chip you retain 100% compatibility with other hardware and software.
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larity to the same extent. The fact remains, however, that in business there is more effort devoted to recording and processing data than there is to its analysis, and this is the kind of work for which the database is designed.

dBase III Plus breaks new ground in being both easy to use and powerful. When invoked in the ASSIST mode, the program is driven by pull-down menu blinds and an interactive user interface, which is intuitively obvious to most first-time users. Quite complex data-management tasks can be accomplished easily, with the program guiding a user through the steps.

Once users becomes more advanced, the new features of dBase III Plus come into play in assisting them with more complex tasks. The construction of multi-file relational spreadsheets, for example, is eased considerably by the new CATALOG and VIEW facilities. The SET VIEW command, in particular, makes it easy to edit and browse through relational databases without the requirement for programming.

In summary, dBase III Plus provides ease of use for the neophyte user, while still offering enough power to reassure buyers they won't have to throw the program away because they have outgrown it.

More Perfect 4.2

As I mentioned in an earlier review, I'm a heavy user of Wordstar — always have been, and it looks like I always will be. However, if the only machine I used was a PC, I'd probably dump Wordstar and switch to Word Perfect.

WP is an excellent word processor for corporate use. First of all, it's loaded with features, making it suitable for a wide variety of users. However, the features do not make it complex or difficult to use.

Some new products are further enhancing the capabilities of Word Perfect. The latest version, 4.2, includes an on-line tutorial, document summary information *a la* Wang word processing, a Table of Authorities feature (for legal users) and a number of other smaller additions from the Word Perfect users' wish list.

A new program called The Library adds new facilities to the program. The first part of this is a menu-driven front-end program, called The Shuttle, which provides a friendly face for inexperienced DOS users. The second part is a collection of utilities, including a macro editor, a program editor, alarm clock and a simple notebook database facility.



Also new is a spreadsheet called MathPlan, which integrates with Word Perfect. Under the Shuttle, users can switch instantly between the two programs, which share a common command structure and function key usage.

All this adds up to an increasingly powerful product which is entirely appropriate for corporate purchase. Absolutely outstanding. Pity it won't run on our Compupro system!

C New Standards

The importance of the C programming language is axiomatic for most PC programmers. A good C compiler makes it easy to generate systems software, utilities and even applications software of high quality at moderate cost. Assembler can give higher performance, but at much higher cost. COBOL, FORTRAN and BASIC can (sometimes) be cheaper and faster to program, but not as efficient or versatile.

Microsoft C sets new standards for quality of generated code, for quality of documentation, for portability, for conformance to the proposed ANSI standard, and for providing a programming environment, rather than just a compiler.

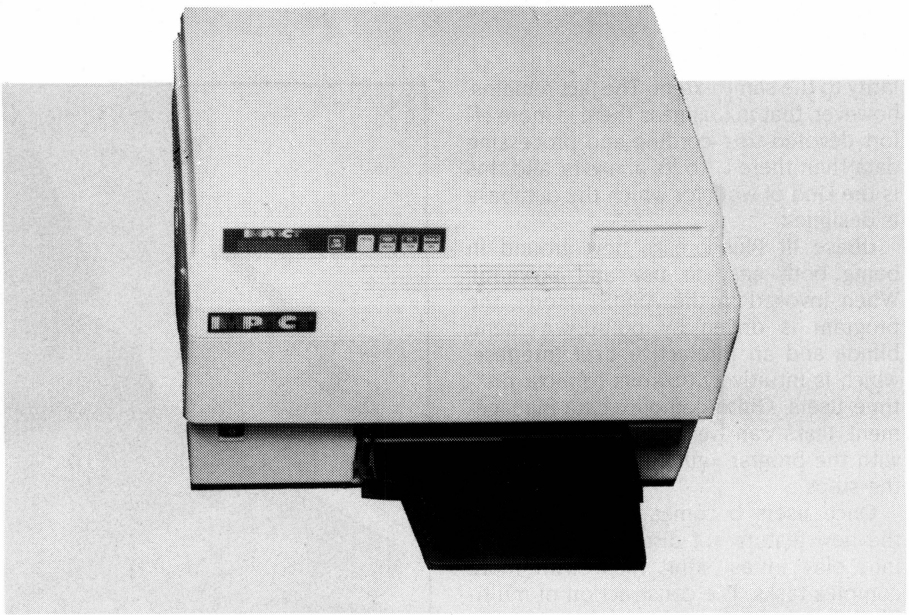
The Microsoft C V4.0 compiler generates good, fast code reliably. But if you should have bugs, then the Codeview debuggerwhich comes as part of the package is an enormous help intracking them down. This mouse-driven debugger allowssingle-stepping through source code, with simultaneous display ofvariables, multiple breakpoints, disassembly with interlacedsource, display of processor registers, and is incredibly easy touse.

Add to this a selection of utilities for modifying .EXEfiles and a MAKE utility and you have a very comprehensive package for large-project development.

Irrelevant

As a frequent traveller with an addiction to computers, I used to suffer withdrawal symptoms when away from the office and unable to update spreadsheets, databases and other files. For a long time I hunted for a solution to this problem.

For a long time, I used a Kaypro II, a sturdy metal clunker of an 8-bit machine. It stood up well to being thrown into the back of Fokker Friendships, car boots and all kinds of other places, and served well as a general office machine as well. But as we made the transition to MS-DOS, it



gradually became, well, *irrelevant*.

I looked at a variety of portable and transportable machines: the HP-110, the HP Integral, Compaq's various machines, the Data General DG One, the Toshiba 1100. None offered everything I needed: IBM compatibility, high-resolution high-contrast screen, and 10 Mbyte (at least) mass storage.

Cute, Powerful and it Works

Finally, however, I have found a machine which meets my needs: the Toshiba T3100. This machine is a clone of the IBM PC AT, in a lap-top clam-shell format. It's heavier than your typical lap-top, but that's not a problem. The machine is not intended for lap-top use, as it requires a mains power supply, but that's not a problem. This is a powerful machine designed for those who travel from office to office to hotel room — wherever mains power is available.

Unlike liquid-crystal displays, which are often difficult to read under poor lighting conditions, the T3100's red plasma discharge display is readable under virtually all conditions. It boasts 640 by 400 resolution, and when operating in text mode, has a particularly pleasing character set.

The T3100 has an 80286 processor operating at 8 MHz, with 640 Kbytes of memory (not sure at this stage how many wait states). A further 2 Mbytes of memory can be added to the machine, making it ideal for large spreadsheet work or databases using large VDISKs.

The major benefit of the 3100 is its built-in 10 Mbyte hard disk. Mine is fully loaded (and then some — it's currently covered with C compilers). A hard disk is more than a convenience feature these days — it's indispensable.

The keyboard of the T3100 has 81 keys, and is a bit restricted compared to the new XT2 and AT2 keyboards. The major lack is of a separate numeric pad — especially the plus and minus keys, which are used by Framework, for example (not to mention Flight Simulator). However, various means exist for accessing the missing keycodes, and we can usually work around them.

Other neat features include a built-in serial port, parallel port (doubles as external floppy disk controller), colour graphics adapter, and an expansion port which will (real soon now) accept a multi-standard modem.

The whole machine is unbelievably cute, unbelievably powerful and works incredibly well.

I've had my machine for four weeks now, during which time it has racked up over 20,000 kilometres. I've used it in London, Amsterdam, Stockholm and Sydney, and everywhere I've gone it has attracted lots of interest. I know of a number of large organisations, including one large UK insurance company (it's buying *thousands* for its agents), which are buying them.

Nobody, but *nobody*, fails to be impressed by this machine.

Management Technology Education Supporting PCs Seminar

(*Those readers who disapprove of blatant self-promotion should stop reading now. We disapprove too, but in this case* Les *is making a valid point — ed.*)

A favourite purchase of several thousand companies in Australia and around the world is Management Technology Education's three-day seminar on 'Supporting Personal Computers'. The reason is simple: personal computers have virtually run amok in many large corporations, and are often outside the control of the data-processing department.

As a result, many companies' experience with personal computers has not been 100 per cent favourable; in fact, in the majority of companies, PC usage is both ineffective and inefficient. Senior DP personnel were slow to realise just how much support end users would require, and just how complex PCs are.

The Supporting Personal Computers seminar addresses the key issues which must be resolved to effectively implement and support personal computers throughout an organisation. Day one covers management issues, such as implementation of a personal computer policy, equipment selection guidelines, establishment of a PC Support Group and various issues encountered by PC support staff, such as getting support from suppliers.

On following days we progress to discuss software selection techniques, the major software packages, operating systems, software development, hardware selection, hardware trends, hardware upgrades, asynchronous and synchronous communications, networks, and miscellaneous support techniques, such as installing PCs and DOS, writing batch files, recovering deleted files and standard maintenance procedures.

Delegates receive almost 600 pages of course notes — a kind of 'enquire within on personal computing' — which they can use for reference after the seminar, together with a floppy disk of useful software.

A good time is had by all, since discussion ranges widely, both during the formal sessions and during coffee and lunch breaks. Case studies really get debate going, and provide delegates with an opportunity to present their views and experiences.

To date, several thousand companies around the world have sent staff on this course, making it a favourite corporate purchase. And of course, this pleases me no end, because the course designer and presenter is, of course, yours truly. □

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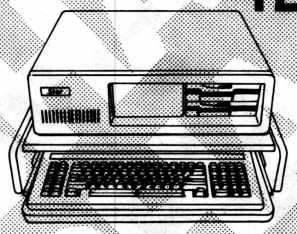

4.77 to 8.77 MHz (Hardware switchable), 8087 socket, 8 extension slots. 640K RAM, serial port, parallel port, games port, clock calendar/battery B/U, colorgraphics card, floppy drive card, 2 x 360K drives, 135W power supply. (Desk not incl.).
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AT LAST! AT BEST!

Performance is really the name of the game in the business micro market these days. While IBM's AT may have started it all, it has quickly been eclipsed by the imitATors. And, says Matt Whelan, you could be forgiven for thinking you needed a pilot's licence for at least two of them . . . two which, naturally, made it onto his list of the top ATs of 1986.

IF YOU THINK I'm power-hungry, you are right . . . but it may surprise you to know that two of my selections for the pick of the ATalikes of 1986 don't even make it to the top ten in the performance stakes.

I'm a little shell-shocked after a year of comparing the fastest micros around; picking the leading five was no easy task. Despite my bias, I knew the choice had to be based not only on performance, but also on design features and value for money.

That's why the Texas Instruments Businesspro was one of the first machines on the list — it ranks a seeming lowly fourteenth on our performance chart, but is such a clever, integrated and well-engineered design it could not be overlooked.

The Televideo Telecat 286, though ranked eleventh on the fleet-sheet, was the next to get the nod — simply for its sound engineering and value for money. And that was before we discovered Data Peripherals has a big shipment of the Telecat available 'on special' at a stunning less-than-$5000.

Also getting the nod on the basis of bang-for-the-buck is the Osborne SP, tested only last month. It's our fifth-fastest performer overall, yet can be had for $6000 complete and ready-to-run, including a 44 Mbyte *fast* hard disk.

The Osborne ousted the locally assembled Video Technology machine, my favourite of the December issue contenders, purely on the basis of price.

My final selections, it may not surprise you to know, were two of the hottest machines we've seen.

Speed Killers

The world's fastest PC? We asked ourselves that question after testing ITT's astonishing Xtra XL, which blitzed all the performance stars of our previous AT tests.

There was little doubt, according to our sizzled stopwatches. So we photographed it for the cover of that issue (September 1986), and asked our readers the same question. We should have known better in this fast-changing world of superchip PCs — for no sooner had the ITT wheelspun its way across our desks than the jet-propelled, *Australian-built* Earth Computer Systems Eclipse blasted its way to the top of our performance charts.

Was it over? No! The ECS could only hold its place for a few weeks before it too was blitzed — by yet another ECS release, powered by a 12.5 MHz version of the 80286 processor.

With this sort of rewrite of the performance rules, you might expect the ITT to drop from sight — but it's still the top overall performer in the category. As a multi-user machine it outclasses its opposition with mini-killing performance.

On our single-user DOS benchmarks, however, it has to settle for a close third to the two hotshot locals.

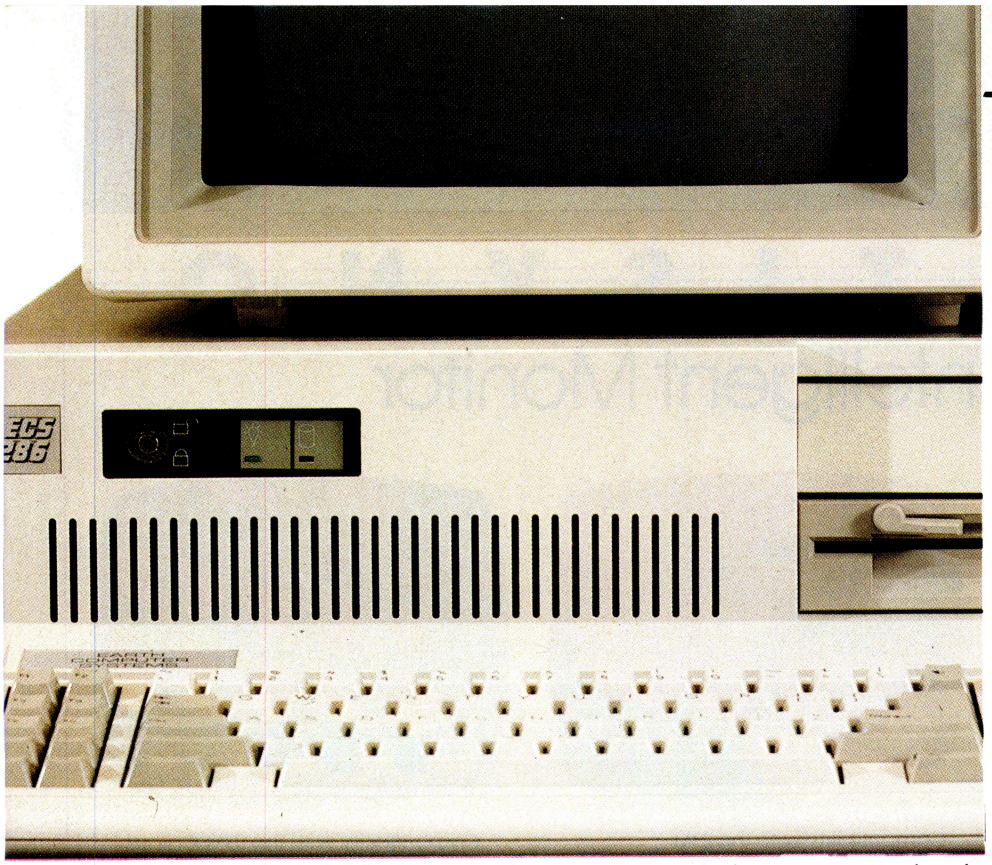
Performance Redefined

Our AT tests have always been about performance, but the latest contenders seem to have redefined the word. However, all the machines tested in the past year have been quick enough to make the PC user drool. Here's how they shaped up, test by test:

January: Our first comparison showed just how much opposition IBM would face during the year — It was blitzed by the NCR PC8, the TI in its 'Turbo' mode, and the Compaq 286.

All three were close. Despite the NCR's performance advantage, the amazing TI was my money-is-no-object choice.

May: The Archives Micro Five emerged a clear winner after the May issue second-round, ahead of a respectably quick but outclassed group which included Presi-



dent's AT, Hewlett-Packard's Vectra, and Sperry's PC/IT.

The Archives machine had enough sting to stay with the leaders right up until the end of the year — even though it gave a less-than-its-best performance because of a cluttered hard disk.

September: The adrenalin was really flowing in our stopwatch hand in September as we uncovered the great speed challenge — ITT's machine running away from the pack only to be zapped by the ECS.

These two stole the limelight from the otherwise deserving, and always delightful, Hypec Lingo AT and Telecat 286.

November: The revamped ECS machine (actually an XT clone rather than an ATalike!) stormed to an unassailable lead, leaving the fast-and-solid DSE Multitech 900 and the NEC APC IV in its wake. Bringing up a still-respectable rear were the Sanyo MBC 990 and Ferranti PC2860-AT.

December: Video Technology's AT snuck past the ITT to take over second place overall, beating Keller Automation's Micro 10, the Osborne SP, and Sperry's new baby Micro/IT.

These machines took over four of the top six performance places, at a price that re-defined the concept of value-for-money at the top end of the market.

Two Dozen Plus, Plus

We've said on occasions there were too many ATalikes hitting the market for us to keep up — nothing's changed. Our review tally has passed 24 and we're still at least two behind what's actually available in showrooms (which is always quite different from the number 'released').

However, of the ones we've benchmarked so far, these are our current carefully considered selections:

ECS Eclipse: This machine isn't even an AT clone — it's designed as a superfast XT (the idea is to ensure greater compatibility with the range of standard PC software). Its 12.5 MHz, no-wait-state 80286 processor makes its resemblance to an XT purely imaginary, however.

The Victorian-produced ECS machine has been designed as the 'ideal vehicle' for engineering and Computer-Aided Design (CAD) applications, or single-user situations where speed is vital.

If it's not fast enough for you, fear not — the company is already working on yet another 'higher-performance' version!

The Australian company has what is clearly the fastest micro available here, apart from the new-generation Compaq 386 (and it even beats that on three of our tests!). It makes *all* the ATs we've tested look positively pedestrian.

The first ECS ran rings around its imported opposition, with only the high-powered, high-priced ITT Xtra XL coming even close to its figures. The new machine rewrites personal computer performance standards, and moves clear of the pack into a class of its own.

The ECS is purpose-built for CAD applications, running the high-resolution Enhanced Graphics Adapter, a numeric co-processor, and a fast 40 Mbyte hard disk. Since our first test of the ECS, we've had a few reports in from owners who seem very happy with their choice (and very proud of its performance!).

ITT Xtra XL: STC is justifiably proud of this machine, which is one of the real quality products in the marketplace. It looks, and feels, solid, well-thought-out and well-engineered.

Like the Archives Micro Five, it is basically a purpose-built multi-user machine. Its design goes well beyond the AT, employing most of the available techniques (high-speed memory, disk-caching, high-speed disk access and so on) to extract superior performance in the multi-user situation.

And it goes even further with the provision of intelligent input/output controllers which allow a 16-user Xenix configuration with, according to STC, no system degradation at all. The eight-port cards carry their own 80186 processor, which takes the I/O burden off the main processor, freeing it for the serious work.

Televideo Telecat 286: The Televideo features one of the most individual designs of the group. The most obvious difference is the size of the system unit, which is not only far more elegant than the 'standard AT box', but also fits into a footprint around 60 per cent the size.

The company had to play some tricks to achieve the size reduction. The biggest problem with downsizing one of these machines is usually the restricted access to the motherboard — Televideo has handled that one neatly by allowing it to slide out from underneath the disk drives. The hard disk is mounted vertically at the side of the case, which means the space for a second floppy or hard disk drive, or tape back-up unit, is still available under the single 1.2 Mbyte floppy.

The Telecat also lost some expansion slots in the trimming exercise: it has five, compared to IBM's eight, but has serial and parallel ports built into the motherboard, and can take up to a megabyte of RAM without add-on cards.

Osborne SP: There was little about our test Osborne to make it stand out from the crowd — until we fired it up! The SP stands for Special Performance, and it does . . .

In fact, the machine we tested was a prototype mounted in a very standard, boring AT-clone case — the production model will feature a much more stylish tower-mount casing.

As we said last month, it matters little how the Osborne looks — its price/performance balance is outstanding.

TI Businesspro: The 6 MHz Texas Instruments machine is quite different to

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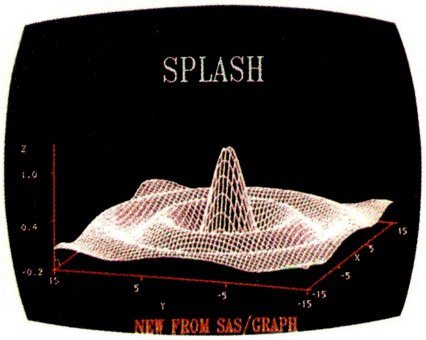
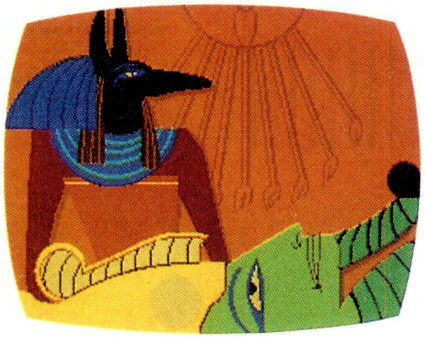
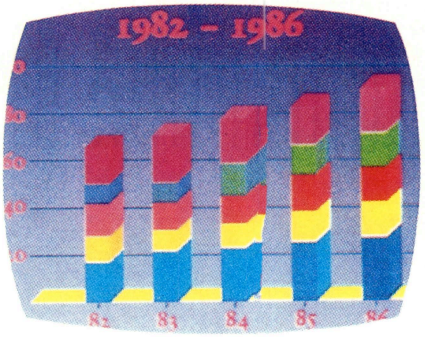


Compatibility with the IBM Professional Graphics Adapter Board



Compatibility with the IBM Enhanced Graphics Adapter Board



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- MultiSync has a maximum horizontal resolution of 800 dots and a maximum vertical resolution of 560 lines for superior clarity of display.
- MultiSync offers both TTL and ANALOG signal inputs, and in the ANALOG mode can display an unlimited palette of colours depending on the graphics board and software being used.
- MultiSync features a TEXT SWITCH with a choice of seven colours (red, blue, green, cyan, yellow, white and magenta) displaying word processing, spread sheets, databases or other software in crisp alphanumeric text on a dark-bulb black background.
- MultiSync has a 35 cm (14″) diagonal tube and a large, 250 × 180 mm (W × H) viewing area.

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Dot Pitch	0.31 mm
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Level	TTL or analog
Sync.	TTL positive/negative, separate or composite analog composite or Sync. on green
Terminal	D-Sub 9 pin
Synchronisation: Horizontal	15.5 kHz – 35 kHz
Selection	Automatic
Vertical	50 Hz – 60 Hz
Resolution: Horizontal	800 dots (max.)
Vertical	560 lines (max.)
Bandwidth	30 MHz (3 dB)
Display Colours	8/16/64 in TTL mode Multicolour in analog mode
Active Display Area	250 × 180 mm
Misconvergence	Less than 0.6 mm
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Power Consumption	78 W max.
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NEC MULTISYNC

the usual AT design, although it follows the same basic theme.

First, it is obviously designed to sit upright beside the desk rather than on it as a monitor support — the way all these too-big 'desktops' should be used. A bolt-on stand is provided as standard on the TI, and the drives are mounted so they'll be horizontal when the machine is stood in a tower configuration on the floor.

The second obvious difference is the rear panel — while most machines slavishly follow IBM's standard of providing eight expansion slots, the TI has 14. This external difference hints at major internal variations — the TI is a cleverly designed machine, and fits a whole lot more into the package than the others.

You don't even have to use the expansion slots when you add memory to the TI, as it has an extra board which slides in from the front of the machine, straight into a special connector on the motherboard; it can carry 3 Mbytes of RAM. Also, there's room for no less than six half-height drives, four at the usual right-hand (or top) end of the case, and two more on the left.

The TI monitor and keyboard carry on the design brilliance. The monitor has its own tilt/swivel stand, and carries a volume control for the speaker mounted in the system unit. In the front of the monitor base, at either side, are sockets for the keyboard and mouse connectors — thoughtfully interchangeable, so left-handers can mouse it up in comfort.

The keyboard has a tiled design — if you lift any of the tiles (using the tool supplied, which sits in a slot of its own underneath the keyboard) you find working key movements. You can move the key loca-

Against The StopwATch, Again

PERFORMANCE is what the AT is all about — and it's the one area in which most of its competitors seek to outgun it — so *that* formed the basis of all our comparisons. To ensure we had consistent, comparable results across the range of machines tested, we retained an identical set of benchmarks throughout the year's testing. For those who missed the original stories, here are the details of the performance tests used.

Lies, damn lies, statistics . . . and benchmarks. Benchmarks can be misleading, we know, but in the case of a direct comparison of such similar machines we consider any measured test a valid indicator. We didn't set out to create special benchmarks to test the ATs — we simply put together a collection of tests we've used before and added a few that happened to take our fancy at the time.

Our tests measured straight processor speed in only two cases (to give us an idea how the different versions of the 286 compared), and in the others measured overall performance in typical user situations. The tests were:

■ **BBBMark** — Boring, BASIC Benchmark isn't really what it stands for, but it will do. It's a straight do-almost-nothing loop in Microsoft BASIC which tests the processor's ability to run around in circles. It goes like this:

```
10 FOR I=1 TO 10000
20 A=A
30 NEXT I
```

■ **CBSieve** — a compiled CBASIC (Digital Research's CB86) version of old faithful, the Sieve of Eratosthenes. You'll usually see the Sieve benchmark written in C, occasionally in MBASIC — we just happened to have a CB86 compiler for the ATs, and no C compiler at the time. It doesn't really matter for the sake of our tests, but you can't compare these Sieve times with those in other languages on other machines.

■ **Lotus** — a three-stage test using one of the most popular PC packages, Lotus 1-2-3. We timed the machines loading a 300-Kbyte-plus file, recalculating it, and saving it to disk again. The spreadsheet contents were meaningless, simple calculations duplicated in blocks until they filled the available memory of the 512 Kbyte AT.

■ **dBase** — another three-stager, used often by Les Bell to compare the overall speed of test machines. The results of this test can't be compared to our previous dBase benchmarks, however, as we used the new Version 2.43* and made the test five times as long. The first stage of this test measures computation speed, the second a combination of CPU power and disk I/O, and the third measures straight file handling and disk accessing.

■ **Doit** — Just something we needed to do for the other tests, so we made it a test on its own . . . our Doit batch file loaded three quarters of a megabyte of files onto the hard disk from the AT's 1.2 Mbyte high-speed floppy, from three subdirectories on the floppy to three newly created subdirectories on the hard disk. This gave us a measure of floppy-to-hard-disk transfer speed.

We measured each machine several times on each test, and drew up a chart of the results. In the first comparison we rated each of them on the results, and drew up a performance grading chart. The rating system was simple — the fastest machine on that particular test got 100, and the others were given points that amounted to their time expressed as a percentage of the winner's. This system seemed less valid the second and third times around, when we wanted not only to compare the machines in the individual test session, but also rate all of the ATs tested against each other.

So from the second comparison we instituted a system of rating all the challengers against the 'standard', the IBM AT. We compared each machine's times against the AT and rated them as a percentage of the IBM. Thus a machine with similar performance to the AT would show up as 100 per cent, one with 20 per cent better performance would show up as 120 per cent, and so on.

On the first test we had the NCR machine for a short time only, and missed the Doit test on it. We decided to give it an 'estimate' for this test so future ratings charts (including this issue's one) can give a complete overall rating to the other machines. The estimate was based on its performance on the other tests, and took into account its strengths and weaknesses.

All the machines were set up as similarly as possible for the tests. Where possible their hard disks were formatted and loaded with exactly the same files, in the same order. We ran the tests in the same order on each as well. □

tions around to suit yourself! (Although at the time of testing, the software required to redefine the keyboard didn't yet exist).

Screening Ahead

In the earlier tests we noted manufacturers like Texas Instruments and Hewlett-Packard weren't content to be 'limited' by the IBM standard, electing instead to provide standard-equipment 'extras' like high-resolution video controllers.

Later groups of test machines showed this trend was accelerating — most now provide multi-mode or high-resolution video as standard. Of our top five, only the Osborne comes without an EGA-style high-resolution colour screen.

The ITT came with a dual-mode graphics card (colour graphics and monochrome text outputs ran through separate cables to the dual-mode monitor).

The ECS sported a Digicom Digis-1000 Enhanced Graphics/Printer adaptor, which provides the three IBM modes — monochrome display, colour graphics and enhanced graphics adaptors — as well as the Hercules mono graphics mode.

The Televideo had just the sort of screen we would expect of a company which made its name selling quality terminals — a 14-inch high-resolution non-glare display with a high-resolution controller. It well and truly lived up to the company's reputation.

The TI is able to 'downgrade' to the IBM CGA standard but also runs a TI-PC compatible high-resolution mode that is very impressive.

Multi-Speedsters

Multi-mode processors are the order of the day as much as multi-mode video cards — all but one of our top machines came with switchable processor speeds.

The ITT allowed three-way switching, between 6 MHz (the IBM standard), 8 MHz with one wait-state, and 8 MHz with no wait-states. Two speeds can be selected as 'standard' using the set-up program — a default speed (usually the fastest) and an alternate speed (usually the slow IBM-compatible speed). Once selected, these can be toggled at the keyboard.

ITT describes the ability to select 6 MHz as 'complete backward compatibility'.

The Televideo runs 8 MHz with one wait-state as its fastest speed, and allows a change to the IBM speed through a switch mounted at the rear of the machine — a less-convenient, but still useful, arrangement.

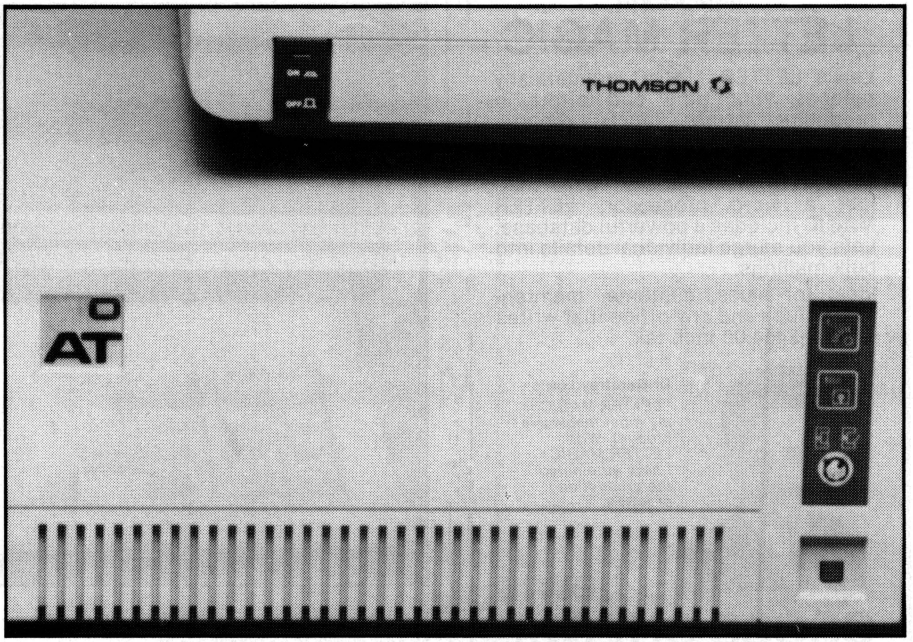
Because of its lack of switchable speeds, the only stand-out compatibility problem was with the ECS, which is just too fast for Softguard's Superlok copy protection scheme. We were unable to install dBase III Plus (the protected version 1.0; unprotected it works just fine — another solid argument against this copy-protec-

	BBBMARK	CBSIEVE	Load	Lotus Recalc	Save	dBase II Stage 1	dBase II Stage 2	dBase II Stage 3	DOIT	Issue Tested
ECS 12.5 MHz	3.7	1.75	12.4	3.0	11.7	144	209	228	54.0	November 1986
Video Technology	5.3	2.9	18.0	4.5	12.7	220	249	276	33.5	December 1986
ITT Xtra XL	5.5	2.65	16.5	4.4	13.0	238	267	298	50.0	September 1986
Micro 10	5.5	2.9	20.2	4.7	12.9	223	294	329	42.3	December 1986
Osborne SP	5.3	2.9	22.5	4.4	12.4	222	297	334	60.5	December 1986
Sperry Micro IT	5.6	2.7	23.6	4.6	12.3	221	336	367	65.2	December 1986
MicroFive	5.6	2.89	22.0	4.9	12.9	294	258	353	66.2	May 1986
DSE Multitech	5.5	2.93	22.8	4.5	24.4	224	322	359	64.4	November 1986
NEC APC IV	6.9	3.68	22.5	5.5	13.0	280	331	372	42.7	November 1986
Hypec Lingo AT	6.9	3.69	23.0	5.8	13.0	280	326	366	69.0	September 1986
Televideo Telecat	6.9	3.70	22.2	5.8	13.5	281	366	403	55.0	September 1986
NCR PC8	7.0	3.70	23.3	6.0	14.0	280	315	351	68.0*	January 1986
Sanyo MBC 990	7.5	3.63	23.2	5.9	15.5	303	378	422	40.5	November 1986
TI Turbo	7.3	3.64	23.4	6.0	14.4	307	391	435	46.0	January 1986
Compaq 8 MHz	6.9	3.69	22.5	5.5	13.8	281	434	476	62.3	January 1986
President AT	6.9	3.56	23.5	6.0	14.1	306	382	425	85.5	May 1986
HP Vectra	6.9	3.69	23.2	5.5	23.0	283	472	514	70.0	May 1986
Sperry PC/IT	6.9	3.71	22.8	5.8	25.1	287	393	573	71.3	May 1986
Ferranti PC2860-AT	7.0	3.71	23.5	6.0	24.2	284	458	501	67.0	November 1986
IBM AT	9.1	4.89	23.8	7.7	23.3	378	408	458	57.0	January 1986
Kaypro 286i	9.1	4.89	23.5	7.7	23.5	379	403	452	77.3	January 1986

tion stupidity).

ECS has sent a machine to Softguard, which is looking at the problem. Meanwhile buyers who want the fastest machine in town also need a copy program like Unguard, because the only alternative is having ECS slow the machine down (which it will do if you're silly enough to ask . . .).

We still regard this as a flaw in the machine — switch-selectable speed would be the ideal solution.



A Few ObservATions

I won't go into a blow-by-blow description of our performance testing (you can see for yourselves in our performance charts, which cover the leading 21 machines), but will make a few observations on the behaviour of the top five.

The obvious bits first: the ECS and the ITT really are rocketships. However, there are very few applications where you'll no-

	BBBMARK	CBSIEVE	Load	Lotus Recalc	Save	dBase II Stage 1	dBase II Stage 2	dBase II Stage 3	DOIT	% of IBM
ECS 12.5 MHz	245	279	191	256	199	262	195	200	105	215
Video Technology	171	168	132	171	183	171	163	165	170	167
ITT Xtra XL	165	184	144	175	179	158	152	153	114	159
Micro 10	165	168	117	163	180	169	138	139	134	153
Osborne SP	171	168	105	175	187	170	137	137	94	150
Sperry Micro IT	162	181	100	167	189	171	121	124	87	145
MicroFive	162	169	108	157	180	128	158	129	86	142
DSE Multitech	165	166	104	171	95	168	126	127	88	135
NEC APC IV	131	132	105	140	179	135	123	123	133	134
Hypec Lingo AT	131	132	103	132	179	135	125	125	82	128
Televideo Telecat	131	132	107	132	172	134	111	113	103	127
NCR PC8	130	132	102	128	166	135	129	130	83	126
Sanyo MBC 990	121	134	102	130	150	124	107	108	140	125
TI Turbo	124	134	101	128	161	123	104	105	123	123
Compaq 8 MHz	131	132	105	140	168	134	94	96	91	122
President AT	131	137	101	128	165	123	106	107	66	119
HP Vectra	131	132	102	140	101	133	86	89	81	111
Sperry PC/IT	131	131	104	132	92	131	103	79	79	110
Ferranti PC2860-AT	130	131	101	128	96	133	89	91	85	110
IBM AT	100	100	100	100	100	100	100	100	100	100
Kaypro 286i	100	100	101	100	99	99	101	101	73	97

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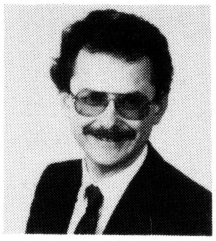

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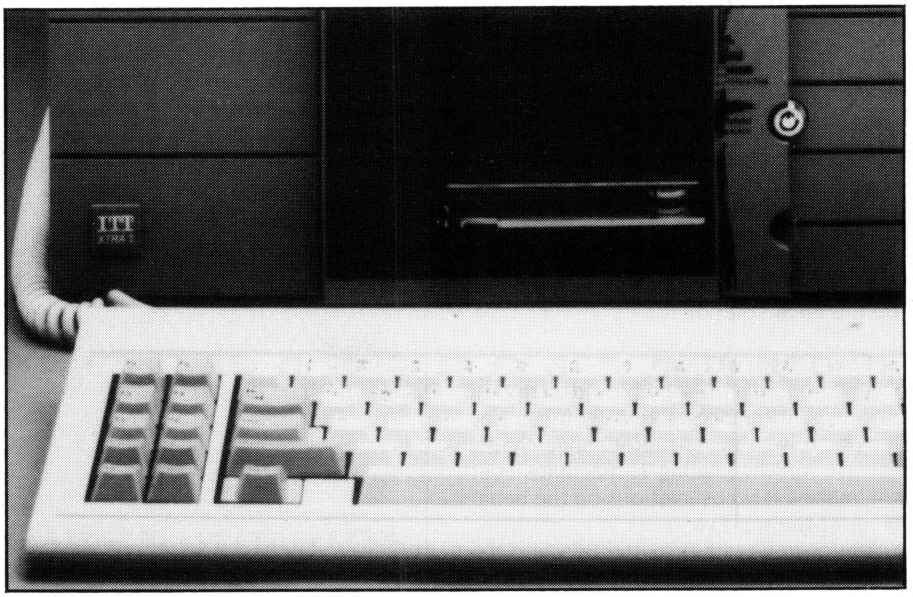

tice the difference — right down to the TI, these machines are *f-a-s-t*!

The Telecat's excellent overall performance was all the more impressive when you consider it runs a relatively standard hard disk — in contrast, we could hear the telltale sound of (high-speed) voice-coil actuation on virtually all the top-line machines.

The Televideo result is an example of what a little careful tuning will do for standard components — when Televideo goes to a faster processor and voice-coil drives I want to watch its maiden flight!

See Your Bank Manager Today

You'll need to if you want to buy an ITT — the price of that engineering excellence and performance tuning isn't cheap. STC admits the XL price is a little 'heavy' for a single-user desktop machine, but has never considered that to be its market.

Instead, it sees the machine as a network master or, more often, as a high-performance Xenix multi-user machine to rival very powerful minis, and in that role it starts to look like a bargain.

Starting price for the Model I, with 640 Kbytes of memory and a 40 Mbyte hard disk, is around $14,000 — the top-of-the-line Model IV, with 1.64 Mbytes memory, a 72 Mbyte hard disk, 60 Mbyte tape drive and intelligent I/O controller for eight users runs out at close to thirty big ones.

The ECS machine is spectacular in the power-for-the-dollar stakes, retailing at around $10,000 as tested. (ECS can be contacted on (03) 439-4900. The Sydney dealer, who supplied our test machine, is Magic Computers of Harris Street, Ultimo.)

The Osborne and Televideo machines are a relative steal considering their performance. The base version of the Osborne AT sells for around $5000, including monitor and a 20 Mbyte disk drive. The voice-coil 44 Mbyte drive that did so much for its speed on test brings the price up to just under $6000.

Televideo's Telecat 286 was decidedly impressive at its retail level of $6800 for the 20 Mbyte model and $7800 for the 30 Mbyte machine. Both prices include video card and monitor, and are well above the 'special' prices to be had at the moment.

The TI is a little expensive at more then $12,000, but the inspired engineering more than makes up for it.

I Can't Do It . . .

I had enough trouble selecting five machines from an impressive pack — so don't ask me to choose between them.

I loved the ECS machine's speed, but would be just a little nervous about compatibility problems unless I was buying it for the CAD-style applications it is purpose-built for — in that area it would be untouchable.

The ITT and the TI machines were also just my style but, again, I would have to be spending the boss's money before I could stretch to them.

The Televideo and the Osborne have won me, however — at the price they're close to unbeatable. □

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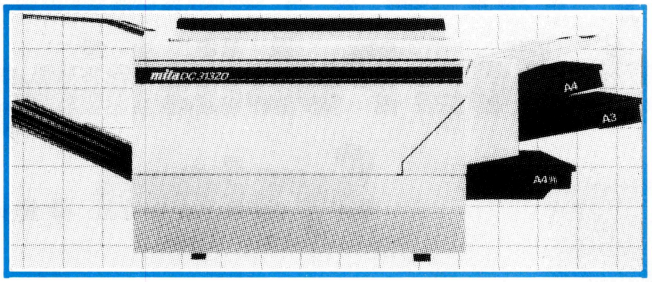

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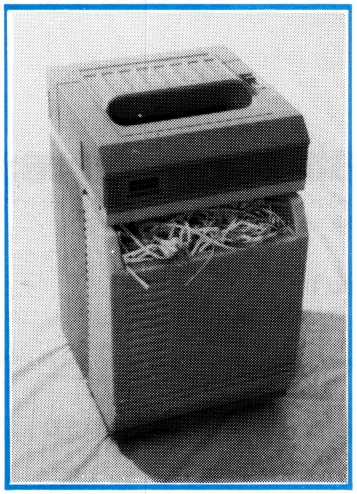

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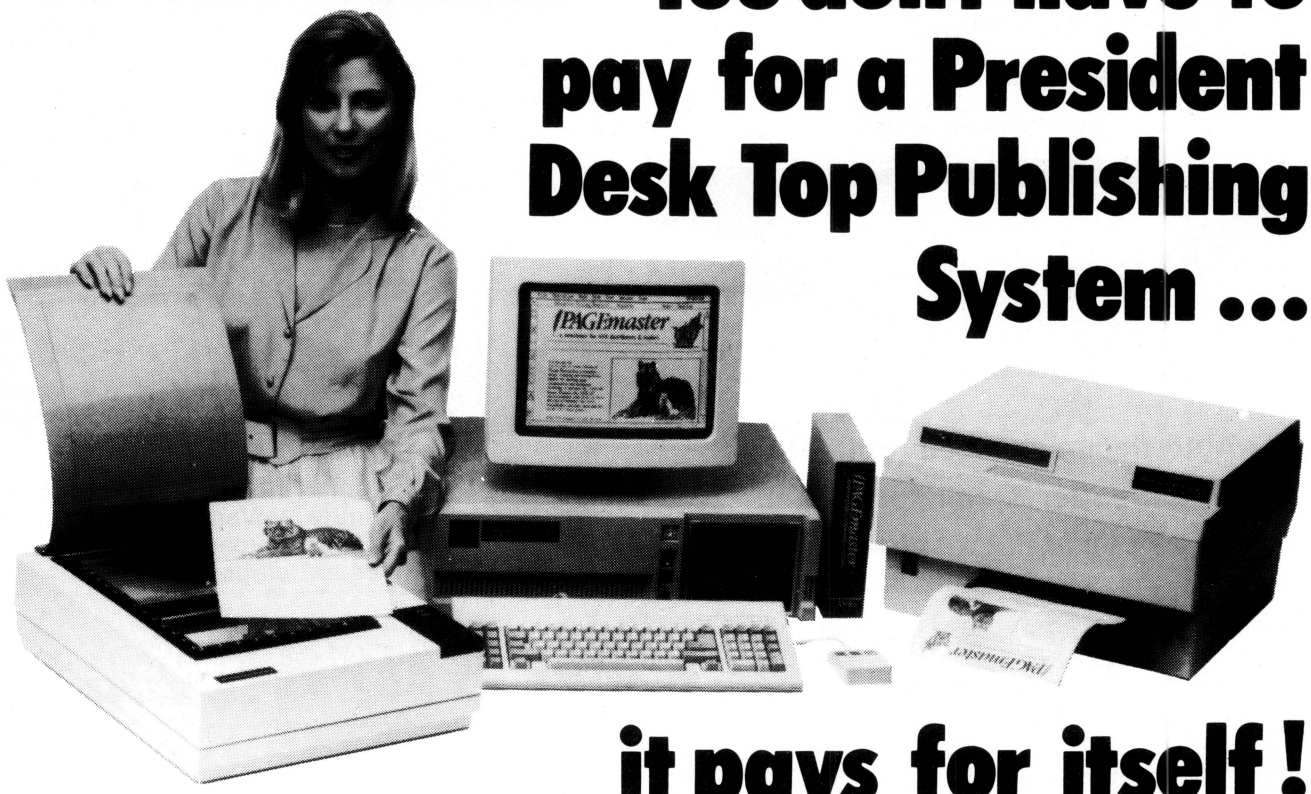

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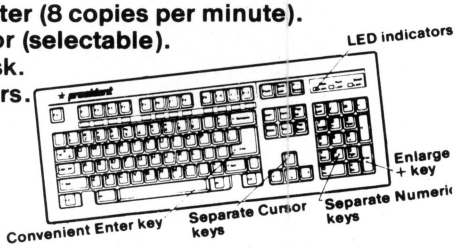

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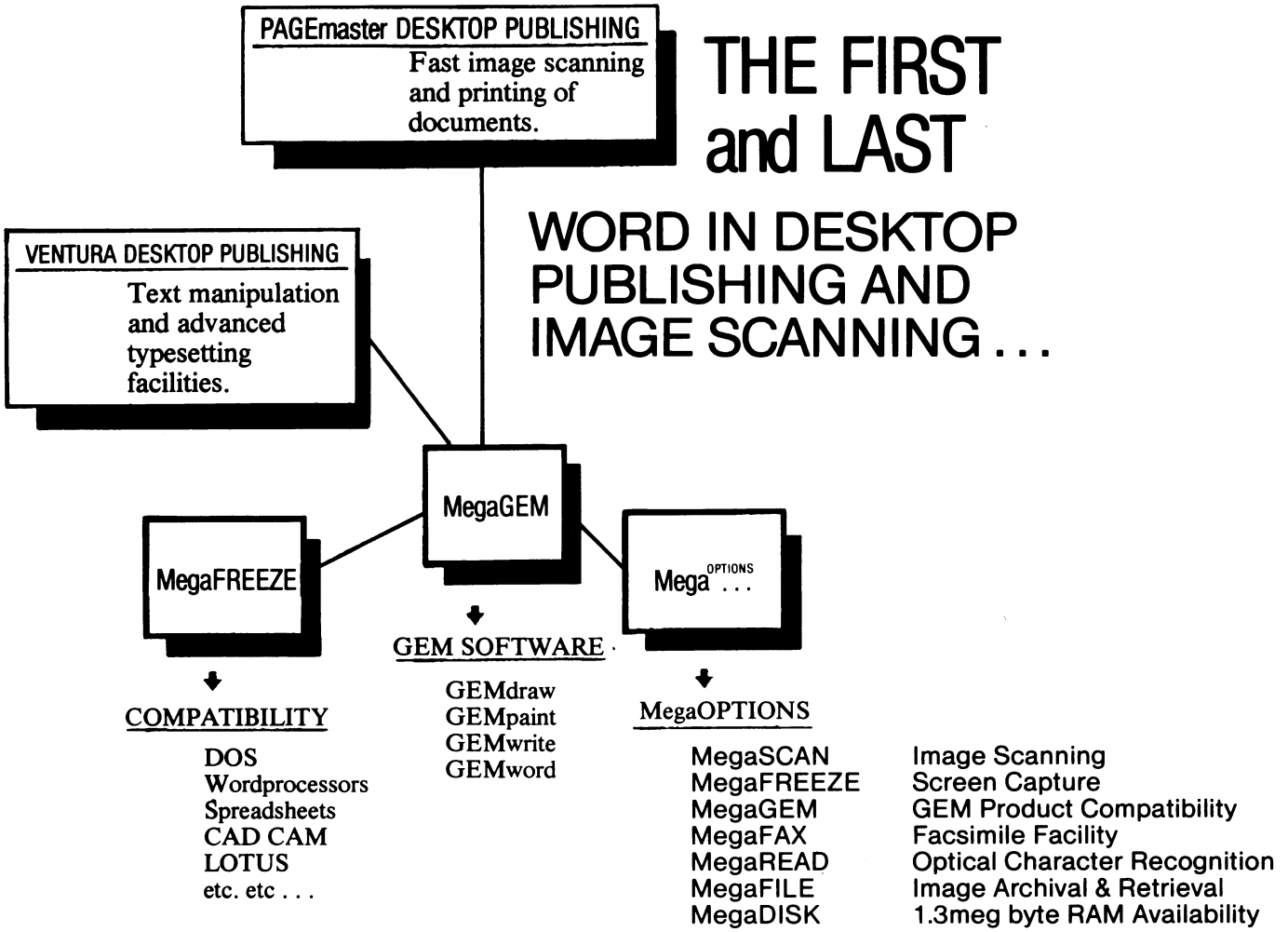

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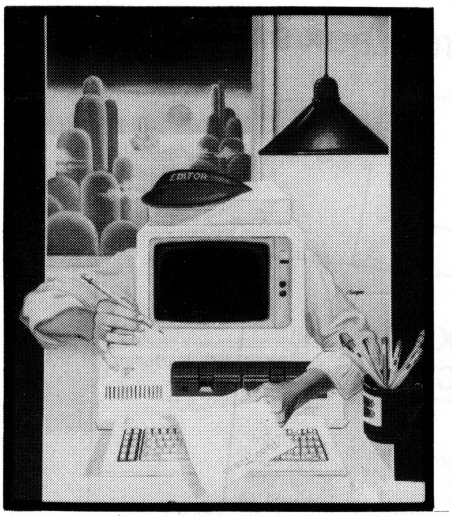
Borland products are everybody's favourite things. Good quality, value-for-money, innovative programs, they come in the modern-day equivalent of Julie Andrews' brown paper packages tied up with string — el cheapo shrink wrapping. When his dog bites, when his IBM stings, John Hepworth simply runs one of his favourite Borland packages, and then he don't feel so bad.

Borland Round-up



THINK OF BORLAND, and what products jump to mind? Turbo Pascal for sure, and Sidekick as well, and Reflex: all hot sellers that have helped boost this young company to number four in the world of PC software sellers. Annual sales currently exceed $A200 million and that's less than four years after Philippe Kahn (75% backed by European finance) founded the company in Scotts Valley, California.

Each of the four years has been an exciting record-breaker for Borland, with imaginative releases and new market developments happening every few months. Two of the most interesting developements for Borland in the last year were the acquisition of Singular Software (Cupertino, California) who had developed Interlace, a relational database program for Apple's Macintosh — now relaunched as 'Reflex for the Mac' — and the joint marketing arrangement made with Toshiba. The US market is now seeing the top-of-the-line Toshiba T3100 sold with both Sidekick and Superkey as standard, and the new T1100 Plus comes with Sidekick. *And*, Borland has put all of its IBM PC-compatible software on 9 cm disks — suitable for use with IBM's Convertible and Compaq's Portable II. (*See John Hepworth's review of the* IBM *Convertible, 'The Little Blue Sportscar', in this issue.*)

But this year, Borland's big news is in Europe: They've gone public on the London Exchange and have fired up an aggressive marketing campaign in the UK and France. The newly appointed Director of European Operations — Alain Bancquart of European MicroPro fame — is aiming to make Borland "Europe's largest microcomputer software publisher."

And there has been a rush of acquisitions aimed at strengthening Borland's hold on distribution — recently they acquired Fraciel, a French software distributor now renamed Borland International France, to give them a base for translating and distribution in that area, and they have bought a larger stake in their sole German distributor (and added the Borland name to the company).

Mention of the Borland name and distributorships brings us to what's happening here in the Antipodes (or not happening, as things stand now). The infighting for the exclusive right to market Borland's money-spinners in Australia started way back in mid-1984 and is still continuing amongst the five local software houses generally considered in the running for the agency. At one time or another, each of them was convinced that it had the business sewn up, but, as one runner summed it up, "[Borland] had a change of plans and told us it was all off."

The only 'committment' that Borland has made to date as a result of all the lobbying from this end, is that they indicated that they have decided to make a decision some time in the future regarding an Australian distributor and that, eventually, they will do the marketing here themselves. With Borland taking **that** (rather indefinite) approach, it speaks *very* well for Turbo Pascal, Sidekick and the rest of the stable that they have gained an active and enthusiastic core of dedicated users. And with *that* approach, it's not surprising that none of the local contenders have been actively promoting Borland — Why should they when someone else might get the agency next week, or Borland might . . . do what?

While there's no winner yet in the Borland stakes, the loosers are the users (and Borland, too!). One industry pundit pointed out that the lack of strong, local support is costing Borland about half of its potential market here in Australia.

How was Borland's winning stable created in such a few years, and how have so many loyal customers been won over? The answer lies in the consistent creation of good products, with good user interfaces, at a fair price.

The stable now includes two languages (Turbo Pascal and Turbo Prolog), tutorials (Turbo Tutor), RAM-resident utilities for writers, programmers and other users (Turbo Lightning, Superkey and Sidekick), source code for applications (Database, Editor, Games and Graphics Toolboxes, and Word Wizard) and a database (Reflex and Reflex Workshop).

Turbo Pascal

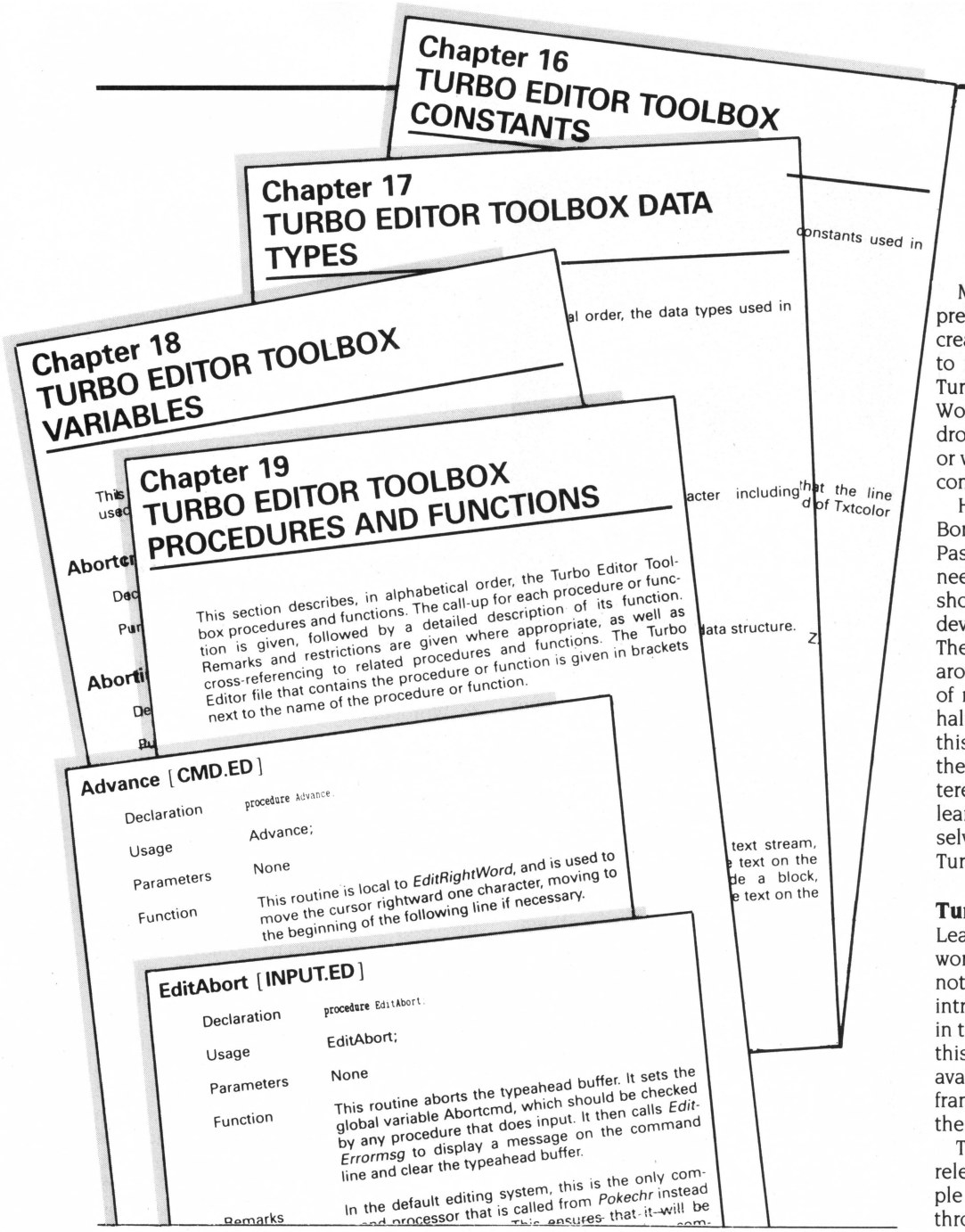
Turbo Pascal was (and is) a revolutionary concept in compilers. Traditionally, compilers are expensive and inconvenient, requiring programmers to use a separate editor to create the source code and then going through a tedious compile and link cycle to produce the final executable program. As a result, many programmers use an interpreter (if available) to develop and debug source code, and only compile when happy with the interpreted results. This is fine if a matching interpreter and compiler are available in the language and dialect of your choice.

The Turbo Pascal system includes in the one program a powerful editor for the source code, using compatible keystrokes to Wordstar, and a fast compiler. If the compiler detects an error in the source code during a compile, it stops, jumps back to the editor, specifies the type of error detected, and positions the cursor at the error. The code can be compiled to disk (so the program is saved and may be run independently of the compiler), or to memory (allowing it to be run from inside the compiler during development). When the code is compiled to memory, run-time errors also cause a jump back to the source code, accompanied by information on the type of error and its position.

Turbo Pascal 3.0 is the current version. It creates only .COM files. Whispers of a future version 4.0 indicate it will offer the option to produce .OBJ modules which can be linked with other .OBJ modules created by Turbo Pascal, C, BASIC, Fortran and so on. In the meantime, the former BCD and 8087 support options are now standard on the MS-DOS and PC-DOS versions, allowing the compiling of programs with reals from 1E-63 to 1E+63 with 18 significant digits, and faster numeric manipulation, respectively.

Turbo Prolog

The other Borland language is the newly released Turbo Prolog. The promise of artificial intelligence has tantalised scores of programmers since the birth of the digital computer. While true artificial intelligence is a long way off, the creation of programs with quasi-intelligence is becoming a reality. Writing such programs in the conventional procedural languages, such as Pascal, BASIC Fortran, Cobol and so on, is nearly impossible. Prolog is a language which promises to make writing expert systems, if not artificial intelligence programs, a lot easier. ▷



The Editor Toolbox Technical Reference (Part IV of the manual) is a almost a toolbox itself — the clear, easy to follow explanations give detailed coverage of the constants, types, variables, procedures and functions available.

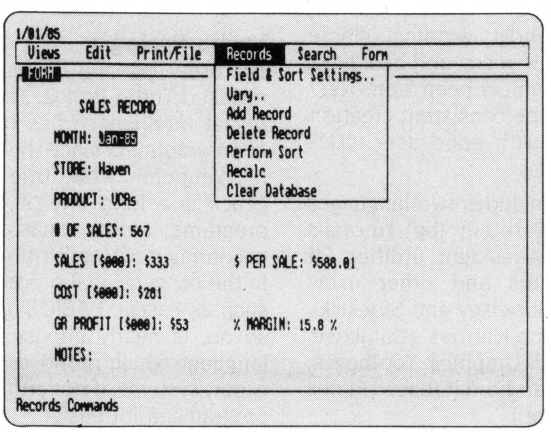
Most Prolog implementations are interpreters, while Turbo Prolog is a compiler, creating either standalone .EXE files ready to run, or .OBJ modules for linking. Like Turbo Pascal, it has a built-in editor, using Wordstar-compatible commands, and drops back to the editor during compiling or while running programs from inside the compiler.

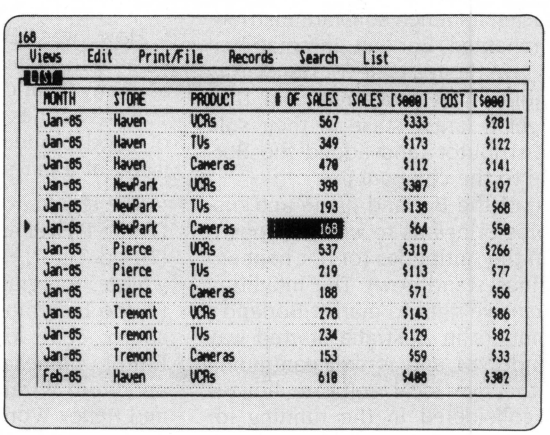
How many copies of Turbo Prolog will Borland sell? The sceptics said of Turbo Pascal that only a few programmers would need such a compiler, and that pricing should be based on covering a lot of development time with a handful of sales. The quality of the product, and a price around 10 per cent of the traditional price of microcomputer compilers, saw around half a million sold. Clearly there are not this many commercial programmers out there — so many copies are going to interested users who want to dabble, to learn, to write little routines for themselves. The same could well happen to Turbo Prolog.

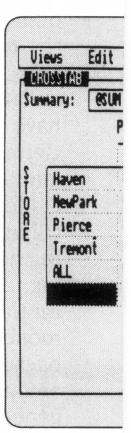
Turbo Tutor

Learning a new language is always hard work, made doubly so when textbooks are not available. When Turbo Pascal was first introduced, there were no specific books in the computer sections of bookshops for this dialect of Pascal. What texts were available were usually based on mainframe implementations, and did not cover the unique Turbo features and extensions.

To partially solve this problem, Borland released Turbo Tutor. Version 1 was a simple paperback book, which lead the user through the skills of Pascal, Turbo style. Packed with sample programs, the book also came with a disk on which were copies of all the programs in the book. Now Version 2 of Turbo Tutor has been







Reflex offers the choice of five different views of the data and can window several of them on the screen at the same time.

Borland Round-up

released. The book has nearly doubled in the number of pages, the writing style has been refined, and now two disks are included. Even better, one of the disks is an interactive hands-on tutorial.

Source Code

One of the best ways to learn any language is to see examples of good source code. One of the fastest ways to speed up a project is to have a range of modules or subroutines pre-written for specific tasks, which can be grafted onto your own programs.

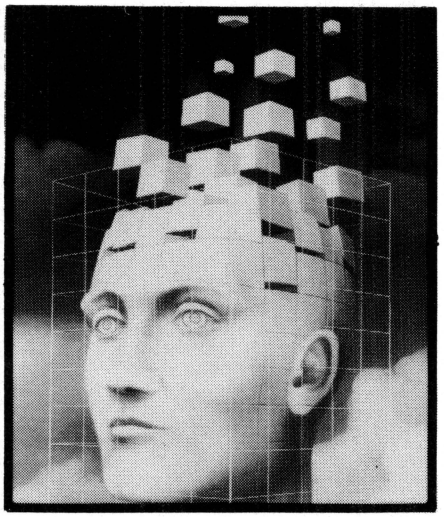
The four Turbo Pascal toolboxes offer a fantastic collection of prewritten routines and programs —

Editor Toolbox creates a Wordstar-style word processor (in a somewhat pared-down form). The manual starts with a tutorial on design and implementation of word processors, and then describes each subroutine on the disk with comments on usage and how to include it in your own programs. These routines are not limited to use in word processing. Say you're writing a database report routine and want to word-wrap a field down a column of a report. Routines in the Editor Toolbox will help this and many other tasks.

Graphix Toolbox is similar, making easier the writing of graphics routines which will be portable (at source code level) between machines with Color Graphics Adapters and Hercules boards. Windowing, window copying, curve fitting and many other tricks are supported.

Gameworks gives an insight into the programming of Chess, Bridge and Go-Moku. Source code and executable files for these games are provided.

The Database Toolbox includes B+ tree routines and QuickSort routines, ready for



inclusion in your database program. It even has a compact and ready-to-run database included for demonstration purposes. The Database Toolbox also has a general-purpose installation program for inclusion in your software, allowing the user to select the appropriate terminal configuration for your software and their system.

Word Wizard is yet another toolbox/tutorial. Written in Turbo Pascal, and with source code included, it uses the Turbo Lightning 'engine' to solve word games and crossword puzzles, while simultaneously demonstrating the methods of accessing those Turbo Lightning features.

Sidekick

Over half-a-million users are organizing their desk tops with Sidekick — the program that launched the rash of RAM-resident utility programs now on the market. Sidekick is loaded into memory before another program is run, and sleeps there until either the two shift keys or the Ctrl and Alt keys are pressed simultaneously. Then the other program is suspended and Sidekick takes over the screen.

Sidekick offers a mini word processor, which can also read in a screen display from the suspended application; a calendar with appointments which can be scrolled forward or backwards by months or years; a calculator in hex, binary and decimal; an ASCII table in decimal and hex, which also shows on screen the true appearance of each character; and a dialler. Help is available at the press of a key.

Travelling Sidekick, an add-on program to Sidekick, creates appointments listings and generally takes care of scheduling a professional life, using files created by Sidekick. It comes in a nifty leather-look binder, with a solar calculator and forms for printing out all relevant data.

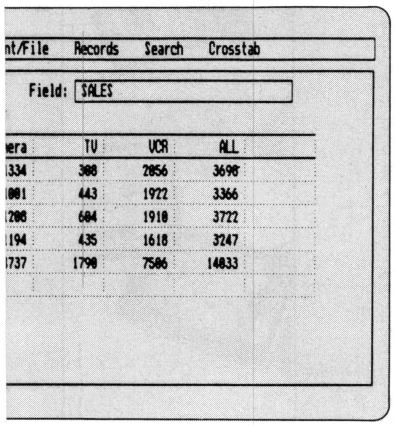
Superkey

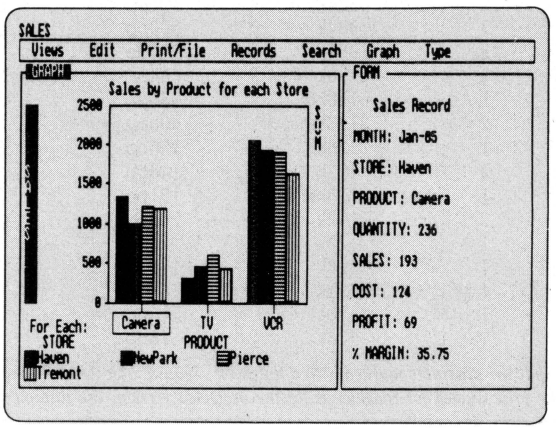
Do you have a program which requires a host of arcane keystrokes to achieve some simple, repetitive action? Then you could be a customer for Superkey, a keyboard enhancer which allows the creation and storage of macros which are invoked at he press of a single key and are seen by the application program as the whole original series of keystrokes.

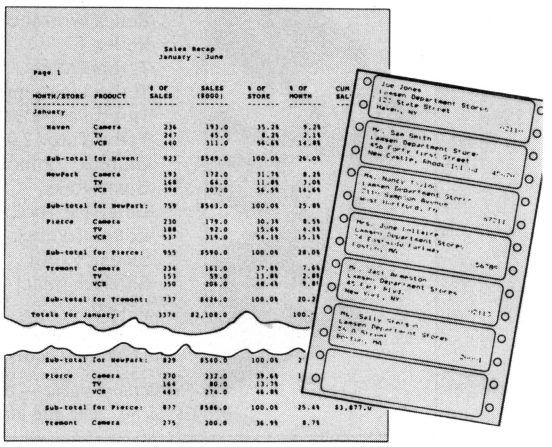
Turbo Lightning

Turbo Lightning is a RAM-resident dictionary/thesaurus which promises to become the 'engine' for looking up all kinds of textual data. Initially it comes with a dictionary and thesaurus, and can do spell checking or offer synonyms. Proofreading can be automatic, beeping whenever you mis-spell a word.

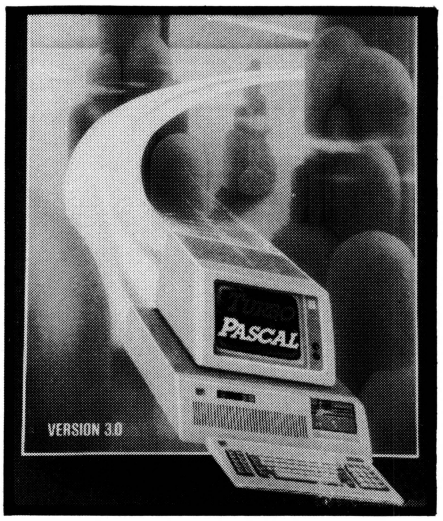
In full screen mode, all words on screen are checked, and unknown words are highlighted. Alternative spellings for misspelled words (or alternative words from the thesaurus) can be selected, and Lightning can insert them into your application as if they came from the keyboard. ▷







Borland Round-up



Lightning is compatible with most word processors, databases and other well-known applications.

Reflex

Reflex is Borland's revolutionary database. A totally RAM-based design, supporting the Intel/Lotus/Microsoft extended memory boards, it offers several 'views' of your data.

The List view arranges records in rows and columns, with each row a record and each column a field. Individual records can be seen one at a time in Form view. They look like cards in a card file, up to 500 lines high and 500 characters wide, and can have field names, prompts and headings selected by the user.

The Graph view demonstrates graphically the relationships between elements of the database. Crosstab analyses data into a table. Say you have four salesmen, each selling to the same four cities; Crosstab could make the columns cities and the rows salesmen, and add sales for salesman A in city B in the database and show the result in one cell, repeating the process for all other combinations of salesman and city.

The Report view is exceptionally powerful, with full and simple control of output format, including all the prompts, headings, subheadings, totals and subtotals that one could desire. Sorting within the database and report are independent, and can be done with multiple keys.

Reflex uses windowing to display more than one view at a time on the screen, and supports either the CGA or Hercules boards — it's exceptional in handling the latter. The program can also read in data files from other applications, including Lotus 1-2-3, Symphony, dBase II and III, PFS, DIF and ASCII. During the translate process the records being imported can be selected by user-defined criteria.

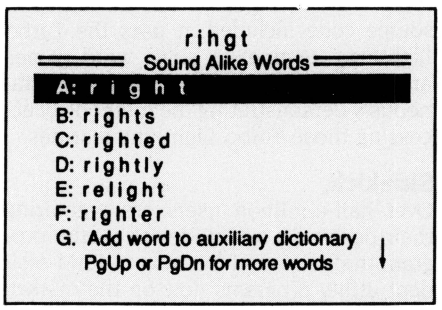
Borland has recently released Reflex Workshop, which supports Reflex with 22 prewritten applications and a comprehensive tutorial. The applications range from financial management to project management to arranging a conference schedule.

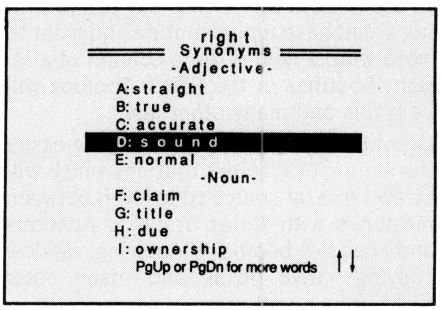
Quality and Value

As mentioned above, Borland is noted for its policy of offering a good product at a fair price, with good documentation. There are no packaging frills to soak up money — the manuals are well-written, well-printed and clear, but they are paperback books to save money on fancy binders, and the disks are merely slipped inside the manual and the whole lot is shrink-wrapped. As a result, pretty well any computer user can afford Borland products — and some, like me, have a copy of virtually everything ever released by the company.

Availability

All Borland products are available for IBM-PCs and clones, and some are also available for CP/M machines and the Apple Macintosh. The products reviewed came from PC Extras, (02) 319 2155; illustrative material was supplied by Software Source, (02) 389 6388, and Imagineering, (02) 662 4499. □





In full screen mode, Turbo Lightning checks the spelling of words as they are typed in — if it doesn't recognize a word, it sounds a "beep" and automatically lists similar words on the screen, allowing either a correction in the text or an addition to the dictionary. And, the thesaurus is just as easy to use.

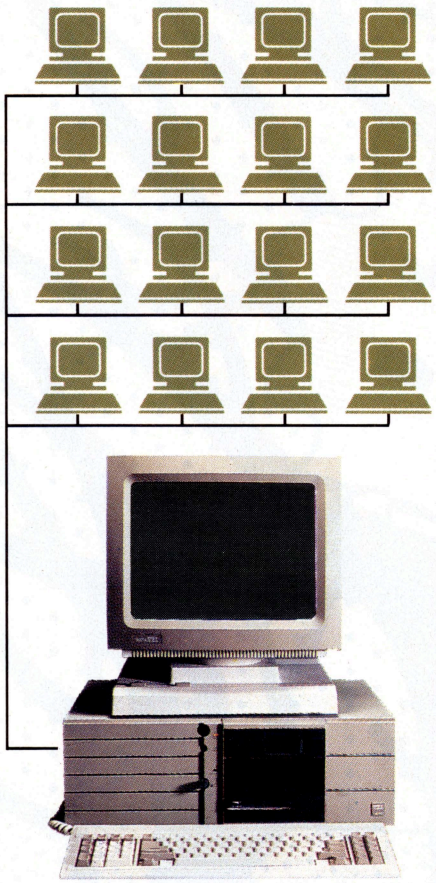


Product	Disks	Memory Needed	Manual Size	RRP (tax inc)
Reflex Workshop	2	384k	406pp	$135
Reflex 1.1	3	384k	500pp	$293
Turbo Prolog 1.0	2	384k	220pp	$15
Turbo Lightning 1.0	3	128k	84pp	$195
Turbo Pascal 3.0	1	128k#	386pp	$200
Turbo Tutor 2.0	2	128k#	408pp	$84
Graphix Toolbox	1	128k	256pp	$135
Gameworks	2	192k	148pp	$135
Database Toolbox	1	128k#	151pp	$135
Editor Toolbox	2	192k	245pp	$135
Sidekick (PC)	1	128k	122pp	$152
Sidekick (Mac)	1	128k	175pp	$152
Superkey	1	128k	165pp	$168
Word Wizard	1	128k	40pp	$130
Travelling Sidekick	1	128k	78pp	$151

The Borland stable — Note that the programs marked with a hatch (#) require 64k RAM if they are run under CP/M-80. Note also, that the price quoted for Sidekick is for the protected version; the unprotected is $110.



MORE BANG, LESS BUCKS.



The ITT XTRA XL* super micro has the performance to match mini computers that cost more than twice as much.

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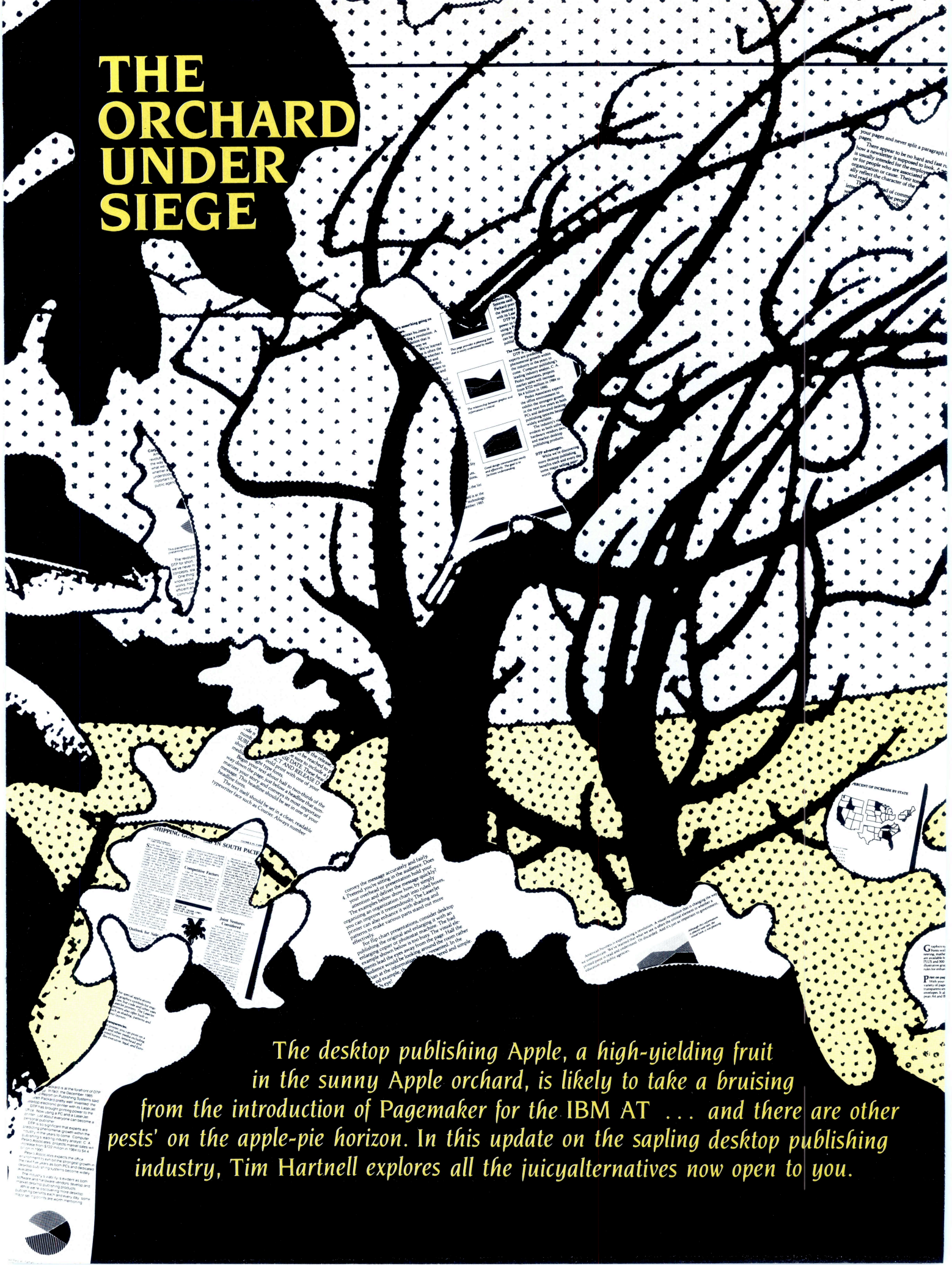
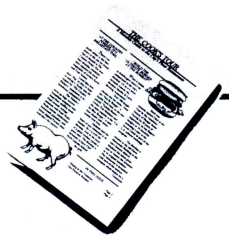
THE ORCHARD UNDER SIEGE



The desktop publishing Apple, a high-yielding fruit in the sunny Apple orchard, is likely to take a bruising from the introduction of Pagemaker for the IBM AT . . . and there are other pests' on the apple-pie horizon. In this update on the sapling desktop publishing industry, Tim Hartnell explores all the juicyalternatives now open to you.



Desktop Publishing

THE WALLS ARE closing in on Apple. After more than 18 months of having the desktop publishing game basically to itself, the PC challenge is starting to be felt.

Steve Clemons is international marketing manager for Aldus Corporation, the folks who brought the world the number-one desktop publishing program for the Macintosh, Pagemaker. He told me recently that the profit reported by Apple in its last financial year was almost exactly the same figure as the amount of hardware sales which Apple told Aldus were created by people wanting to run Pagemaker. In other words, claims Clemons, Apple's recent profit has been due almost entirely to the near-stranglehold they had on real desktop publishing.

Of course, there have been some not-so-successful programs to bring desktop publishing to the non-Macintosh world, such as the ponderously slow Personal Publisher, and the okay-for-school-but-not-for-real-life Newsroom, but until recently, if you wanted to be involved on any meaningful level with desktop publishing, you had to wander into the orchard.

This gave Apple an atypical penetration into the corporate market. Most people who need computers to work with in Australia buy IBM PC clones. Those who needed to do desktop publishing, or wanted access to particular graphics power which was not provided by the clone world, bought a Macintosh. I was one of them. Although I am, at heart, a dedicated PC-person, I bought a Mac, a Laserwriter and the whole caboodle when I wanted to get involved with desktop publishing. I have never regretted it (although the keyboard might win an award as the least-ergonomic device ever invented by humankind). However, if 'real' desktop publishing software had been available for my PC, I'm sure I would have been tempted to buy the software, a much cheaper laser printer than Apple's, and possibly an Extended Graphics Adaptor and a 'go faster' board. More and more, I suggest, in 1987 we'll see those in the corporate sector who want to make use of the benefits of desktop publishing sprucing up their clones, rather than singing the Macintosh melody.

Certainly, that's the impression created by Aldus with PC-Pagemaker, and by Hewlett-Packard and their 'Document Description Language'. The aggressive home-grown clonemaker, President Computers, which puts its machines together on the hi-tech Gold Coast, is backing the PC horse, of course, but with a whole system, sold as a job lot — scanner, XT-clone, laser printer, 'Pagemaster III' software. Here we'll look at these three approaches to giving desktop publishing power, as well as checking out the latest developments in the Apple world. The PCs might be muscling in, but Mac will not go down without a fight.

Pagemaker for the PC is fast, even faster than Pagemaker on the Mac. You need an IBM PC AT or compatible (the XTs and PCs are too slow for the program to run satisfactorily), with at least 512 Kbytes of RAM, a 10 Mbyte or larger fixed disk, a mouse, and an IBM Enhanced Graphics Adapter or Hercules Graphics Card.

PC Pagemaker

Pagemaker for the PC is fast, even faster than Pagemaker on the Mac. You need an IBM PC AT or compatible (the XTs and PCs are too slow for the program to run satisfactorily), with at least 512 Kbytes of RAM, a 10 Mbyte (or larger) fixed disk, a mouse, and an IBM Enhanced Graphics Adapter or Hercules Graphics Card. The program runs under Microsoft Windows, and — as a general rule — Software Corporation of Australia (the importer of the program) says any clone which will run Windows will be able to run Pagemaker.

You can see that if you have a plain-vanilla PC clone, running at 3.7 MHz and just with twin floppies, you'll need to do a bit of pricey upgrading before you'll be able to run Pagemaker. However, such upgrading will probably be cheaper than junking your PC and buying a Mac and Laserwriter.

As I pointed out, the program needs a 10 Mbyte or larger fixed disk, and needs to be run on an AT. If you've got an XT with fixed disk, you'll be able to run Pagemaker, but it will be too slow to be of much use to you. There are a number of low-cost 'go faster' cards which can be added to an XT to give it near-AT performance. Note that you need the EGA or Hercules card in order to run the program satisfactorily. Pagemaker will run on the standard IBM Colour Graphics Adapter, but its 640 by 200 resolution is nowhere near high enough to allow you to use the program properly.

The program supports many popular word processors, including Word Perfect, Microsoft Word, Multimate, Wordstar 3.3 and Xywrite III. And, as you'd expect, you can pump ASCII files directly into it.

The most expensive part of an Apple desktop publishing system is the Laserwriter. By going the PC route, you get access to much, much cheaper laser printers. Pagemaker on the PC can print to any Windows-compatible printer, such as the Hewlett-Packard Laserjet and Laserjet Plus. The release of Pagemaker for the PC is a significant event in the developing history of desktop publishing. Many, many people have been waiting for it to become available.

Pagemaker is distributed in Australia by Software Corporation of Australia, (03) 699 7255) *and* (02) 211 4099.

President Computers

Pagemaker's market will come largely from those who already have their AT's, and want the software. President Computers believes there is another market, of companies which either do not have an AT clone, or have so many of them another one wouldn't hurt. President's desktop publishing solution is a $23,000 (plus tax) package of President's own ATalike with a hard disk, a Canon A1 Laser Printer, a scanner, and the Pagemaker-like software Pagemaster III.

It is a fast and impressive system — the inclusion of a scanner in the package is a good idea. The scanner, a President AVR-300 Image Scanner, is swift and accurate — it's a 'flat-bed' unit (like a photocopier) which means you can scan pages from books and magazines, in contrast to many scanners which demand a single page be fed into the system.

President's system was launched in late-October, last year, coinciding with a similar announcement in California by Advance Vision Research, the company which developed the system. Despite its American parentage, the President- ▷

badged system is assembled in the Sunshine State.

I gained the impression, when watching a demonstration of the Pagemaster III software (which runs under Digital Research's GEM — a route which Aldus says it considered, but rejected in favour of Microsoft Windows) that it was very fast, and easy to use, employing a Mac-like user interface, controlled by a mouse. It is a real, genuine what-you-see-is-what-you-get-folks system. President offers just two hours on-site training as part of its package, which suggests the company is confident this is all that is needed to get creditable results. Certainly, Pagemaster III looks very much like Pagemaker, and a first-time user should have little trouble in producing simple documents, with more sophisticated output after a little more experience.

What do you get for your money? For a start, the AT-clone comes with a 30 Mbyte hard disk, and a 60 Mbyte internal tape back-up, 1 Mbyte RAM on the motherboard, two 1.2 Mbyte/360 Kbyte disk drives (so you can use them as quad-density, or drop back to the standard 360 Kbyte), colour graphics card and colour monitor, the image scanner, and the Canon Laser Printer (with an adapter so it can be driven from the AT). The operating system is MS-DOS 3.10a, and in addition to Pagemaster III, you get President's own word processor (President Write), their spreadsheet (President Calc), and a diary/planner program.

So, you get a lot for your $23,000 (plus tax). The system seems sound, and because it is all supplied as a package, you won't be forever trying to find cables to link all the bits together. There is no doubt the system works well, delivers what is claimed for it, and for the price represents value which three years ago would have been inconceivable. Is there a market for it? President obviously thinks so. As I suggested earlier, the market seems to be limited to those organisations or individuals without a computer or laser printer or anything, who want to get into desktop publishing and, for some reason, don't want to go the Apple route; and to those companies who have PCs coming out of their ears, want to become desktop publishers, and feel an additional computer wouldn't go astray.

If you want to know more, and want to see the system in action (and it's pretty impressive, believe me) you can call President's head office on (02) 476 2700 *for the name of your nearest dealer.*

One of Apple's real advantages is that, during its virtually unopposed control of the market, many other companies went to work with a will to provide products which would stretch the possibilities of desktop publishing.

Hewlett-Packard

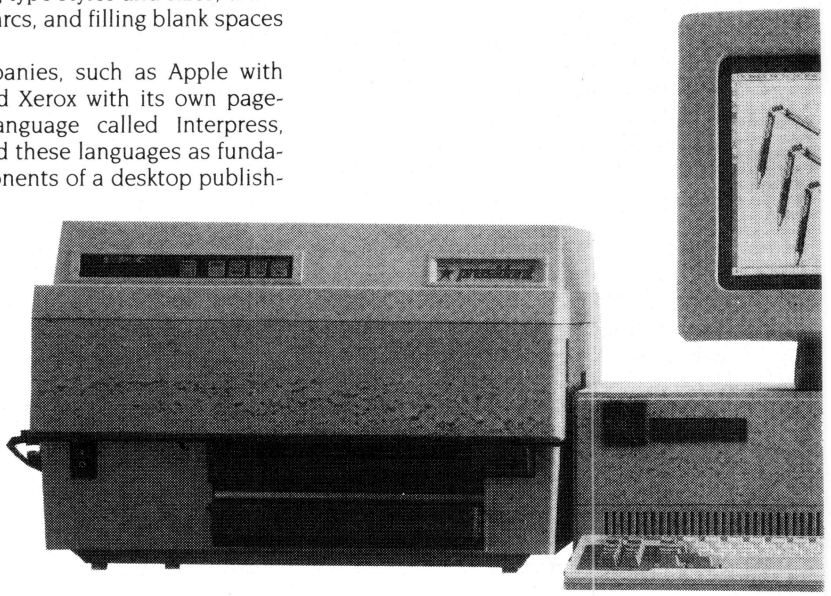
The control language Postscript enables the Apple Laserwriter to perform its many wonders. Postscript, developed by the United States company Adobe Systems, translates the on-screen representation of text into information the printer can use. It is transparent to the user. That is, you don't have to know anything about Postscript in order to be able to use it. You just turn part of the text on your screen into bold, and make the headlines bigger than the body copy, and put a little graphic here, and a thick blank here, and Postscript automatically converts this into the data the printer needs in order to print the page out. Page-description languages enable computers to perform a variety of graphics-oriented functions easily, including controlling type styles and sizes, drawing lines and arcs, and filling blank spaces with patterns.

Some companies, such as Apple with Postscript, and Xerox with its own page-description language called Interpress, have embraced these languages as fundamental components of a desktop publishing system. HP claims that although page-description languages have a place in the market, they suffer from one fundamental drawback: memory demand. Page-description languages eat up a lot of memory. On the Mac, for example, Postscript resides in ROM on the printer-controller board, boosting the memory requirement (and, of course, the price) of the Laserwriter. HP claims the majority of today's desktop publishing needs do not require the added capabilities — nor the added expense — of a page-description language.

Although there are more Hewlett-Packard Laserjet (and Laserjet Plus) printers installed world-wide than any other brand of laser printer, until recently they have been somewhat limited compared to the Apple Laserwriter. The HP printers were fine if you made limited demands, and saw them essentially as quiet daisywheel replacements.

(In fact, HP encouraged users to see the printers as very ordinary, by supplying only one typeface (Courier) which looks just like a typewriter. It is beyond me why HP thought a company which bought a laser printer would want the output to look like typewriter output, rather than like the output of a typesetting machine. Typeset-like fonts were available, as 'optional extras', for around $500 a plug-in font cartridge, and these allowed a limited number of fonts to be in use at a time, with limited headline sizes.)

Despite these limitations, HP's reputation for technical quality control, the fact that it was the first serious player in the laser printer stakes, and its installed base





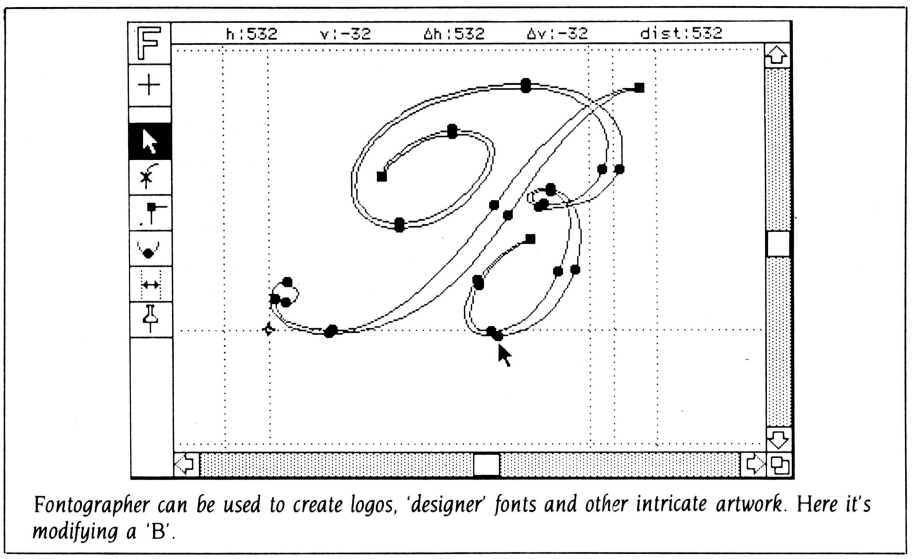
of other HP equipment, have all contributed to the fact that there are more HP Laserjets in use than any other make. HP has also strongly supported software developers, so just about any major software in the world which supports laser printers will specifically work on an HP Laserjet.

At the beginning of this section of the article I talked about Postscript. This language has become the de facto standard for laser (and other, more sophisticated) printer control. HP printers do not speak Postscript. To get around this, HP has adopted a document-description language, DDL, developed by the United States company Imagen Corporation.

DDL appears to incorporate all the graphic control features of other page-description languages, such as Postscript, along with control of such operations as merging text and graphics. Under the terms of HP's agreement with Imagen, DDL is being implemented for existing and future HP printers and personal computers.

HP has a good, solid, expensive PC clone called the Vectra, and the company is pushing this, a LaserJet with DDL, and specific software as its 'desktop publishing solution'.

As we discussed earlier, printer-control languages mediate between the software application and the printer to describe how a set of images will be rendered on the printer. DDL describes a document in two sections: as a collection of images, and as a set of rules for placing these images on paper. These two sections are merged only when the document is actually printed. According to Walt Sledzieski of HP's Laser Printer Division, this separation of image from rules increases the performance for sophisticated applications.



Fontographer can be used to create logos, 'designer' fonts and other intricate artwork. Here it's modifying a 'B'.

Imagen's big boss, Patrick Welch, says DDL "takes the capabilities of the basic page description languages several steps further, by allowing the user to define entire documents, rather than just pages."

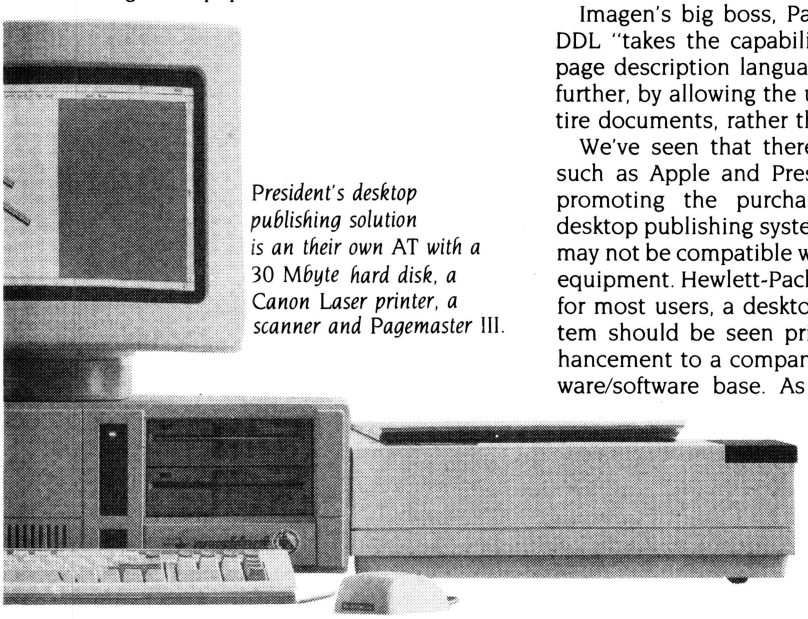
We've seen that there are companies, such as Apple and President, which are promoting the purchase of dedicated desktop publishing systems, which may or may not be compatible with existing office equipment. Hewlett-Packard believes that, for most users, a desktop-publishing system should be seen primarily as an enhancement to a company's existing hardware/software base. As a result of this view, HP is pushing its own equipment, and the capabilities of DDL, as a sensible upgrade path to allow companies who already have some installed computer equipment to move gently into desktop publishing.

I tend to agree with HP. Most users of 'desktop publishing' are really users of typeset-like, 'pretty' output. They have no real need for, nor the time and skills to produce 'book-quality' documents. They simply want their internal documents to look as good as possible, without demanding excessive work.

It may well be that the HP path is one you could profitably follow. If you decide the Laserwriter is too expensive, or simply too feature-laden for your needs, an HP Laserjet is worth considering. But, before you buy HP's printer, you really ought to look at the other ones in the same, and lower, price brackets, such as Australia's own Impact printer, or Canon's Laser 1.

Despite the claims made for DDL, my experience has been that trying to produce more than rudimentary typesetlike output on the HP Laserjet can be a frustrating and difficult experience. I used a Laserjet for a month, and then went out and bought an Apple Laserwriter. You can draw your own conclusions.

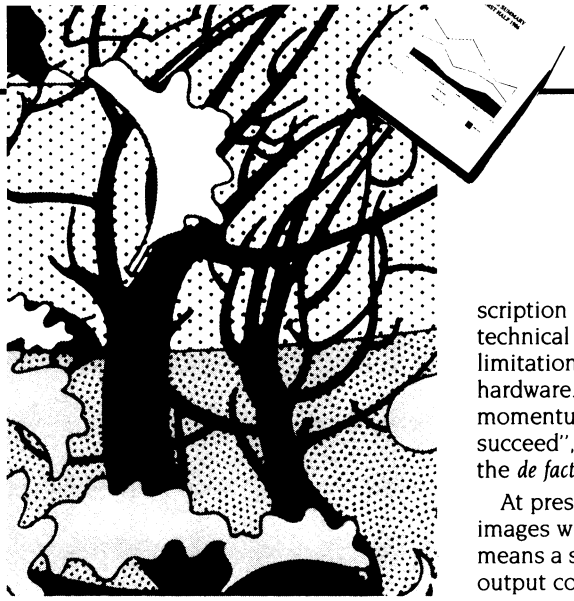
If you want to know more about HP's *approach, ring* 895 2895 *in Melbourne, or their* STD *free number* 008 033821.



President's desktop publishing solution is an their own AT *with a* 30 M*byte hard disk, a Canon Laser printer, a scanner and Pagemaster* III.

Apple Computer

That brings us neatly back to where we began, in the orchard, with the folks who started the desktop publishing revolution, and appear, to some observers, to be in ▷



danger of losing their commanding control of the field.

Apple is not sitting back waiting for its prize market to be pinched from underneath it. One of Apple's real advantages is that, during its virtually unopposed control of the market, many other companies, such as Aldus with Pagemaker, went to work with a will to provide products which would stretch the possibilities of desktop publishing. These third-party developers have continued their work — let's look look at some of the more interesting and significant of these developments.

PageMaker on the Mac has been one of the driving forces behind desktop publishing. But the program was not without flaws, as anyone who has used it for more than the most trivial tasks will agree. Pagemaker 2.0, due out shortly for the Mac, will incorporate all the new features now in the PC version of the program.

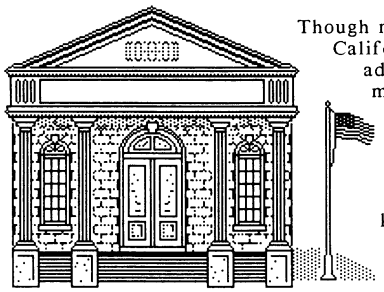
Pagemaker 2.0, claims Aldus, offers more than 20 new features which previous Pagemaker users have requested. The main ones are automatic hyphenation based on a dictionary of 90,000 words (and Steve Clemons claims an Australianised version of the dictionary, rather than the usual Yankee-speak, will be available here), as well as user-defined entries; increased typographic capabilities, such as manual kerning on all printers, and automatic kerning on selected printers (kerning adjusts the space between characters), as well as other word spacing and letter control; the ablity to produce documents up to 128 pages in length; and the ability to work on facing pages at the same time.

Steve Jobs, the truant half of the pair who conjured up Apple in that Californian garage, is now thumping his own drum with his new company Next Incorporated. At a desktop publishing convention in San Francisco, he pointed out that, within the past 10 years, word processing has virtually become an inbuilt generic function of all computing systems. He said that, at the moment, we're in a transition with desktop publishing from seeing it as an add-on to current technology, to a generic function. He said it would only take until the end of 1989 for this move to be made. Within five years, Mr Jobs predicted, every computing system would have desktop publishing capabilities built into it.

Jobs said new full-page displays will be easier to use, and much more powerful hardware would be developed to handle them. He claimed Postscript has already won the battle as the standard page description language, as it has the right technical approach, and any performance limitations would be overcome by new hardware. There is, says Jobs, "too much momentum behind Postscript for it not to succeed", so it would eventually become the *de facto* imaging standard.

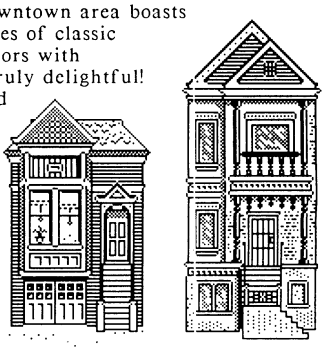
At present, the Laserwriter produces its images with '300 dots per inch' (dpi). This means a solid black square inch of printed output consists of a square of 90,000 (300 ▷

BUILDINGS OF THE PALO ALTO NEIGHBORHOOD



Though not known for its outstanding architecture, Palo Alto, California has many buildings which please the eye and add to the overall ambience of the community. The old main post office, for example, is a lovely assemblage of columns and ornate balustades. Built in 1943, the building was used as the main post office until 1984, at which time the modern facility near the freeway was constructed.

Our neighbor to the north, San Francisco, is well known for its charming Victorian homes. Palo Alto is not without its displays of old-world class. In particular, the downtown area boasts numerous examples of classic Victorians. Many have been painted in multitudes of colors with painstaking detail paid to borders and trims. They are truly delightful!



Of course, the traditional home of the '50's is alive and well on our quiet neighborhood streets. Though overwhelmed by Eichler homes in South Palo Alto, there are a number of classic homes to be found in the area near Oregon Expressway. Many of the homes were built just before the rapid expansion and re-apportionment of property and lot lines in Palo Alto, so they have the added benefit of huge back yards, and frequently are surrounded by more trees than the homes of later build.

The only problems with the homes of Palo Alto is their cost. This neighborhood is one of the most expensive in which to buy property in the entire U.S. A home can hardly be found for under $150,000, and even the smaller homes are well into the $200,000's. It is remarkable to think that only 15 years ago, many of these were selling for less than the cost of a 1986 BMW 318i.

Many of the most notable buildings of Palo Alto are actually located on the Stanford University campus. Among these are the President's home, the old music building, and the famous Stanford Memorial Church. Stanford also boasts some of the ugliest buildings to be found in the area. In particular, the Meyer Undergraduate Library is known as "UGLY" for short by the students. Hoover

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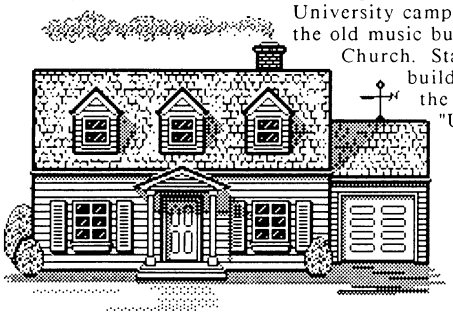

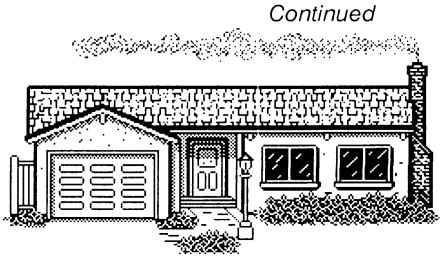

Palo Alto architecture represents periods from Victorian to modern.

Hewlett-Packard's Document Description Language describes the document as graphics and text separately and merges them only when printing out — an advantage in sophisticated applications, it's claimed.

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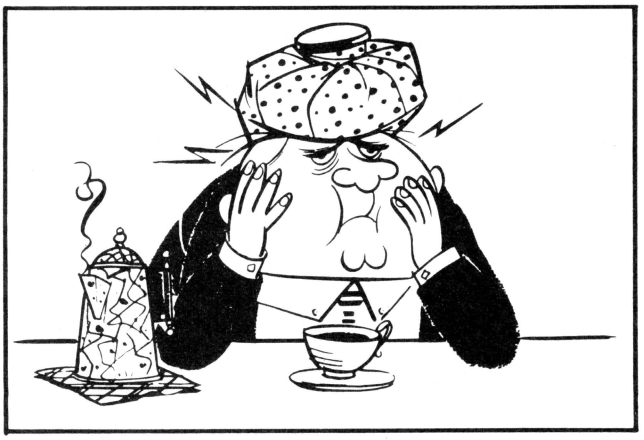

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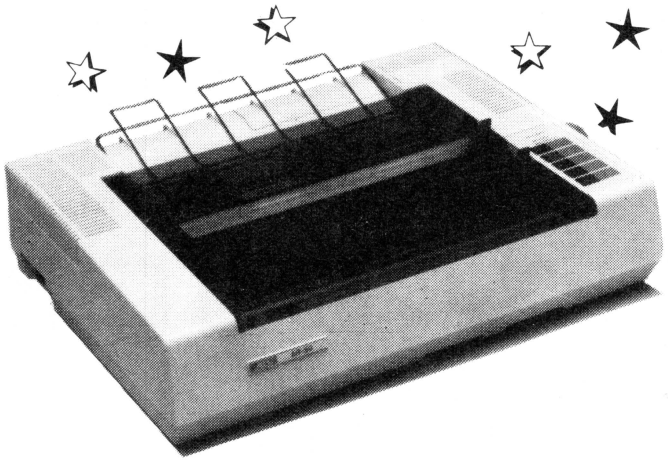

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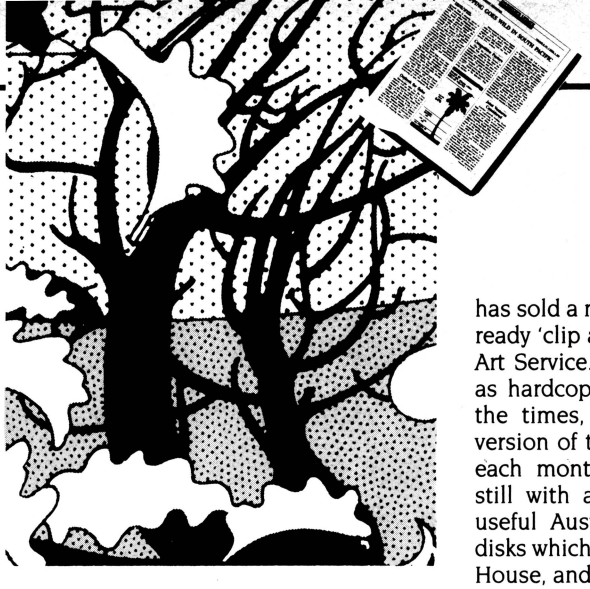


times 300) dots. Professional typesetting machines are typically four or eight times this (1,200 dpi, or 2,400 dpi), but 300 dpi is pretty good, and is more than acceptable for most applications. Jobs predicted a convergence at 400 dpi, covering FAX machines, scanners and third-generation laser printers.

So much for the future. What is available now for Mac-publishers? In the hardware line, three United States companies are making bigger screens. One of these is the 38 cm FPD from Radius,and is desgned to work 'on its side', so you can see a full page at once.

Infomagic, (02) 858 4111, handles Radius products in Australia.

The second is Micrographic Images' 48 cm display, Megascreen, with a resolution of 1024 by 900. Finally, E-Machines is marketing a 42 cm display called Big Picture, with a resolution of 1024 by 808.

Two new, non-Apple disk drives have just become available in America. One of these is called Drive 5.25, from Abaton Technology Corporation. This package consists of both hardware and software for the transfer of files between IBM PCs and Macs. The system can read and write IBM, CP/M and Unix disks, and can also work as a standalone CP/M computer. FT100 is a software package which transfers MS-DOS files from PC to Mac. It was developed by Dayna Communications. The second drive, sounding more like a weight-control product, is the MacSlimline Series, from the company Univation. It's an external hard disk subsystem, complete with a removable 10 Mbyte Winchester hard disk, or a 40 Mbyte optional tape back-up unit.

And a swag of software has been released over the past four to six months. Even though not all of it is available in Australia, it is interesting to see the kind of desktop publishing software which is being sold, if only to show the areas where people are working on new developments.

ACTA, from Symmetry Corporation, is an outline processor which integrates with many other programs. Dualtext, from a company with the natty name of The Electronic Publisher, is a complete automatic copy-taking and inter-office communications system, which works using the standard telephone network. The Electronic Publisher also has a product called Newswrite, which is a word processor designed for authors and journalists, and includes fonts, editing, glossaries and copy-fit. Extra, is an integrated desktop publishing program, which includes a word processor, graphics, typesetting capabilities and a spelling checker — from Quark Incorporated.

Desktop Art, from Dynamic Graphics, is a set of five double-disk packs, with each pack containing around 200 to 300 graphics, including animals, common objects, individuals, famous personalities (including Jesus complete with crown of thorns, and Rembrandt with palette), seasonal symbols (like Father Christmas and firecrackers), silhouettes, and design elements. The first two packs are MacPaint documents (so they are 75 dpi), but the other three (which have the titles 'Education', 'Sport' and 'Four Seasons') include MacDraw and FullPaint documents at 300 dpi.

Desktop Art is handled in Australia by Dynamic Graphics, on (02) 660 0211, or STD-free 008 22 5319.

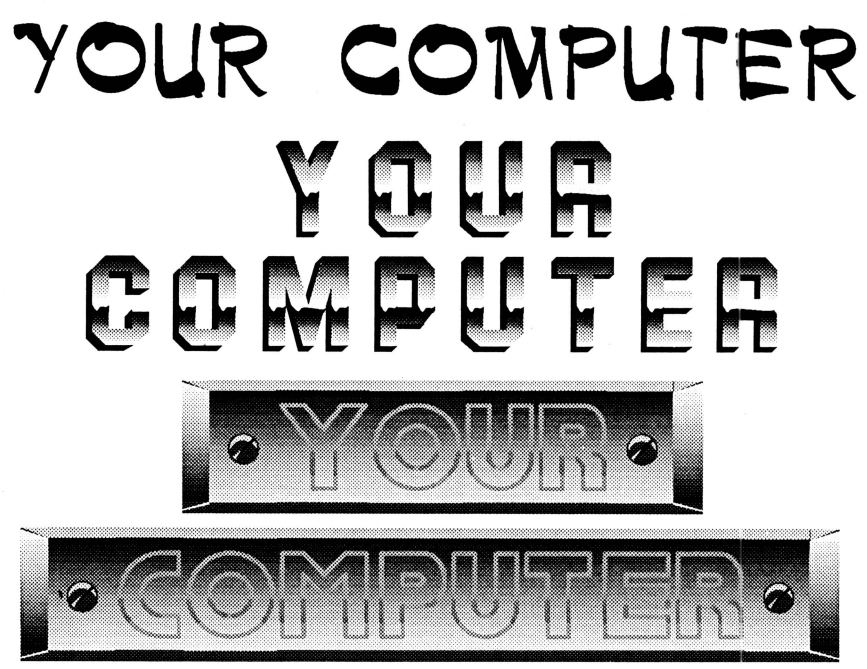
For the past 20 years, Dynamic Graphics has sold a monthly publication of camera-ready 'clip art', called the Clipper Creative Art Service. This was, of course, provided as hardcopy material. Now, moving with the times, Dynamic offers a Macintosh version of the Clipper service, with a disk each month. This Clipper art, although still with an American flavour, includes useful Australian items, such as recent disks which included pictures of the Opera House, and camera-ready material for use in conjunction with Australia Day.

Just Like Magic

Also in the graphics area is Graphic Works, from Mindscape, which is a paint program which works in layers with Laserwriter fonts and multiple pages. Fontographer, from Altsys Corporation, is now in its second incarnation (version 2.0), and is a package to create logos, fonts and intricate artwork.

Fontographer is also distributed in Australia by Infomagic, (02) 858 4111.

In addition to Fontographer, Infomagic handles a wide range of Macintosh 'goodies for desktop publishers', including the 'sideways' monitor (from Radius) mentioned earlier. The most significant new product ecently brought to Australia by Infomagic seems to me to be Ragtime, a program advertised under the slogan 'In- ▷



True laser fonts can be scaled without losing definition — these examples from Image Club (in Paintbrush, Chrome Bumper and Brass Plate) could be 'blown up' and used much larger.

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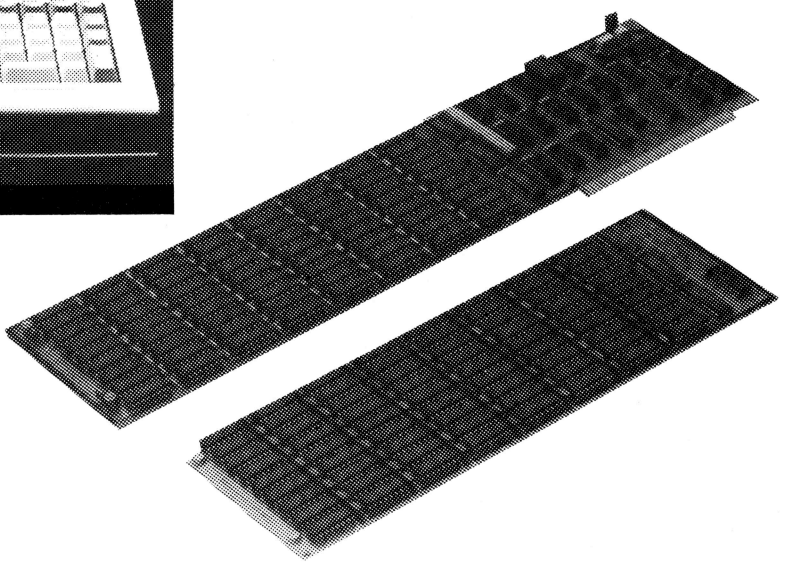

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8087	**$279.00**
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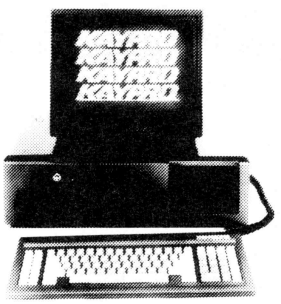
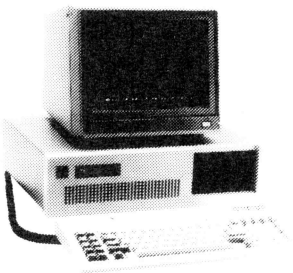


CPU:	8.0 MHz 80286.
RAM:	640 KB expandable to 15 MB.
ROM:	IBM AT compatible.
DISK STORAGE:	1.2 MB floppy disk drive, one 30 MB High Speed hard disk.
EXPANSION:	Eight expansion slots.
INPUT/OUTPUT:	1 each serial and parallel ports.
POWER:	185 watt power supply.

KAYPRO 386
the mean machine



CPU:	16 MHz 80386.
RAM:	1 MB 32 Bit wide RAM, expandable to 16 MB.
ROM:	IBM AT compatible.
DISK STORAGE:	1.2 MB floppy disk drive, one 40 MB High Speed hard disk.
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tegrated Page Processing'. If you have a Mac, and little software for it, Ragtime might well be an 'all-in-one' solution to most of your software needs, as it provides facilities for word processing, desktop publishing, forms generation and spreadsheet work, in an integrated package.

The desktop publishing part of Ragtime includes a split-screen facility, with up to nine windows on the screen at once, so you could work with nine different parts of

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MegaFax

MegaFax enables users of PAGEmaster products to both send a graphics file to remote facsimile machines, and to receive fax transmissions on their PC's for editing or for printing on the system's laser printer. MegaFax serves as an image transfer utility between PAGEmaster 300 dpi graphic images and Group III fax file 200 dpi images. Combined with AVR's MegaScan Image/Text Editing software and high quality HP LaserJet compatible fonts, facsimile images of unprecedented clarity and content can be quickly composed and sent worldwide.

AVR uses GammaLink's fax modem board and software as the PC to phone line interface. By using the GammaFax high-speed PC-to-PC file transfer capability, PAGEmaster users have the option of avoiding the 200 dpi resolution of Group III fax machines and transfer 300 dpi images directly between similarly equipped PC workstations at rates up to 9600 bits per second.

MegaFax Features

*PC to Group III FAX transmission
*FAX-to-PC reception
*PC-to-PC communication at 9600 baud
*Automatic 300 dpi <-> 200 dpi scaling
*Compatible with MegaScan and AVR-300 Image Scanner
*Mouse driven user interface

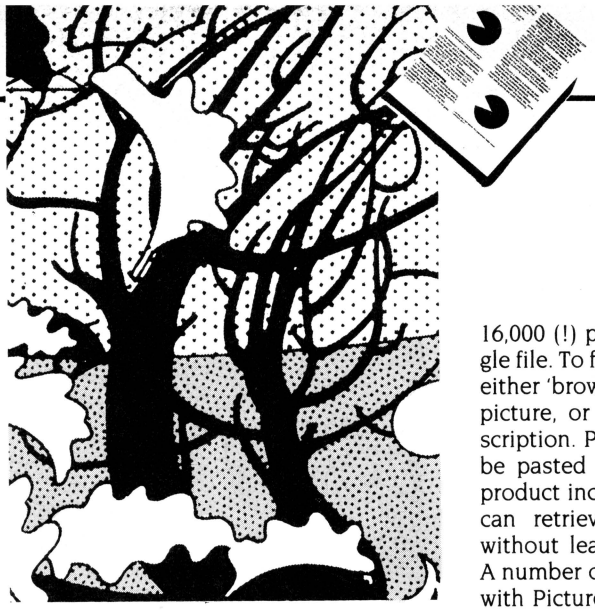
John Hancock







Think how useful it could be to send and receive graphics files via fax — it's now possible with the Megafax option for Pagemaster, from President.



the document simultaneously. The program allows you to add lines into your documents, and you can highlight lines of text by reversing them, to produce white text on a black background.

The word processor portion of Ragtime allows you to work in columns, with automatic text-flowing from column to column, leading (the ability to change the amount of space between lines of text), and sizing of fonts from a minimum measurement of one point (so tiny you can't read it), up to 127 point ('Second Coming' headline size) type.

Infomagic also handles a set of new Laserwriter typefaces produced by the company Image Club. These are true laser fonts (rather than bit-mapped fonts such as those which appear in MacPaint output), so they can be infinitely scaled without loss of definition. The Image Club fonts can be downloaded to the Laserwriter, or any Postscript-compatible device. Each font family includes at least two variations, such as 'extended', 'bold', 'thin' and 'grey'. The most interesting of these fonts, in my opinion, are Paintbrush, Chrome Bumper and Brass Plate.

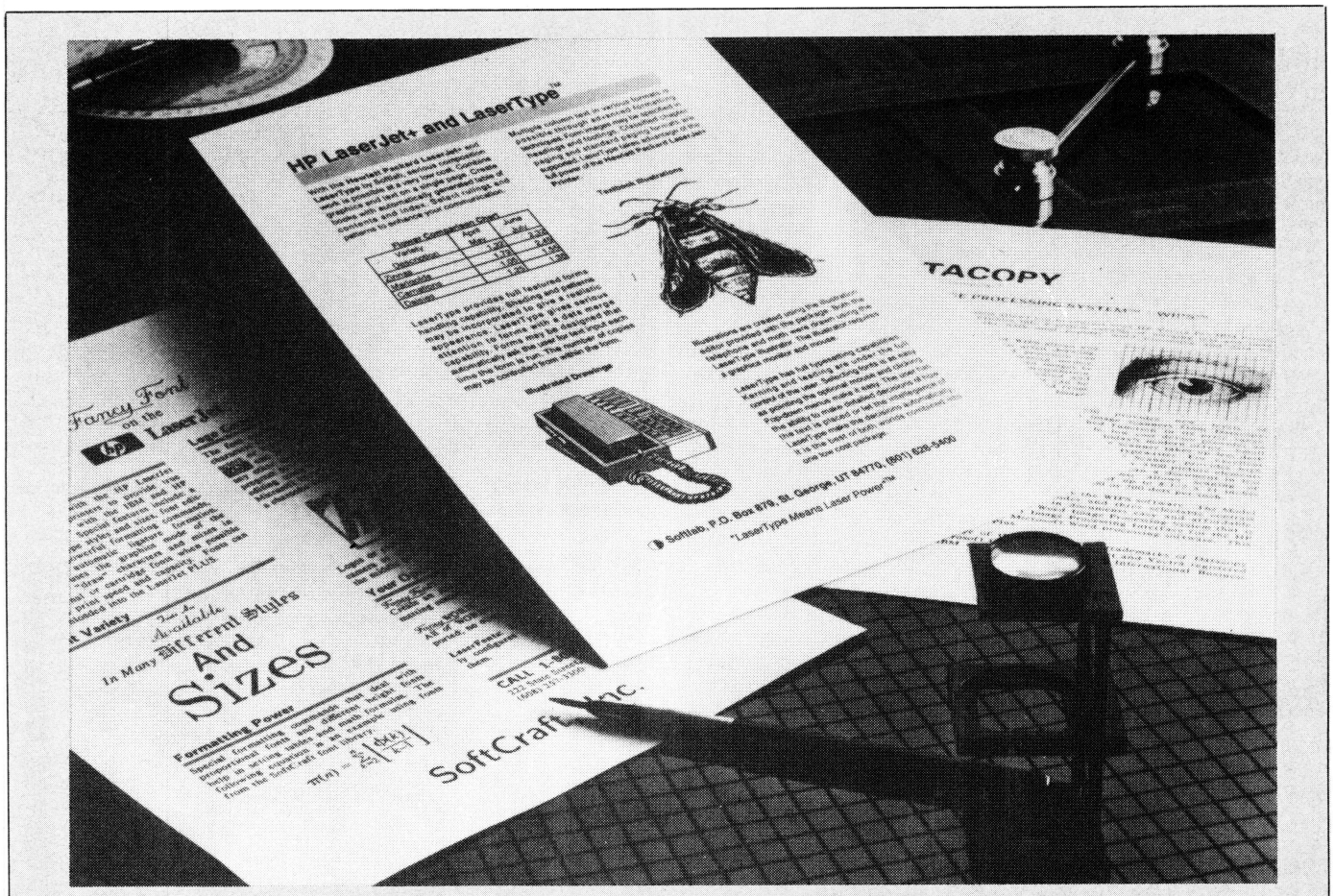
Finally, also from Infomagic, is the Picturebase art-management system. This allows you to arrange Macintosh clip art, MacPaint and MacDraw documents into an organised library, so you know what you have, and can get to it easily. Up to 16,000 (!) pictures can be stored in a single file. To find a particular picture,you can either 'browse through' the file, picture by picture, or search for it by name or description. Part or all of a picture can then be pasted into another application. The product includes a desk accessory, so you can retrieve pictures from Picturebase without leaving your current application. A number of sample pictures are included with Picturebase.

Additional details on these are available from Infomagic.

There are, of course, many more products in the pipeline to give even more power and flexibility to the Mac working as a desktop publishing device, but this selection shows the kind of products available.

Conclusion

It's almost like the early days of personal computers, all over again. For a while, ▷



Using third-party software, very sophisticated desktop publishing results can be produced on Hewlett-Packard's Laserjet printer.



things were getting pretty stale in the computer field. Lots of ho-hum, me-too PC clones and boring spreadsheets and word processors. Now, with desktop publishing entering its second phase, with PCs in the running and the stakes heating up all over, there's a bit of life in town — at last.

There are now a number of clear alternatives if you want to get involved with desktop publishing. If you already have part, or all, of the hardware on hand, you might decide on Pagemaker for your IBM. If you want to start from scratch, you can follow the Macintosh or the President line, or you can modify your set-up to take advantage of Hewlett-Packard products.

It's certainly extremely interesting at the moment, and the effort being put into software and hardware for desktop publishing can only benefit the computer industry as a whole. If you do not become involved in desktop publishing, the spin-offs from the products being developed will find their way into the future computer investments you make. □

If you want a taste of desktop publishing (and a chance to appreciate some of the problems), see Tim Hartnell's DIY desktop publishing program, Newletter Publisher, in YC, August 1986.

Magazine MICR

Exploring The Use Of Microcomputers In Magazine Publis

Volume One, Number 9 □ A Renegade Public
Terry Ulick, E

Building A Publishing Model
Part One: Planning

Last issue, we introduced you to an exciting new page makeup technology for creating pages on the Macintosh computer. We are putting such a program to use this issue, and we can't tell just what a pleasure it is to put pages together on a computer screen instead of a paste-up board!

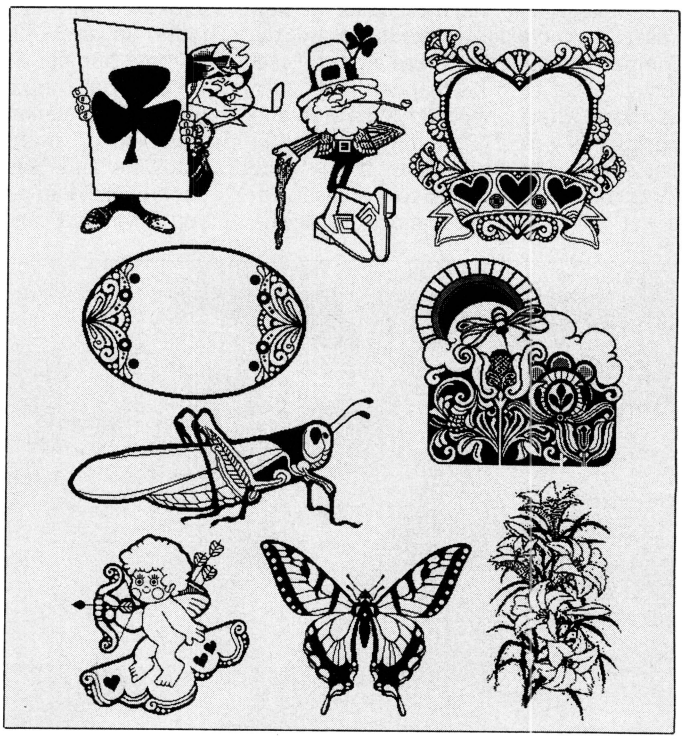
This issue we start building what is commonly referred to as a "publishing model." If you're not sure exactly what the term "model" means, you're not alone. We have had trouble with the term, but in our view, a model is a combination of statistics about your operation, put together in such a way as to show their relationships. From this model, you ca how various aspe your operation in upon others, and changing variab alter the bottom With such a mc also possible tc forecasting int based upon the the past.

Ideally, the n allow you to

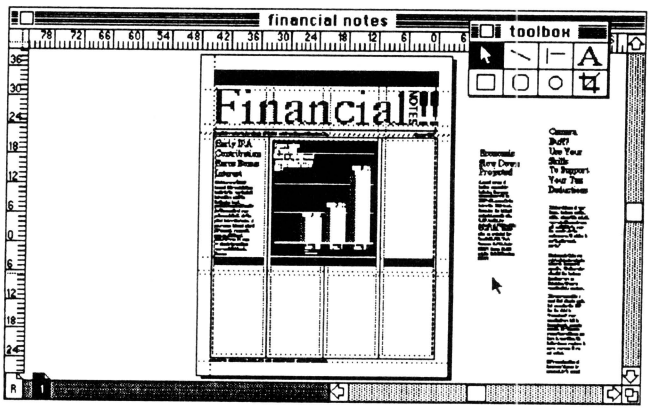


Pagemaker on the PC turns out exactly the same professional-looking results as on the Mac, with the advantage of allowing access to much cheaper laser printers.

Pagemaker on the Mac has been one of the driving forces behind desktop publishing. Version 2.0 has more than 20 new features, including the ability to work on facing pages at the same time.



Desktop Art provides a library of hundreds of graphics, from animals to seasonal graphics to general design elements.



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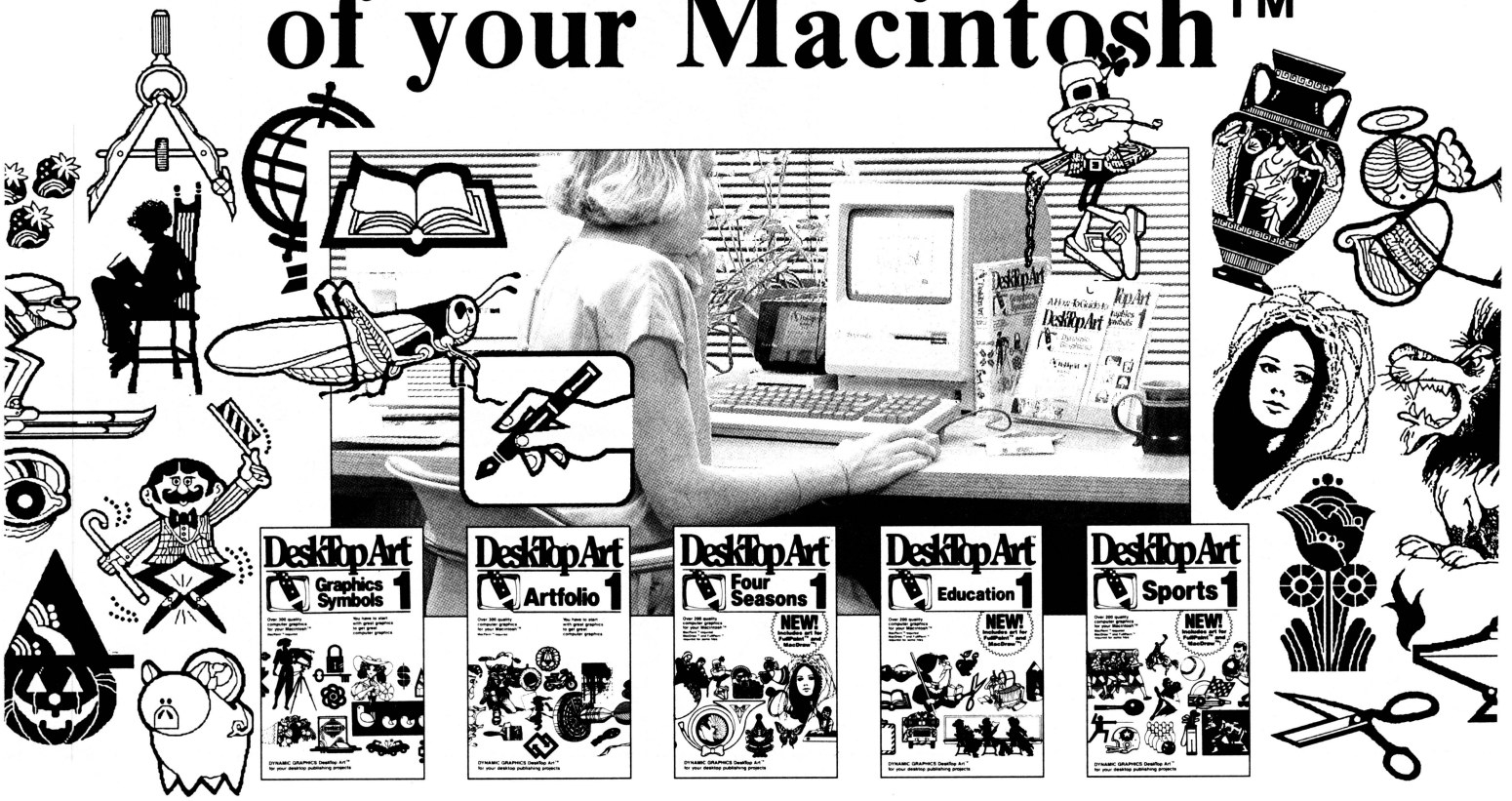

Each DeskTop Art collection has been specially compiled from Dynamic Graphics' art library of more than 20,000 professional illustrations by top commercial artists.

With DeskTop Art collections for the Macintosh, you create stand-out communications every time ... newsletters, reports, brochures, ad layouts, forms, overhead transparencies - all you desktop publishing projects will profit.

The DeskTop Art collections are compatible with Macintosh publishing programs and include 200-300 graphics stored as MacPaint™ documents. Three of the packages also include FullPaint™ and MacDraw™ graphics documents for better visual resolution.

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A JAPANESE STORY WITH 7000 C

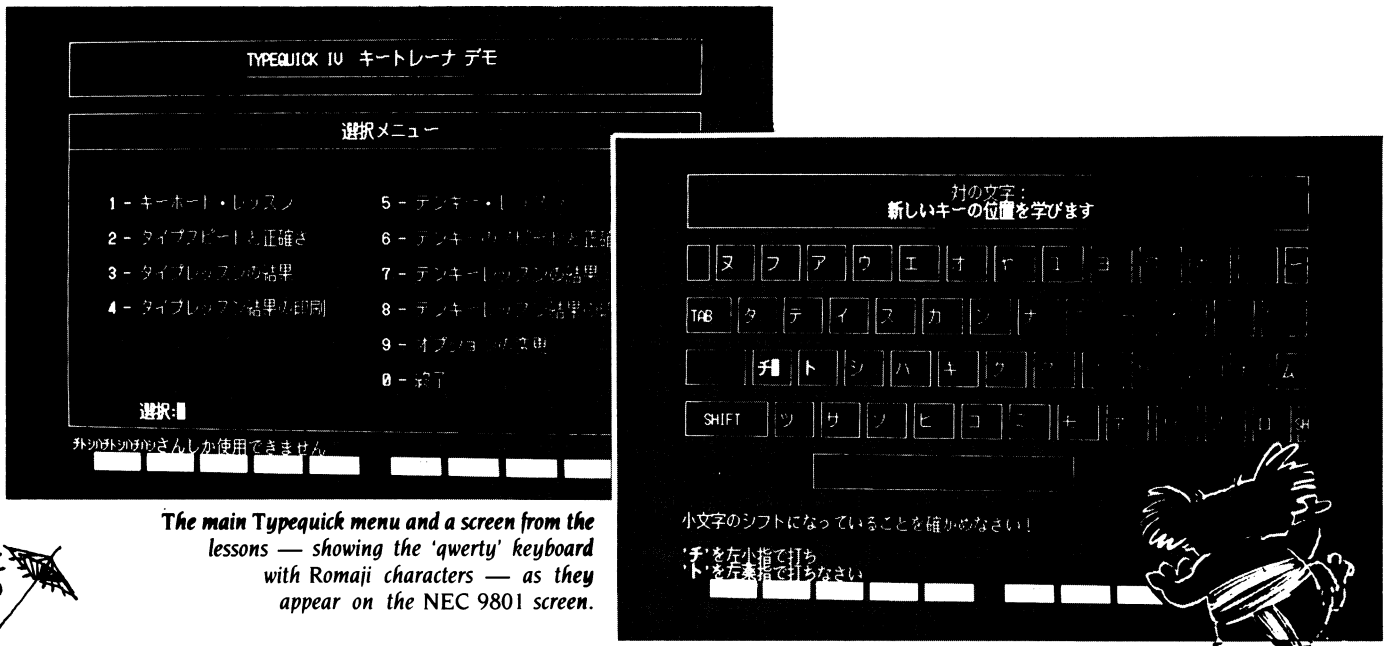
Frank Lee, himself aa most honourable developer of computer programs, reports on the first Australian software product to be translated into Japanese, while Brendan Akhurst has his own perspective on the Kanjiroo and Katakoala invasion.

KONICHIWA! Selling software in Japan is a tall order, and a task not to be lightly undertaken. Not only is the Japanese language very different from English (Aahhhghh — those 'Jinglish' manuals) but the character set is humungous. There are two primary sets of Kanji characters known as JIS 1 and JIS 2. Each defines roughly 3500 characters which are essentially Chinese in origin. The situation is further complicated by the use of two additional (but smaller) uniquely Japanese character sets, known as Katakana and Hiragana. School children begin by learning to write using the simpler 49-character Katakana syllabary. To cap it off, most Japanese technical writing includes occasional words in English.

The larger computer companies (including NEC and Fujitsu) are still in the process of defining a standard keyboard to replace the old Japanese keyboards which can take up a complete desk space.

High-res (No, Not Hi Les!)

The need to display the complex Kanji symbols is the primary reason why most computers of Japanese origin have high-resolution graphics as standard. Examples include the NEC APC series and the Panafacom Duet 16. A by-product is the very non-IBMish screen-memory layout. Programmers familiar with the NEC APC III are aware that you just don't put data into certain byte positions in the window memory. The reason lies in the origins of the APC III. It is essentially a cut-down Japanese NEC 9801 with the Kanji facility disabled. It takes only one byte to display an ASCII character, but two bytes to define



The main Typequick menu and a screen from the lessons — showing the 'qwerty' keyboard with Romaji characters — as they appear on the NEC 9801 *screen.*



HARACTERS

a Kanji symbol. These symbols are so complex that even with a high-resolution monitor you can pack only 40 to a row.

It seems the most popular 16-bit PC in Japan is currently the NEC 9801. There are about 500,000 already in use (compared with only 100,000 IBM 5500s). The 9801 is based on NEC's fast equivalent of the Intel 8086, and runs at either 6 or 8 MHz. It has a very large (but not IBM-compatible) ROM BIOS, high-resolution colour graphics and provision for a Microsoft mouse. It runs a Japanese version of MS-DOS. All the utilities have their prompts translated into Japanese. The floppy disk drives can be used for either 640 Kbyte or 1.2 Mbyte formats. Be warned, however, that although it can read IBM 360 Kbyte diskettes, it cannot write to them. Transferring files from the 9801 to the IBM-PC requires serial communication hardware and software. Although NEC BASIC is in ROM, it is also available under MS-DOS. Surprisingly, the ROM BASIC cannot handle MS-DOS formatted diskettes!

The upshot of all this is that there is not much of a market for straight IBM PC-type software in Japan. Not, that is, unless one is prepared to put in a great deal of effort into what amounts to a complete re-write.

Typequick — Work Faster

Hats off, then, to Sydney-based Typequick, and to its managing director Noel McIntosh for beating the odds and landing a lucrative contract with Japan Management Consultants (JMC) in Tokyo earlier this year. Having purchased a 9801 to use as the target machine, the staff at Typequick battled through (real) Japanese technical manuals (no English translations exist) and created Japanese equivalents — formulated to teach either Romaji or Katakana — of their highly successful typing tutor program. Readers may recall that Typequick topped our 1985 Personal Computer Of The Year in the Australian software segment (and was originally reviewed in our May, 1984, issue). It was also the first Australian software package to be marketed by IBM under its own logo. IBM Japan has also signed a contract with Typequick and will distribute the copyrighted Japanese version for the JX and IBM 5500 series of personal computers.

Prior to the Japanese conversion, Typequick made extensive sales in the English-speaking world. Over 3000 students have improved their typing skills in the United States, and users include the Ford Motor Company, Hewlett Packard, BMW North America and Boeing Computer Services.

Our standard (QWERTY) keyboard is also used on the great majority of Japanese computers and electronic typewriters ('Wapros'). To enter a Kanji word, one types the phonetic equivalent in 'Romaji' (from 'Roman plus Kanji'). A software front-end processor throws up a menu of all the Kanji equivalents which sound the same. The user then selects from that menu. This front-end processor has been tacked on to Wordstar 2000. It uses an enormous dictionary (around 180 Kbytes) to do the conversion. The computer generally provides the Kanji symbols in ROM. The JIS 2 set is usually optional.

This means that the Japanese have to learn to type on a standard keyboard, all of which adds up to a major market for Typequick's new baby. Given the current Australian yen for the Yen, software exporting is more than ever an attractive proposition. The Yen has multiplied (in Australian terms) by a factor of four in as many years. McIntosh says that about one million Japanese (mainly women) are trained in keyboard skills each year. This demand should perpetuate, since it is traditional for Japanese women to leave

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Soft-Sell in Japan



Typequick used the NEC 9801 *to develop their Japanese version of the tutorial — the high resolution monitor is a necessity, and it happens to be the most popular* PC *in Japan.*

the workforce at about age 28.

JMC anticipates sales in the order of $A8 million over the next three years. With a staff of 450, JMC has an annual turnover of $A20 million.

Typequick claims that approximately $A105,000 went into the task of translating the product and introducing it into the Japanese market. Some of this was offset by assistance from the New South Wales Government's Department of Industrial Development and Decentralisation.

It's Not Enough to Do as the Romans Do

To break into the Japanese market one needs to have the services of people who already know Japan. In this case, the 'vector' was the Sydney-based company Dynapacific and its counterpart in Tokyo, Data Pacific (Japan). These two companies jointly organised meetings with prospective buyers,resulting in the eventual contract with JMC.

Dynapacific has invested in a NEC 9801 and intends to offer assistance to companies considering taking the yellow brick road to Tokyo. The managing director Graeme Bruce speaks fluent Japanese and provides translation and interpretation for clients who need to front up to non-English speaking Japanese.

Perhaps your software product is right for Japan. Conversion to Japanese will probably cost you more than the original developmental outlay, but there is a very large market overseas — (and overseas sales don't attract sales tax). Come on all you software developers, let's get this country's deficit back where it belongs. Besides, its a great excuse to sample the culinary delights of Tokyo — one of the world's greatest restaurants. (Of course, you won't be able to afford it — but it sure looks good.) □

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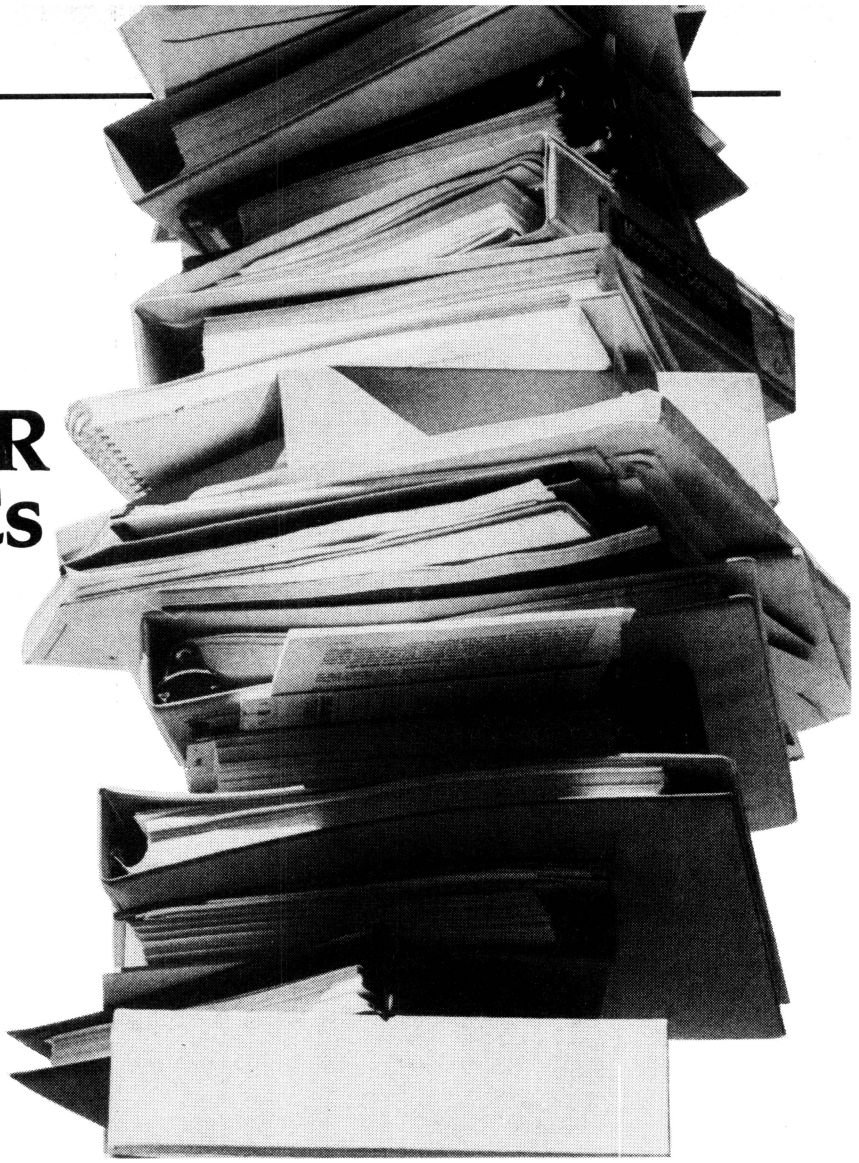

Regular readers have doubtless been following Les Bell's series, 'C for Smarties', and wondering which C compiler they should buy. Les and his team have set out to answer the question in a comprehensive evaluation of a number of C compilers and interpreters.

WITH THE WIDESPREAD adoption of the C programming language as the standard for PC software development (it must be the C-son) there is growing interest in the rapidly increasing nuber of C compilers available, and in their associated tools: function libraries, debuggers, editors and the like.

In this first of an occasional series of reviews of programmer's tools, we seek out at a number of C compilers, giving objective assessments of performance, together with product descriptions which we hope will assist programmers in selecting an appropriate tool for their needs.

Before starting to examine the compilers, we need to establish just what we are looking for, see? In other words, just what makes a good C compiler?

We can identify a number of characteristics which distinguish the various C compilers on the market. These are:

■ ***Reliability***

Professional programmers, in particular, need to be sure that when a bug emerges in their code, they put it there — not the compiler. To professional programmers, time is money, and they cannot afford to waste time debugging the compiler when they should be debugging their own code. All other characteristics are irrelevant if this cannot be satisfied. Reliability is also important to the beginner programmer, who is discouraged by the appearance of bugs. Hackers alone may be willing to trade off reliability for cost (hackers are notoriously short of money for software).

■ ***Support from Third-Party Vendors***

The emergence of suppliers of pre-compiled function libraries for PC compilers has encouraged programmers to sweeten up their products with the inclusion of windows, mouse-driven menus, communications functions and the like. If you want your programs to look good, you'll have to use some of these libraries. Other libraries support B+-Tree file access, screen forms and other functions essential to business software.

Compilers which are not supported by these third-party products are obviously of less utility. Similarly, programmers may be dependent on sophisticated debugging tools. While programmer of the old school (like me) may view such new-fangled gizmos with scorn (we paid our dues, debugging the hard way, and don't see why these youngsters should have it easy!) there's no doubt that when you're in a hole, some of these split-screen, debuggers, which can simultaneously display source and object code, can pay for themselves in minutes. The same applies to profilers, which tell you which parts of your code are executed most frequently and should therefore have the most optimisation attention paid to them.

■ ***Run-time Performance***

Speaking of which, a slow program is undoubtedly less appealing than a fast, responsive one. Compilers which generate slow code — all other factors being equal — are of less interest than those that generate fast code. Hence our interest in benchmark performance.

■ ***Small Code Size***

Likewise, code size is important, not so much to the beginner, but definitely to the programmer working on large projects. It doesn't really matter whether a program

comes out at 16 Kbytes or 12, but it certainly does make a difference whether it comes out at 640 or 512 Kbytes! Incidentally, this is why Ashton-Tate had to switch C compilers between dBase III and III Plus — on the older compiler, III Plus was coming out at over 640 Kbytes, which just won't fit into the memory of the PC.

■ *Compile Speed*

This is more important to beginners and hackers than to professional programmers. Beginners tend to have to recompile programs frequently as they discover bugs; the professional is more inclined to the view that the program is ultimately compiled once but run millions of times, and that therefore run-time performance is more important.

■ *Memory Models Supported* (for 8086/88)

The 8086/8088/80286 processor family uses what is termed a segmented architecture. This breaks memory up into 64 Kbyte chunks called segments, an there are various ways of combining segments into a program. The simplest, called '8080 model', simply places all code and data into a single segment; this limits the size of the program and its data.

More commonly used is 'small model', in which the code and data are separated into two segments. This allows larger programs at virtually no cost in terms of speed or complexity.

The next refinement is to allow multiple segments for either code or data or both. Now, to access widely separated data items, the processor's segment registers must be reloaded, which slows the machine, and of course pointers must now be 32-bit values rather than 16 bits in size, using up more memory.

Different compilers have different ways of coping with this situation, but, of course, it is important for large programs that it be dealt with somehow.

■ *Conformance to Standard and Portability*

One of the major benefits of the C language is its portability — the ability to move programs between machines, operating systems and compilers. As soon as you start to use non-standard features of a compiler, you are severely restricting the portability of your code. Admittedly, you can make use of the C preprocessor to assist, but, in general, programmers find it harder to switch between dialects of the same language than to switch between totally different languages.

Adherence to a standard ensures that code written to those standards will compile correctly first time, that programming skills can be transferred, that function libraries will port correctly and that code you write will have a long life on different systems.

Beginners tend to have to recompile programs frequently as they discover bugs; the professional is more inclined to the view that the program is ultimately compiled once but run millions of times, and that therefore run-time performance is more important.

■ *Comprehensive, Usable Documentation*

This almost goes without saying. The more documentation you have, the better. It should be well organised, indexed, with sections describing the compiler options, associated utilities such as librarians, and the function library. Non-standard functions, in particular, should be thoroughly documented with examples, and something I would like to see is a definition of exactly in what way non-standard functions are non-standard and what the Unix equivalents are.

In fact, programmers' needs vary as they progress through different stages of using a language. Beginners need a compiler that is fast, simple, unsurprising, and are generally less concerned about speed and compactness of generated code. They need good-quality documentation, ideally with a tutorial orientation, and the ability to compile at least a good selection of introductory tutorial programs.

The hacker needs a compiler that is ideally fast, generates fast and compact code, isn't too laden with options, and has the ability to compile standard code as well as a wide selection of public domain code.

The professional programmer needs a compiler that is above all reliable, has a wide range of options to generate code for different memory models, can link to an assembler, has strong support from suppliers of libraries and support tools, generates tight code and is well documented. The professional is generally willing to pay for it.

What Does ANSI Mean?

The proposed ANSI standard X3J11 for the C programming language incorporates a number of advances and new features. Unlike some earlier language standards (for example, ISO Pascal) this one adds features and does not constitute a subset of all practical compilers, and in practice many compilers are starting to support the ANSI standard extensions, such as function prototyping.

Methodology

An evaluation of several C compilers is an ▷

What is a Compiler?

GOOD QUESTION! Computers actually execute internally stored programs in a code called object code, which comprises simple instructions to move the contents of memory around and process it in excruciatingly simple ways. When I say excruciatingly, I mean excruciatingly — even simple tasks like comparing two words can require pedantic execution of hundreds of instructions.

We can write instructions into the computer in their binary patterns, but these patterns do not make much sense to humans, and so we more often use a code called assembly language, in which each instruction is represented by a three- or four-letter (or so) mnemonic, such as MOV (move), STO (store) or whatever. This helps a bit, but there has to be an easier way.

There is, in the form of so-called high-level languages. C is a high-level language, in that a single statement of C corresponds to multiple — as many as several hundred — object- code instructions. It is well known that it takes the same time to write 10 lines of code, regardless of the level of the language, so programmers are able to write much larger and more complex programs in high-level languages.

The high-level language cannot be executed directly by the processor, and so must be translated by some other program. This program is the compiler, which reads the original C programs and writes out files of object code which perform the same functions. In practice, the compiler outputs the object code in a special intermediate format called an object (.OBJ) file, which can be combined with other .OBJ files by the linker program, to generate the final program in an .EXE file. □

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The MIX C compiler is conspicuous in this crowd because of its low price — at $79.95 it is the cheapest by a considerable margin. Accompanied by a large (roughly 450-page) tutorial manual, this product is clearly aimed at the beginning C programmer.

ambitious undertaking. Having ascertained what constitutes a good C compiler, one must then design appropriate benchmark tests and investigative techniques for comparing the compilers. Then, of course, any of the compilers may be negatively affected by poor performance in an area not specifically being investigted (sigh!).

Microsoft C Version 4.0

MICROSOFT HAS, of course, a longer track record than any other company in supplying software development tools for microcomputers. This company has introduced a number of high-level language interpreters and compilers, ranging from BASIC through FORTRAN, COBOL and Pascal to C. Until last year, Microsoft had not released its own C compiler, but instead supplied the Lattice compiler under a marketing agreement with that company. However, Microsoft had for some time been developing and using its own compiler inhouse.

Last year, the compiler was released as Microsoft C Version 3.00. Recently, Version 4.00 was released, which takes the development even further. The documentation is very comprehensive; three folders contain four volumes — a User's Guide, Microsoft Codeview Manual, C Language Reference Manual and a Run-Time Library Reference Manual. These stacks of paper are well organised and complete.

Microsoft C boasts an unusually extensive function library, which closely conforms to the Unix/Xenix 'standard', as well as closely conforming to the proposed ANSI standard for the C programming language. In fact, the MS-DOS compiler shares a common run-time library with the Xenix C compiler.

The Microsoft compiler supports more memory models than any of the others reviewed: small, compact medium, large and huge. These are defined as follows:

small model: one (up to) 64 Kbyte segment for code and one segment for data;

compact model: one segment for code and multiple data segments;

medium model: a single data segment and multiple code segments;

large model: multiple code and multiple data segments; and

huge model: as for large, but with no restrictions on array sizes.

These models are simply default ways of declaring different kinds of pointers. Microsoft C supports three kinds of pointers: near pointers, far pointers and huge pointers. Near pointers are simply 16-bit values, often interchangeable with integers (though this is obviously implementation-dependent); while far pointers are 32-bit entities which comprise a segment value and an offset value, both 16 bits each. Address arithmetic (and this applies to most compilers) is performed on the offset value only, on the assumption that comparisons and subtractions are only performed on pointers to related objects in the same data segment. While this is adequate for most purposes, it does impose a limitation on array sizes.

The huge pointer type is the same size as a far pointer, but pointer arithmetic on huge pointers is carried out on all 32 bits, thus allowing data items which are referenced by huge pointers to span more than one segment (though there are some restrictions in the interests of efficiency).

Apart from extensions such as these, the Microsoft C compiler adheres very closely to the proposed ANSI standard for the language. It supports such advanced features as structure assignment, the void type, enumerated types, and function prototyping in forward-reference declarations of functions. While some facilities are not implemented, such as the const and volatile storage classes, the corresponding keywords are reserved. In addition, the manual describes the size of an int as 16 bits on the 8086/80286, but 32 bits on the 80386 and 68000, indicating the likelihood of future versions of the

The Great C Comparo

compiler for those processors.

As you might expect, the Microsoft C compiler provides comprehensive support for DOS functions — for example, network file sharing with record locking, subdirectory manipulation and access to environment variables. Support for PC hardware is minimal; presumably third-party vendors will take the opportunity to supply libraries for this purpose.

8087 support is comprehensive: the compiler comes with a library which emulates the 8087, and can be linked with ths to sense the presence of an 8087 and either use it or cal the emulation routines. Alternatively, the compiler can generate in-line code for the 8087/80287, for optimum performance, but such code will not run on machines which do not have the maths chip.

The compiler features two control programs: MSC.EXE, which uses the same syntax as other Microsoft compilers, and CL.EXE, which is compatible with the compiler controller for the Xenix version of this compiler. The major difference between the two is that CL can automatically invoke the linker.Three utilities are provided to further customise systems using code generated by the compiler. EXEPACK.EXE compresses sequences of identical characters and optimises the relocation table of .EXE files, making them smaller and faster to load. EXEMOD.EXE allows the programmer to edit the contents of the .EXE file header, to allocate more stack space, change the allocation values and so on. Finally, SETENV.EXE allows the user to increase the size of the environment area allocated by COMMAND.COM in DOS 3.1 and earlier.

One of the most attractive features of the Microsoft C compiler is the Codeview debugger; this is an interactive source-level debugger, which uses windows to display the source code, command interaction and trace values. When used with the Microsoft Mouse, the Codeview debugger is particularly convenient and powerful. Multiple breakpoints can be set with just a mouse click, and variables can be watched. The display can show a disassembled listing with interleaved source code if required, and the processor registers can be displayed. Intelligent use of the Colour Graphics Adapter allows debugger display in one window while graphics output is placed in another.

All in all, the Microsoft C compiler is a very impressive product, and a good choice for the professional programmer working with thew IBM PC or other MS-DOS systems.

Computer Innovations Optimising C86 V 2.30a

Computer Innovations was one of the early entrants to the 16-bit C-compiler market, with versions of its compiler for both MS-DOS and CP/M-86. The compiler is therefore a mature and stable product, which has evolved gradually to provide a good general set of facilities.

CI-C86 comes with 10 libraries for the PC. Two of these are small- and big-model libraries of IBM PC-specific functions; the remaining eight libraries offer combinations of big/small model, pre-DOS 2.0/DOS 2.0 and later, and software/8087 floating point code.

The IBM PC-specific functions are a handy bonus, including routines for access to the RS232 ports, the printer ports, keyboard and screen handling routines, including graphics.

This is not a small compiler, particularly with 10 libraries. Consequently, it is supplied as a collection of squeezed files on five floppy disks, making installation just a little bit more complex than simply copying the files onto a hard disk. Fortunately, a batch file simplifies the process.

Generated code is reliable and bug-free; whenever I've had problems, I've found the solution to lie in my code and not the compiler.

Bit fields are supported, but not the void type, nor structure assignment, nor enumerated types. These are not currently major deficiencies, since few programs make use of them. This can be expected to change with the increased adoption of ANSI features in other compilers.

Performance is quite acceptable; the new version 3.0 compiler (due for release real soon now) is said to be significantly faster.

The documentation consists of a single manual, which covers the various programs which make up the system: the four passes of the compiler, the librarian and archivist utilities, plus the different libraries for the compiler.

All functions are extensively documented with example programs, and this is further reinforcd with some applications notes which illustrate topics like programming the serial ports on the PC, accessing BIOS routines and driving ANSI.SYS.

I purchased two copies of this compiler directly from CI in New Jersey, and found ▷

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the company to be very friendly and helpful to deal with, and offering good support (not that we've needed it).

Incidentally, users of this compiler should be aware of a book called *Systems Software Tools* by Ted J. Biggerstaff, published by Prentice-Hall. This book, which teaches the principles and practice of systems software design, contains source code for a terminal emulator program and a windowing, multi-tasking operating environment for the IBM PC. A disk containing the source code will be available shortly — and of course, it's all for CI C86.

I believe one of the early versions of this compiler has been placed in the public domain, which would certainly make it a great bargain. And meanwhile, by the time you read this, there should be another new-improved version of CI C86, called C86+, on the market.

DeSmet C

HERE'S A COMPILER to conjure with: high performance in a well-thought-out package, at a low cost. DeSmet C is, to the 16-bit CP/M-86 and MS-DOS world, what BDS C was (is?) to the 8-bit CP/M-80 user. That is, it offers adequately high performance, reliability and full functionality, at a price attractive to hackers, and is good enough for a lot of quick and dirty and small systems work.

DeSmet C, from CWare, is supplied on four disks, which contain a comprehensive collection of software and utilities. Apart from the compiler itself, which operates in two passes (parser and code generator), there is also an assembler (which doubles as pass three of the compiler), a linker (called BIND), libraries and various header files. So far, all is as expected — but the fun has barely begun!

Also supplied on the disks are a full-screen editor, librarian, symbolic source code debugger, profiler, VDISK program,, source-code comparator program, and various utilities and example programs. These are no lightweight utilities, either, as a brief experiment will show.

The compiler is a fairly straightforward affair, lacking the support for ANSI features which more expensive products boast. Such features include structure assignment, enumerated types and bit fields. I have mixed feelings about this: if this older dialect of the C language was good enough to write the Unix operating system in, then it ought to be good enough for most of us. Certainly, I've managed without such 'fancy' additions for a long time now — but I suspect my code might look better if I did use them.

The DeSmet compiler supports only small memory model — that is, one code segment and one data segment. This is adequate for many applications; and for applications which require more code, DeSmet provides one work-around in the form of an overlay manager which will allow the programmer to place multiple overlays into the .EXE file and load them as required. This is good for small-memory systems also (remember them?). Alternatively, the overlays can be permanently loaded into memory, for greatest speed.

The output of the DeSmet compiler is a .O file in a proprietary object format. Actually, the output of the compiler is assembler, which is passed to the assembler directly, and it is the assembler which produces the .O file. This means it is possible for the programmer to insert assembly source in the C program source file, preceded by the #asm 'preprocessor directive'. The assembler is fairly plain vanilla, with no support for macros, codemacros or any of the other goodies to be found in MASM. On the other hand, the only use for this assembler is to write very short routines to perform functions like accessing the IBM PC ROM BIOS.

The compiler provides good support for DOS functions like chain(), exec() and others, and also has functions for IBM PC scree and keyboard access.

The editor, 'see', is quite powerful and easy to customise for non-IBM hardware, since the source code for the screen driver component is supplied in source code form, and can be bound to the object version of see provided. Other utilities (such as the debugger) use the same screen driver. See has quite adequate facilities, including the ability to create macros, to auto-indent and even to automatically auto-indent following a { character.

Two libraries are provided, one with software floating point support and one with 8087 code. It was not clear from my (admittedly brief) reading of the documentation whether the 8087 code is in-line, or whether it uses subroutine calls.

The debugger is a source-code type which operates in the same way as see, with a Lotus-style menu across the top of the screen. The compiler and linker can include symbol-table information in the generated code, which is picked up by the D88 debugger to allow display of source code, values of variables and expressions, including arrays and structures. Screen flipping (from debugger to program output) is supported on the IBM PC and similar machines (source code for the driver is supplied).

The profiler is quite a neat idea; triggered by the system clock, it simply collects the current value of the program counter and increments the count in one of 1024 buckets which produce the performance histogram.

Documentation for this compiler is on the flimsy side, but is nonetheless fairly complete, extending even to a description of the 8086 and 8087 instruction sets.

The benchmark timings reveal that the DeSmet compiler is no slouch, being just behind the Microsoft compiler in performance, at a considerably lower price.

A particularly attractive 'feature' of the DeSmet package is the way in which it has started to attract public domain support. A brief look through the libraries of the C Users Group, for example, reveals that the majority of recenty contributed programs were written using this compiler.

Eco-C

JACK PERDUN IS best known for his books on C programming for Que Corporation, but he is also active as a software developer with his company, EcoSoft. A strong and vocal believer in the future of the C programming language, Purdum has set about developing an up-to-date, powerful compiler at a low price. The result is Eco-C, a low-cost yet powerful and up-to-date compiler (!).

The compiler is supplied on two disks, and is simply and easily installed on either a floppy-only system or on a hard disk system by running the appropriate batch files (two versions of the compiler's manager are supplied).

Like other low-cost compilers, Eco-C supports only the small model (64 Kbyte code, 64 Kbyte data). However, it supports the construction of files in memory, allowing access to large data sets. Unfortunately, memory-resident overlay code (*a la* DeSmet) is not supported.

The compiler comprises six files, which install themselves in your hard disk BIN subdirectory; this suggests Eco-C is a multi-pass compiler, though I doubt it makes six passes through the code. The various passes are managed by a program called CC.EXE, written by Chris DeVoney of Que Corporation. This automatically opens the appropriate files in the appro-

priate subdirectories, and also automatically invokes the MS-DOS link program.

CC.EXE is moderately smart, and includes a 'MAKE' option, loosely modelled on the UNIX MAKE utility, and which examines the date and time stamps on the various source and object files and only recompiles those files which have been updated since the last compile. A nice feature, not too difficult to implement, and very useful in large projects. The source code for CC.C is provided, so the system can be extensively modified.

Floating-point support uses the IEEE format, and will use an 8087 co-processor if one is available; a compiler variable called 8087 indicates the presence of the floating-point chip.

Eco-C does not support some features of Unix V7 (K&R) C, most notably bit fields. On the other hand, it does provide support for some of the proposed ANSI X3J11 C features, such as the void function type (for functions which do not return a value), function prototyping, and structure assignment and function returns.

The compiler is supplied with a comprehensive library of over 200 functions, which are for the most part modelled on the Unix System V libraries, with some from the Berkeley versions of Unix. In addition, there are hardware access functions for IBM PC screen manipulation using hardware functions, as well as other useful functions such as –

```
int soundex(s)
char *s;
```

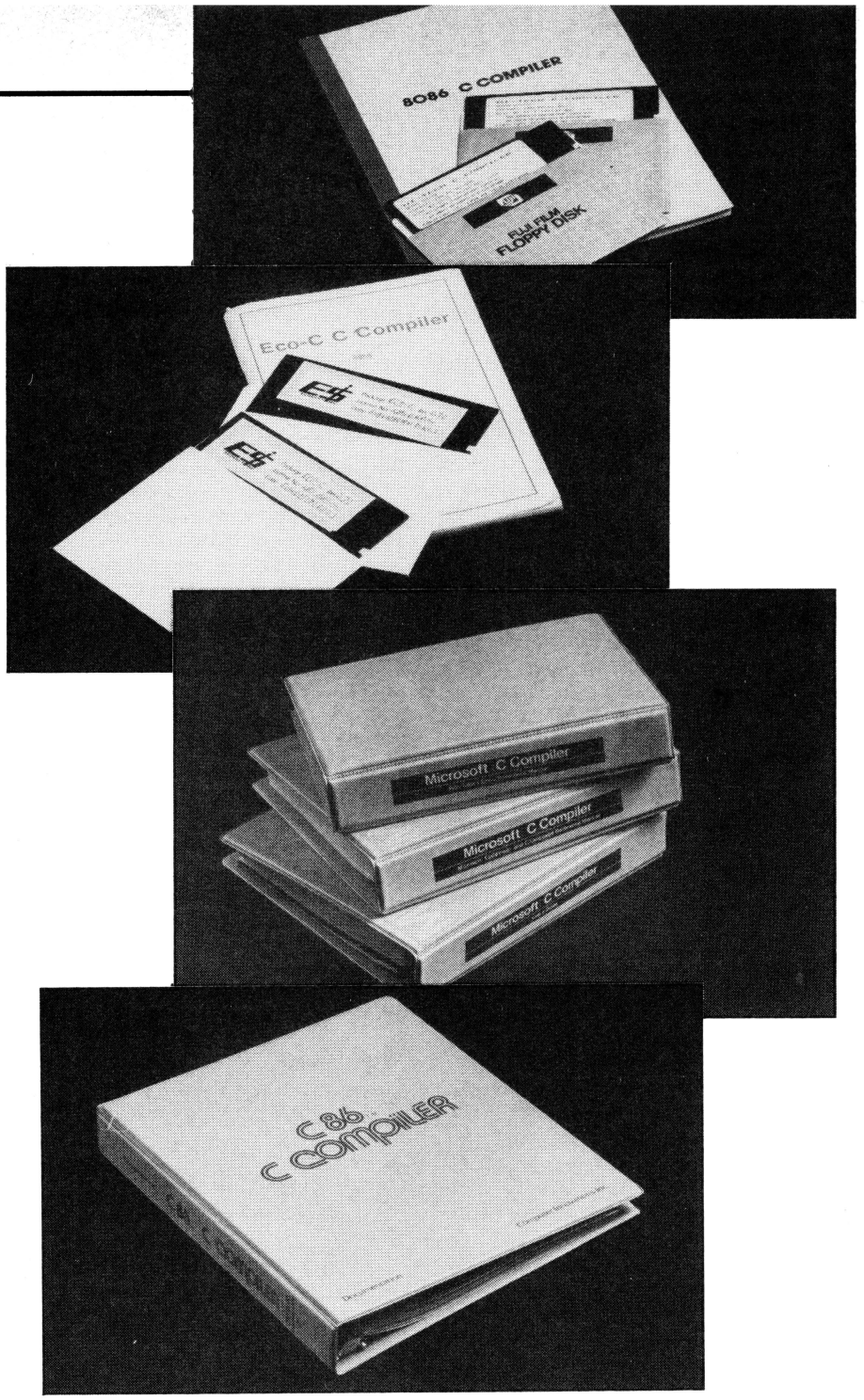
which calculates the soundex code for a string.

The compiler provides good performance, as the benchmarks show, and is good value at the price.

MIX C Compiler V 2.0.2

THE MIX C COMPILER is conspicuous in this crowd because of its low price — at $89.95 it is the cheapest by a considerable margin. Accompanied by a large (roughly 450-page) tutorial manual, this one is clearly aimed at the beginning C programmer.

MIX C is available for both the CP/M-80 and MS-DOS operating systems, and despite the constraints placed on its designers in running on both those operating systems, it is a full implementation of the C language as described in K & R. In fact, it is a superset: it supports enumerated types, structure assignment, and other advanced features which K & R warned were coming but are only now finding their way into the ANSI standard for C.



The compiler comprises a single program, apparently single pass, though it's hard to be sure, with a matching linker. The compiler produces a source code listing on the screen as it works, which slows it down a little, as the benchmark timings show. However, this is useful for the beginning programmer, as any errors are displayed in context with error numbers and an arrow to the offending character in the erroneous statement. Unfortunately, explanations of the error numbers are not printed until the end of the listing, but many will be obvious in any case.

The output of the compiler is a .MIX file which contains relocatable object code. This is passed to the linker, which links it with the standard library to generate a .COM file (this is unusual; most compilers use the Microsoft linker and produce .EXE files). This does mean pograms are restricted to 64 Kbytes of combined code and data, but that is unlikely to affect beginning programmers.

The resulting code is far from blindingly fast, as the benchmarks table shows, although compile times are competitive. An optional optimisation program can be passed over the object .MIX file to produce worthwhile improvements in performance at minimal cost in file size (see table). The sieve benchmark, for example, ▷

improves from 2008 seconds to 164 seconds! I don't know what SPEEDUP.COM is doing, but it must be doing something right!

A similar optimiser called SHRINK.COM will provide space improvements. Alternatively, the run-time code can be omitted from the generated .COM file, to make it even smaller; however, it must then be loaded at run-time from the RUNTIME.OVY file.

The package provides an unusual way of managing the standard function library; rather than providing a librarian, a program is used to convert the library into an ASCII file which can be edited and appended to. It can then be re-converted back into its binary form — ingenious, not too much trouble, and quite appropriate.

The documentation is nothing if not comprehensive. At 450 pages, it is a lot more than one expects with an inexpensive compiler. An initial section introduces the user to the compiler and linker through a sample program, and this is followed by the biggest section of the book, a tutorial on C programming. Then comes the reference section, which is not all that well organised for reference (it seems to follow a format similar to the tutorial), and finally a reference section on the compiler and linker options and utilities.

At the price, this is a class act, and compares favourably with compilers at five to 10 times the price. However, I would have to suggest that this compiler is not suitable for full-scale production work; it does not generate as fast code as the leaders, nor is it as well supported with function libraries and other add-ons, or do the compiler and linker have as many options and features (big and other model support, 80286 support, and so on).

Hi-Tech C Compiler Version 3.02

IT IS ALWAYS nice to be able to point to local products which are on a competitive level to the internationally marketed United States products which dominate our computer scene. Over the years, a number of products have shown Australian software to be up to world standards: the Zardax word processor, Typequick typing tutor, and other products, have all succeeded in world markets.

In the Hi-Tech C Compiler, Australian Clyde Smith-Stubbs has done it again. This compiler has been around for a couple of years now, with versions for CP/M-80, CP/M-86 and MS-DOS/PC-DOS. For Australian users, the advantages of *local support direct from the author* are obvious.

The compiler is supplied on two disks, with an installation program which places the files in a subdirectory with the compiler manager program in the root directory of the fixed disk. Operation on a floppy-only system is possible, and doesn't seem to painful; the only problem we found was that the installation program did not edit our AUTOEXEC.BAT file correctly. No matter, I never trust these programs anyway.

The compiler is actually implemented as four passes, plus a separate link stage, followed by an .EXE file-generation stage. ▷

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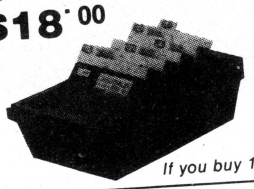

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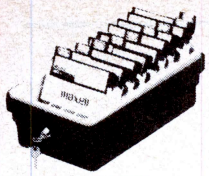

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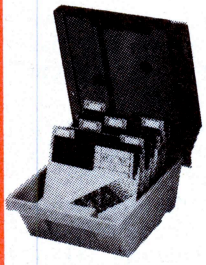

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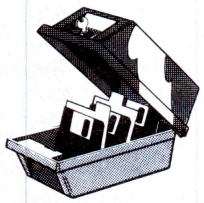

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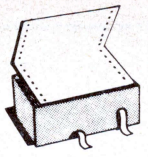

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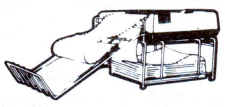

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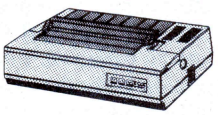

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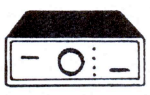

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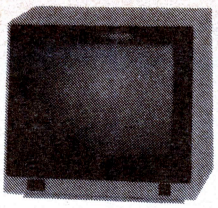

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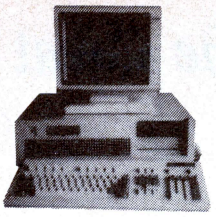

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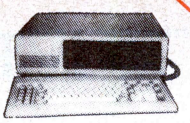

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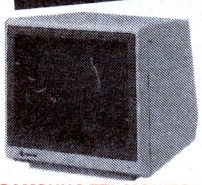

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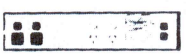

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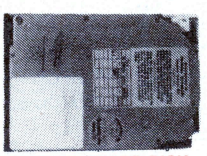

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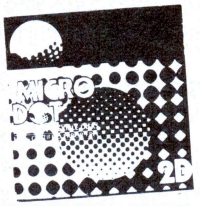

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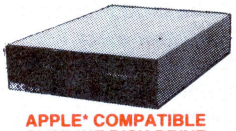

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The Great C Comparo

The compiler generates a proprietary object code format which cannot be used with the DOS linker. Assembly language output can also be generated.

The first pass of the compiler, the preprocessor, performs some fairly strict type checking, rather after the fashion of a Pascal compiler (or the Unix lint program). This considerably improves the portability of code, both from this compiler to another, and from others — if you are likely to have problems with type conversions this compiler will warn you.

Two memory models are supported, through the use of two code generators and two sets of libraris. The small model supports up to 64 Kbytes of code and 64 Kbytes of data, while the large model supports up to 1 Mbyte of mixed code and data.

The dialect of C supported by the compiler is very standard (is there such a thing as very standard? — ed), with some recent extensions, such as structure assignment and the void type. Enumerated types are supported, with some restrictions appropriate to the type; this assists in writing clear code.

Register variables are supported (though it is not clear in the documentation just how many can be used, except on the Z-80 where the limit is one), but bit fields are not supported (a strange omission).

An optimisation pass will work for either speed or space optimisation. And 8087 support is provided, through the use of calls to a library; a software fp library is also supported. The default action is to generate 8087 code; only if the –n flag is given on the command line does the compiler load the software fp library. This caused us some problems at first, as our benchmarks refused to run; we feel the default action of the compiler should be to generate plain vanilla code which will at least run.

Support for operation under DOS is good, with functions provided for subdirectory and environment access, as well as process spawning and the more unusual dup(fd) function, which forces a duplicate file descriptor.

The documentation is terse but adequate, at 106 pages of laser-printer output (at a guess). However, important information is often buried in throw-away lines, such as the point that the –n flag is required on non-8087 systems (above). We'd suggest reading the manual carefully with a fluorescent-ink marker in hand.

It is always nice to be able to point to local products which are on a competitive level to the internationally marketed United States products which dominate our computer scene. Over the years, a number of products have shown Australian software to be up to world standards ...

The compiler comes with a companion relocating macro assembler which accepts a variant of standard Intel ASM-86 mnemonics. It has some unusual features, such as the ability to use temporary labels for local references and to assemble conditional long branches (which assemble o a short branch if possible, otherwise to a short branch of the opposite sense around a long unconditional jump).

Also provided is an interactive symbolic debugger, which, while it cannot display source code, is nonetheless quite powerful and useful. Its syntax takes a little getting used to, though.

Lattice C Version 3.0

THE LOCAL distributor for Lattice products was contacted to provide a copy of the compiler for review, but declined to do so.

The Best Course . . .

As with all categories of software, it is impossible to pick out any one of these products as the 'best'. Each of them has its distinctive features and advantages in difference circumstances.

For the beginning C programmer, we'd suggest the MIX compiler because *a*) it is inexpensive (you might not stick with C in the long run) and *b*) the documentation has an extensive tutorial. The restrictions of this compiler, particularly the lack of large model support, will not matter to the neophyte, while its ease of use and diagnostic listing will assist considerably.

For the hobbyist/hacker, it's hard to go past the DeSmet compiler. It's fast, fairly complete, and well supported, and a bargain at the price. Anyone writing code with this compiler should not consider membership of the C Users Group — they should simply go ahead and join anyway. A great compiler for writing games, small utilities and even quite large projects.

At the top level, it's a choice between Microsoft C and Computer Innovations Optimising C86. Microsoft C is a higher-performance product, and the inclusion of the Codeview debugger, together with the luxurious documentation, pretty well clinches it. On the other hand, CI C86 has a pretty useful library of functions for access to PC hardware, which is attractive to those writing printer drivers, comms and similar utilities for the IBM PC. The best course? Probably to buy both (?). □

Distributors

Computer Innovations C86
The Computer Factory,
214 Harbord Road,
Brookvale 2100.
(02) 938 2522
Price: $900 (*inc tax*)

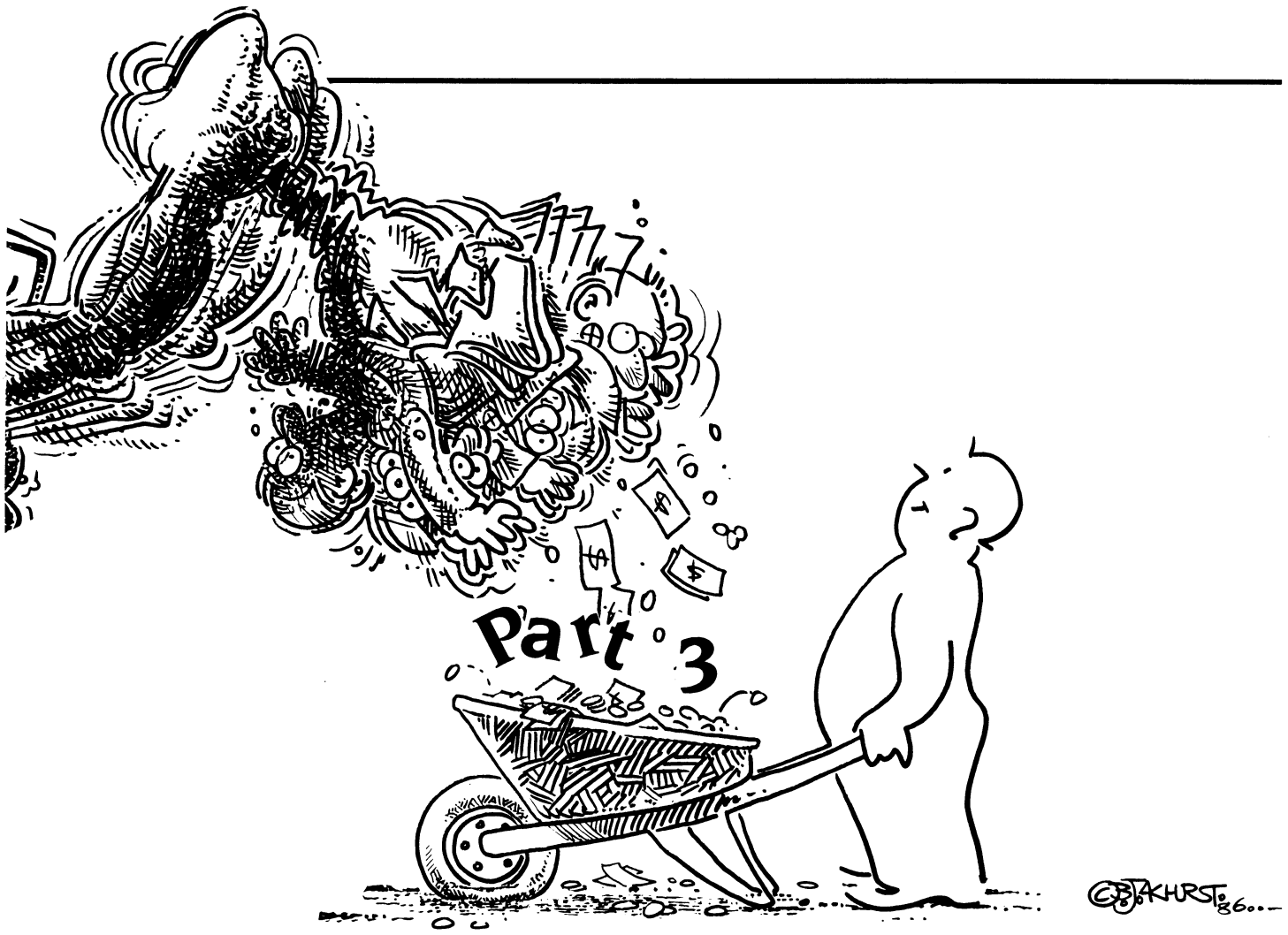
DeSmet C
Computer Trader,
98 Hoddle Street,
Abbotsford 3067.
(03) 417 7044
Price: *about* $300

Eco-C
Ecosoft Inc,
6413 North College Avenue,
Indianapolis, IN 46220.
(317) 255 6476
Price: P.O.A

Hi-Tech C Compiler
Hi-Tech Software,
11 Pavonia Street,
Ashgrove 4060.
(07) 38 6971
Price: Z80 *version*, $250 (*plus tax*); MS-DOS *version*, $300 (*plus tax*)

Lattice C
Fagan Microprocessor Systems,
95 Canterbury Road,
Middle Park 3206.
(03) 699 9899
Price: $982 (*plus tax*)

MIX C
Techflow,
PO Box 4,
Woodford 2778.
(047) 58 6924
Price (*inc tax*): $89.95; MIX *Editor*, $65.90; *compiler and editor package*, $129.90.



DEBTMASTER

In this instalment of the ultimate debt-recovery program, Lyndsay Ford tells you how to remove a debtor from file (it's not done with a crowbar).

If you've been following this series, you should now have a copy of Debtmaster with five of its eight Menu options in full working order. Enthusiastic (or broke) readers may even have started putting accounts onto the system, so this month we're going to deal with the sub-program that lets you take them off again. Call it 'PAY.MWB', and follow the rules for program entry outlined in Part 1 of this series.

```
00001 REM -------- PAY --------
00002 POKE 140,1: GOSUB 73: CURS 0: CLEAR: STRS(20000):
      DIM A0(250),A1(250),A2(8): REM Disable <BREAK> key and set
      up arrays
00003 OPEN "I",6,"DATE.DBT": IN#6ON: OUT#0: OUT#0OFF:
      INPUT K3$,K7$,P,D,U: IN#0: OUT#0: CLOSE 6
00004 FOR X=3 TO 14: CURS 1,X: PRINT [A63 32]: NEXT X: REM Clear
      screen display panel
00005 CURS 23,3: PRINT "<<< ACCOUNT PAID >>>"\\ SPC(10) "Date:"\
      SPC(10) "Name:"\ SPC(10) "Address:"\\\ SPC(10) "Re:"\\
      SPC(10) "Reference:"\ SPC(10) "Amount:"
00006 GOSUB 73: PRINT "Enter name (or first few letters of name)@
      ************";
00007 CURS 22,14: PRINT "PRESS <RETURN> TO ABORT"

Get debtor's name
 (Note that this text input routine is based on the routine in
 lines 54-9 of the NEW program - see last part of this series)

00008 K2$="": H=43: CURS 42,16: PRINT " ";: REM Display cursor
00009 GOSUB 66: IF X=13 THEN 13: REM End if <RETURN>
00010 IF X<>8 AND X<>127 THEN 12 ELSE IF H>43 THEN CURS H,16: PRINT
      CHR(8);" ";CHR(8);: H=H-1: K2$=K2$(;1,LEN(K2$)-1) ELSE
      CURS 42,16: PRINT " ";: REM <DEL> & <BACKSPACE>
00011 GOTO 9
00012 CURS H,16: PRINT CHR(X);: H=H+1: K2$=K2$+CHR(X): IF
      LEN(K2$)<12 THEN 9: REM Add key to text string
00013 IF K2$="" THEN 65 ELSE CURS 1,14: PRINT [A63 32];: J=ASC(K2$)
00014 GOSUB 69: IF J<65 OR J>90 THEN 17

Load disk file (if it exists)
```

Account 'Payments'

Although the title suggests that this sub-program is only used when a debtor pays your bill, in fact there are a number of reasons you might want to delete an entry from your files. Maybe you put an account that was already paid on the system and now have to CANCEL it; maybe the debtor has gone into bankruptcy or moved to Zimbabwe, so you may as well WRITE-OFF the debt; or perhaps you have sent the file to your solicitor for a summons to be issued. These alternatives are built in to the PAY sub-program, but for the sake of convenience the Menu only refers to 'Payment' of accounts.

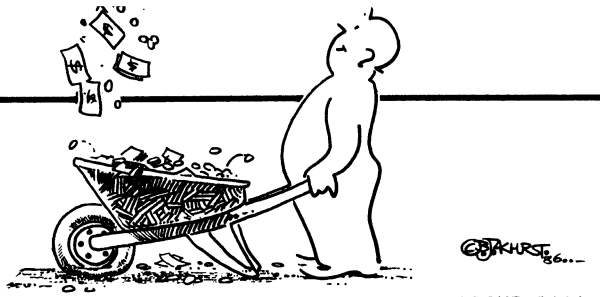
Key 'P' from the Menu takes you into this option, unless there are 100 entries on the 'Paid Bills Ledger', in which case nothing will happen. As the Menu will have warned you for some time that the 'PAID BILLS LEDGER MUST BE PRINTED', this will hardly take you by surprise. See Part 4 of this series for details on how to go about it.

When the sub-program commences, the screen will display a series of prompts like those you see when entering a NEW debtor (Figure 1, Part 2) and you will be asked to enter the debtor's name or its first few letters. The first letter of your entry will then be taken as the disk filename; hence, if you enter 'SMITH' the program will assume the entry is on the file "S.DBT". This illustrates why in the last part of this series I said it's not a good idea to put accounts on files that don't correspond with the debtor's surname.

If no file of the specified letter exists on the disk then the program will display an error message and let you press <RETURN> to go back to the Menu or try another letter (so you can get Mr Smith's account from X.DBT if you were silly enough to put it there). Otherwise the file will be searched for the name you entered. If a match is found the account will be displayed and you will be asked "Is this the one?" Pressing "N" causes the search to continue until all matching accounts have been checked, then the program announces it can't find the name on the particular file and lets you try a file of another letter (as above) or return to the Menu.

In 99.9 per cent of cases you'll find the account you want on the first try, and you will then be asked if it was PAID (key 'P') or to be CANCELLED ('C'), WRITTEN-OFF ('W') or referred for a SUMMONS ('S'). The last three options let you clear junk ac-

```
00015 ON ERROR GOTO 16: C=0: OPEN "I",6,CHR(J)+".DBT": IN#6ON:
      OUT#0: OUT#0OFF: INPUT C: FOR X=1 TO C: INPUT A0(X),A1$(X):
      NEXT X
00016 ON ERROR GOTO 0: IN#0: OUT#0: CLOSE 6: IF C>0 THEN 20
00017 CURS 4,14: PRINT "First letter of name isn't a filename -@
      there's no '";CHR(J);".DBT'"
00018 GOSUB 73: PRINT "Enter Filename or <RETURN> to Abort #";
      CHR(8);
00019 GOSUB 66: J=X: IF X=13 THEN 65 ELSE CURS 4,14: PRINT [A58 32]:
      GOSUB 69: GOTO 15

Search file for name

00020 FOR M=1 TO C: K0$=A1$(M): K5$=K0$(;1,2): K0$=K0$(;3): K1$=K0$:
      X=SEARCH(K0$,CHR(124)): K0$=K0$(;X+1): X=SEARCH(K0$,CHR(124)):
      K0$=K0$(;1,X-1): REM Get name part of each file string in K0$
00021 X=SEARCH(K0$,K2$): IF X=0 THEN 43 ELSE FOR X=5 TO 13:
      CURS 22,X: PRINT [A40 32]: NEXT X: REM If name found then
      erase text following on-screen prompts
00022 K4$="": FOR Y=1 TO 8: X=SEARCH(K1$,CHR(124)):
      A2$(Y)=K1$(;1,X-1): IF Y>1 THEN LET K4$=K4$+K1$(;1,X): REM Put
      elements of file string in A2$ array
00023 K1$=K1$(;X+1): NEXT Y
If file string matches name then display it and ask if it's the
right one, otherwise jump to line 43.

00024 FOR X=1 TO 8: CURS 23,X+4: PRINT A2$(X): NEXT X: CURS 23,13:
      PRINT "$";K1$: F2=VAL(K1$): REM Display each element of
      file string
00025 GOSUB 73: PRINT "Is this the one (Y/N)? ";
00026 GOSUB 66: IF X=78 THEN GOSUB 69: GOTO 43 ELSE IF X<>89 THEN 26:
      REM Continue search if "N"

Find out what user wants to do with the account

00027 GOSUB 73: PRINT "Paid <P>, Cancelled <C>, Summons <S> or@
      Written-Off <W> *";CHR(8);
00028 GOSUB 66: K6$="": IF X=80 THEN 32: REM If X=80 then it's PAID

Routine for accounts not paid

00029 IF X=67 THEN LET K6$="C": K0$="CANCELLED" ELSE IF X=87 THEN
      LET K6$="W": K0$="WRITTEN-OFF" ELSE IF X=83 THEN LET K6$="S":
      K0$="REFERRED FOR LEGAL ACTION" ELSE 28
00030 GOSUB 73: PRINT "ACCOUNT ";K0$;": Are you sure (Y/N) *";
      CHR(8);
00031 GOSUB 66: IF X=78 THEN 27 ELSE IF X=89 THEN LET F4=F2:
      K2$=K1$: GOTO 42 ELSE 31: REM Allow user to Abort (X=78),
      else set K2$=Code letter, F4=Amount. Then jump.

Routine for accounts paid (Hooray!!)
 (This is another text entry routine)

00032 GOSUB 73: PRINT "Enter amount paid or <RETURN> if paid in@
      full:  **********";
00033 CURS 49,16: PRINT "$";: H=50: K2$=""
00034 GOSUB 66: IF X=13 THEN 38: REM Jump if <RETURN>
00035 IF X<>8 AND X<>127 THEN 37 ELSE IF H>50 THEN CURS H,16: PRINT
      CHR(8);"*";CHR(8);: H=H-1: K2$=K2$(;1,LEN(K2$)-1) ELSE
      CURS 49,16: PRINT " ";: REM <DEL> & <BACKSPACE>
00036 GOTO 34
00037 CURS H,16: PRINT CHR(X);: H=H+1: K2$=K2$+CHR(X): IF LEN(K2$)<9
      THEN 34: REM Add key to string
00038 F4=VAL(K2$): IF K2$="" THEN LET F4=F2: REM Implement <RETURN>
00039 IF F4>F2 OR F4=>1000000 THEN 32: REM Filter illegal values
00040 F3=F4: GOSUB 70: K2$=K0$: GOSUB 73: PRINT "$";K2$;
      " was paid (Y/N)? ";: REM Check amount paid
00041 GOSUB 66: IF X=78 THEN NEXT*M 2 ELSE IF X<>89 THEN 41:
      REM X=78 if "N"
00042 NEXT*M 46: REM Exit search loop

File Search loop continues here
```



counts from the system (the program will ask if you are 'Sure' before making the deletion).

If the account was PAID, you will be asked to enter the amount or press <RETURN> if it was paid in full. The amount you entered will be displayed and you will be asked to check it. If it's less than the balance owing, the next prompt will ask if you accept the payment as a 'full discharge'. If you answer 'Y' (for example, you accept Mr Smith's $50 as full payment of his $2000 account!), the account will be deleted from the file, otherwise the money will be accepted as a Part-Payment and the account balance will be adjusted. In this case you will be asked if you want to 'Re-Start time period', allowing you to prevent reminders going out to a debtor who is paying by regular instalments.

Phew! Reducing this to one paragraph makes it look complicated, but in practice the prompts follow one another quite logically and you won't have any problems. Once you've made the requisite entries, the file will be saved to disk (or erased if there are no accounts left in it), the Paid Bills Ledger will be updated, and if it contains less than 80 entries you will be asked if you want to enter another payment ('N') or return to the Menu ('M').

The Paid Bills Ledger

This is variously referred to in the program and in these notes as the 'Paid Bills Ledger and the 'Paid Accounts Ledger' (depending on what looked better on the screen!) It is a disk file entitled PAID.DBT that records all accounts on which an entry is made with this sub-program. Its capacity is 100 entries, at which time access to this sub-program is blocked until the ledger has been printed. Long before this (after 52 entries, a full A4 page) the main Menu will warn you the ledger is filling up.

To view the ledger, press 'E' from the Menu to exit CP/M, then type 'TYPE PAID.DBT <RETURN>'. Then press the <RETURN> key to view each new page. Ledger entries that are not payments in full will be followed by a letter in angular brackets to designate what they are about. These are explained in the second line of the ledger heading (see line 8 of DEBT.MWB, Part 1 of this series).

Next . . .

Part 4 will cover the sub-program that lets you print reminders, business statistics and the Paid Bills Ledger. □

```
00043 NEXT M: GOSUB 73: CURS 16,16: PRINT "<<< CAN'T FIND NAME ON@
      FILE ''";CHR(J);"'' >>>";: CURS 0: PLAY 22,1;0,15
00044 GOSUB 73: PRINT "Enter different file letter or <RETURN> to@
      Abort *";CHR(8);
00045 GOSUB 66: IF X=13 THEN 65 ELSE LET J=X: GOTO 14: REM Abort if
      X=13, otherwise search new file

Program exits Search loop and continues here if file found (line 42)

00046 IF F4=F2 THEN 48 ELSE GOSUB 73: PRINT "Accept part payment as@
      full discharge (Y/N)? ";
00047 GOSUB 66: IF X=89 THEN LET F4=F2: K6$="D" ELSE IF X=78 THEN
      LET K6$="P" ELSE 47

Make "Paid Bills Ledger" entry

00048 OPEN "A",6,"PAID.DBT": OUT#6: PRINT CHR(34);
      K3$(;1,LEN(K3$)-4); K3$(;LEN(K3$)-1); SPC(11-LEN(K3$));
00049 K0$=A2$(2): IF LEN(K0$)>26 THEN LET K0$=K0$(;1,26)
00050 PRINT K0$; SPC(28-LEN(K0$));: K0$=A2$(6): X=SEARCH(K0$,":"):
      IF X>0 THEN LET K0$=K0$(;1,X-1)
00051 IF LEN(K0$)>20 THEN LET K0$=K0$(;1,20)
00052 PRINT K0$; SPC(21-LEN(K0$)); SPC(10-LEN(K2$)); "$"; K2$;: IF
      K6$<>"" THEN PRINT " <"; K6$; ">"; :K6$="": REM K6$=Code
00053 PRINT CHR(34): OUT#0: CLOSE 6: U=U+1: REM U=No. of entries

Routine to Re-Start time period for Part-Payments

00054 IF F4=F2 THEN 58 ELSE LET A1$(M)=K4$+K2$
00055 GOSUB 73: PRINT "Re-start time period (Y/N)? ";
00056 GOSUB 66: IF X=78 THEN LET A1$(M)=K5$+A2$(1)+CHR(124)+K4$
      ELSE IF X=89 THEN LET A0(M)=FLT(P): A1$(M)="0"+CHR(124)+K3$+
      CHR(124)+K4$ ELSE 56: REM If "Y" then replace first element
      of file string and days since 1/1/84 variable
00057 F3=F2-F4: GOSUB 70: A1$(M)=A1$(M)+K0$: GOTO 60

Routine if paid in full

00058 IF M<C THEN FOR X=M TO C-1: A0(X)=A0(X+1): A1$(X)=A1$(X+1):
      NEXT X: REM Condense file to eliminate account
00059 A0(C)=0: A1$(C)="": C=C-1: REM Clear last file and reduce
      file counter by 1

Clean up and end

00060 GOSUB 73: CURS 26,16: PRINT "-Saving File-";: CURS 0
00061 IF C=0 THEN KILL CHR(J)+".DBT" ELSE OPEN "O",6,CHR (J)+".DBT":
      OUT #6: PRINT C: FOR Y=1 TO C: PRINT A0(Y); ",'''"; A1$(Y);
      "''': NEXT Y: OUT#0: CLOSE 6: REM Kill file if it has no
      entries left, else save it
00062 OPEN "O",6,"DATE.DBT": OUT #6: PRINT "'''"; K3$; "'',''"; K7$;
      "'',"; P; ","; D; ","; U: OUT#0: CLOSE 6: REM Save Date file
00063 IF U>79 THEN 65 ELSE GOSUB 73: PRINT "Next Payment <N> or@
      return to Menu <M>? *"; CHR(8);: REM Allow another entry if
      less than 80 entries on Paid Bills Ledger
00064 GOSUB 66: IF X=78 THEN 2 ELSE IF X<>77 THEN 64
00065 CURS 0: RUN "DEBT"

SUBROUTINES
Get key
00066 X=ASC(KEY$): REM Clear key buffer
00067 X=ASC(KEY$): IF X>96 AND X<123 THEN LET X=X-32: REM Capitalize
00068 IF X=124 OR X=128 THEN 67 ELSE RETURN: REM Loop if a null

00069 GOSUB 73: CURS 30,16: PRINT "-Wait-";: CURS 0: RETURN

Convert F3 to a string with 2 decimal places
00070 K0$=STR(F3): K0$=K0$(;2): X=SEARCH(K0$,"."): IF X>0 AND
      LEN(K0$)>X+2 THEN LET K0$=K0$(;1,X+2)
00071 IF X>LEN(K0$)-2 THEN LET K0$=K0$+"0": GOTO 71
00072 RETURN

00073 CURS 1,16: PRINT [A63 32];: CURS 1,16: RETURN
```

Under The Spotlight

Spotlight, distributed in Australia by Imagineering, is described as a 'desktop manager'. Tim Hartnell tries to put it to work, managing his untidy life.

I MUST DECLARE an interest. I am a lifelong convert to the Borland Sidekick school of hidden computer accessories. All my AUTOEXEC.BAT files include SK to boot up Sidekick, and I find I refer to the calendar and calculator in Sidekick many times each working day. So a new program which purports to assist me in the way in which Sidekick does has a pretty hard road to hoe.

To be fair, Spotlight does a great deal more than Sidekick does — but you need to weigh the extra capabilities against the hassle of installing and using it.

There are six functions in the program; appointment book, DOS filer, phone book (with autodialer for a Hayes-compatible modem), note pad, index card file and calculator.

Spotlight is not memory-resident. Although the handler (the Spotlight core) is memory-resident, sitting under your program, waiting for you to hold down the Shift and Alt keys, the accessories themselves are not.

The RAM resident portion of the program eats up 75K, more than the whole of Sidekick, which only needs just over 66K in all without the optional HELP file. The accessory files themselves must be on disk to be of any use. This is no hassle when you're working with a hard disk, but a pig when you're stuck (as I am) with floppies.

If you have a hard disk, skip the next bit where I continue to lament the hassles which are needed to run the program with two floppies.

The unpleasantness continues. Spotlight has a weird protection scheme built in which only allows you to make two copies. If I was to use the program consistently, I would need a copy on each of the major program disks I live with each working day: Wordstar, Gemdraw, BASIC, Personal Publisher, Fontasy and Dynadesk. I cannot make six copies. I cannot keep a Spotlight disk hogging a drive all the time. Therefore, I cannot use Spotlight. The alternative to this is to copy the accessory files themselves onto the relevant disks (you can copy these quite happily without restriction), and use a legit copy of the core when first booting up. Again, that seems more hassle than it's worth.

All the programs I need with Wordstar, for example (my RAM disk, Sidekick, print spooler, key buffer extender and so on) are in an AUTOEXEC.BAT file, on the WordStar disk. When I want to use WordStar, I simply turn the computer on with the disk in place, or do a reboot. I could not countenance going through an extra disk change, just to keep Lotus (who wrote Spotlight) happy. Life is too short to play the floppy disk shuffle.

I called the Lotus Hotline — (02) 663-3941 — about this, and they said that I was not the first person to bemoan the limited number of copies, but they knew of no plans to release an unprotected version.

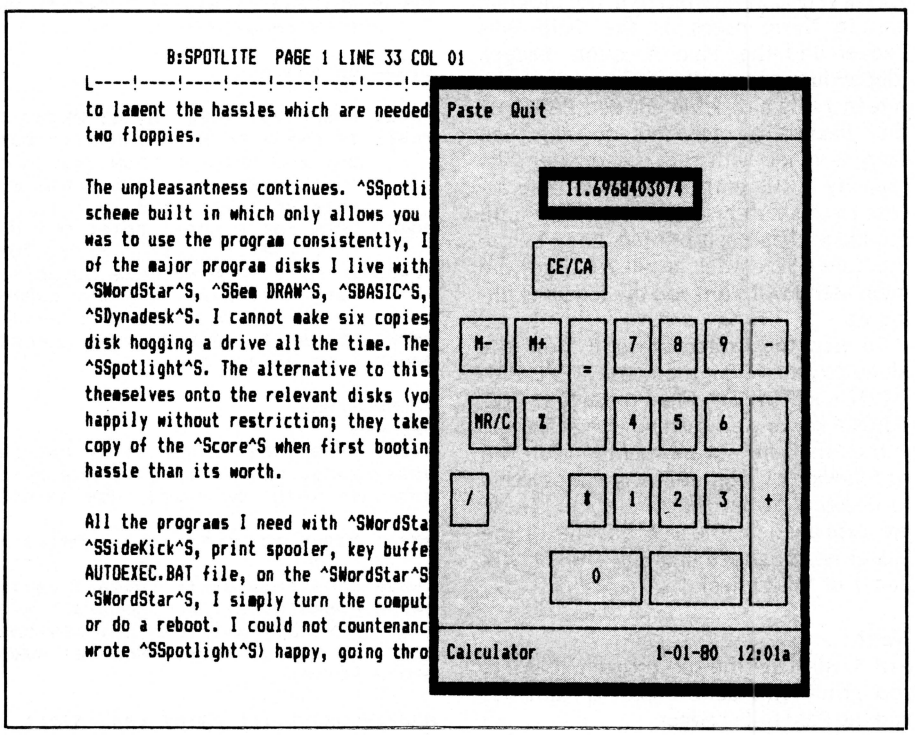
Putting It On The Spot

Anyway, having overcome that problem, or learned to live with it, how good is the program?

Before you find out, you really ought to copy the program. To make your two legitimate copies (and Copywrite doesn't work; I tried it. Spotlight recognizes the pirated copy and freezes up with a self-righteous message) you have to follow an installation program. If you want to wipe one of your legit copies — to move it to another disk — you have to uninstall the first copy to your master, then through the installation process again to make a new legit copy.

If you screw up a disk by using it as a drink coater, or by sticking it to your fridge with a magnetic holder, stiff. You've lost half your investment (although a damaged master disk will be replaced free within 90 days, or for $30 after that). Does Lotus really think its program is so wonderful that people will put up with being treated like naughty little performing seals in order to use it? If I wasn't reviewing the program, I would have packed it up and demanded my money back at this point.

However, I forged on, in the interests of *Your Computer* readers (and the folk at



Imagineering who are, no doubt, cursing me at about this point in the review, and vowing never to let me near one of their packages again: "Don't let Tim Hartnell review any of our stuff — he says what he thinks!").

Now, as I mentioned, to call up an accessory, you must have two things: a legitimate copy of the core program up and running under whatever program you're running on your computer, and the accessory file itself on disk. As well, you have to have enough spare memory to load the accessory. Note that some of the accessories (such as an appointments book) produce data files, so you will need disk space for these.

When you call up an accessory on the screen, a drop-down window appears, with its shape depending on the accessory you have chosen. The windows are divided into three areas: the menu/prompt area at the top, the contents in the middle, and the name and date/time at the bottom.

The menu/prompt area takes up one or two lines at the top of the accessory window, and contains a list of commands for using the accessory. The large area in the middle of the window is the contents window, where you actually do the work associated with the accessory. At the bottom of every accessory window is a line that shows you the name of the accessory and the current date and time.

The Appointment Book

This places items in, and displays, a daily schedule, a weekly, or a monthly calendar. It sounds an alarm to remind you of appointments (even while you're using another program), automatically schedules weekly meetings which occur on a regular basis, indicates overlapping meetings, displays the daily schedule in 15-, 30- or 60-minute intervals (Oh! for a life so predictable, and so ordered!) and can accommodate up to 90(!) meetings a day.

The DOS Filer, a genuinely useful accessory (similar, although more limited, programs exist in the Public Domain), allows you to perform operating system tasks without leaving your current program. You can do such things as formatting disks; display, copy, delete and rename files; and list, create, delete and sort directories, all without leaving your principle program.

The phone book holds up to 500 different entries in each data list (and can search 'instantly' through 36 such lists for a name, address and phone number you want). Version 1.1 of the program, the one provided for review, will also dial numbers for you (this feature was not on 1.0) — simply by move your cursor to the start of the number you want to call.

The note pad gives you eight separate pages for text, within the framework of a simple word-processor, and saves the text in a DOS file you can later edit with your own word processor; it will also print your text.

The index card file can, like the phone book (of which it is a cousin), maintain up to 36 separate indexed lists, store up to 500 entries in alphabetical order in a single list, search for entries which you specify, and print the whole list, or single entries.

Finally, the calculator (which uses the numeric keypad, automatically setting 'Num Lock', so the arrow keys don't work), includes the four basic arithmetic functions, memory keys, constants and a percent key, and inserts results into the program you're using.

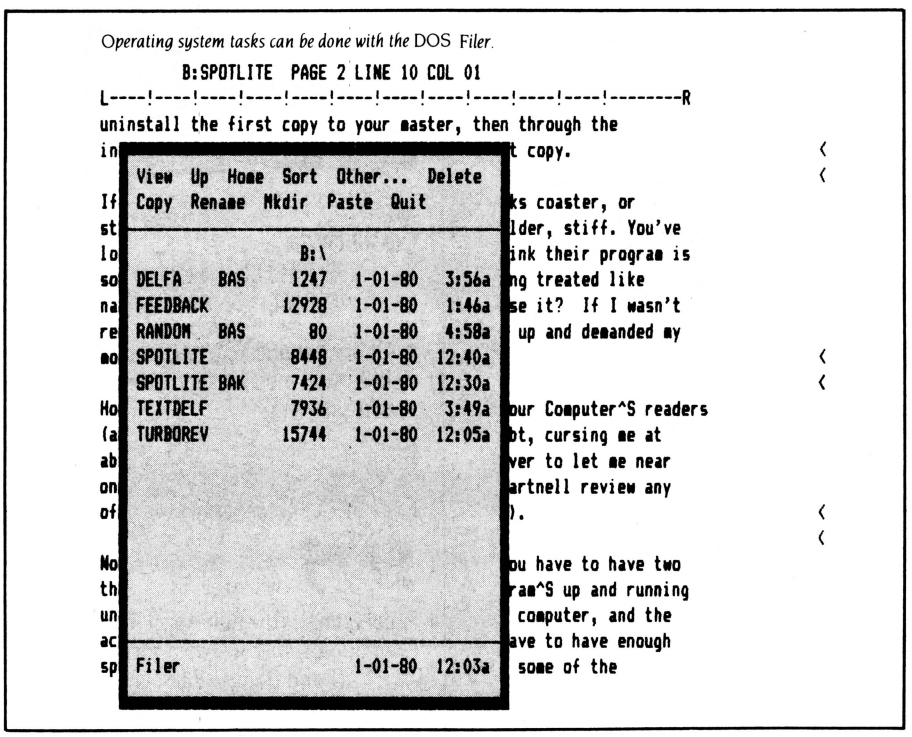
To run the program, you need an IBM PC or XT, or COMPAQ (the documentation says nothing about any other clones), 75K spare RAM for the resident bit, and additional RAM for the accessories themselves, DOS 2.0 or higher. It costs $140.

The real question, at the end of the day (or the review) is: Do you want it? I couldn't face using it. If I had a hard disk, and thought I would never need more than two copies of the program, it certainly would be worth considering. If you're a floppy person, like me, and you only have two programs around which you base your life (or you're incredibly organised and patient, and are willing to load in the handler separately each time you use your computer), Spotlight might be just what you need.

But for me, until it is released in a completely unprotected form, I'll dial my own phone numbers, and stick with Sidekick. I'll not be a performing seal for any software company. □

PRODUCT DETAILS

Product:	Spotlight
Manufacturer:	Lotus Corp, USA
Review Copy:	Imagineering Pty Ltd, 77 Dunning Ave, Rosebery 2018. (02) 662-4499
RRP:	$140



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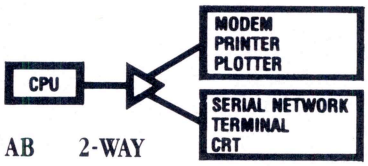

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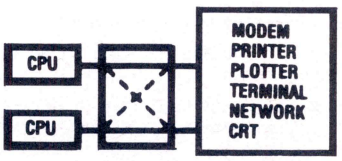

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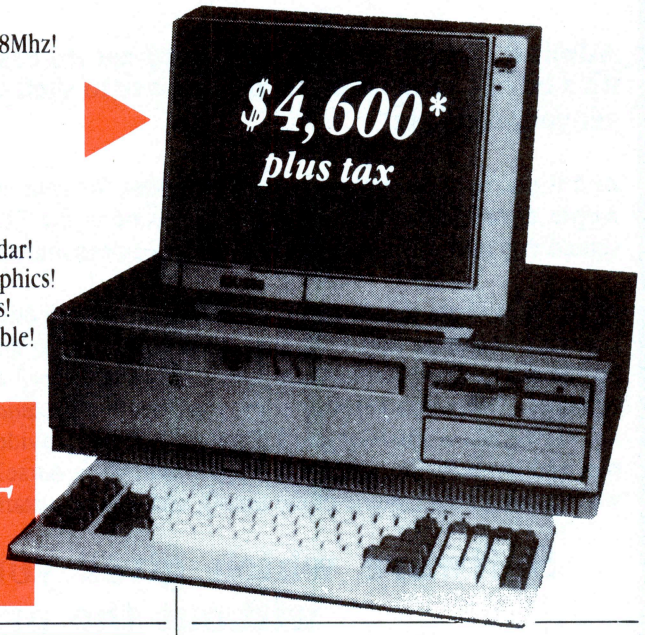

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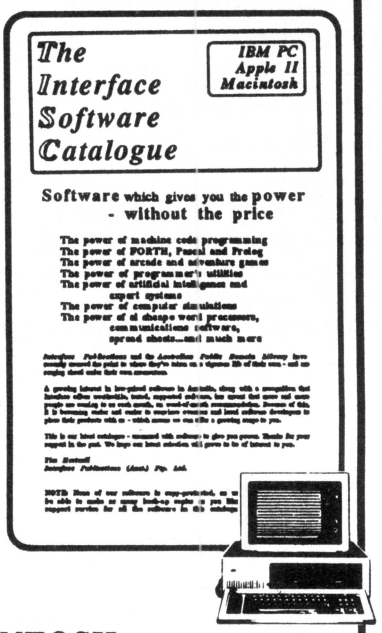

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THE LES BELL ENCYCLOPEDIA OF BATCH FILE PROGRAMMING—Part 2







Batch files are text files containing, at the elementary level, sequences of DOS commands and programs to be run. The most common use of batch files is to ensure that a sequence of commands is executed correctly, without relying on the user's memory to get it right. Remember? Here's another batch.

YOU LEFT ME last month engrossed in making batch files interactive, using the public domain program ASK.COM. More powerful is the ability to use environment variables within batch files. There are several ways this can be done.

The simplest way to set an environment variable is to set it using the SET command. For example:

```
SET USER=Fred
```

In typing a SET command, do not type any spaces around the equals sign — they seem to upset the command. The command is not case sensitive; the variable name is always transferred into upper case when it is stored, while the value is stored exactly as you type it.

You can type a SET command before running the batch file, or alternatively you can incorporate the SET command into the batch file. However, there is a restriction on SETting environment variables from within batch files: the operation of the batch file processor restricts the growth of the environment, so that only a few strings can be stored there. By contrast, if you keep setting strings into the environment manually, it can expand up to 32 Kbytes in size.

There is a public domain utility (I forget what it's called, unfortunately) which does for environment variables what ASK does for the ERRORLEVEL. In other words, it is like a BASIC INPUT statement for batch files. By the time this appears in print, you can expect to see either that program or one of mine that does the same thing on the *Your Computer* Bulletin Board. I would have had one written in C except that my C compiler can only read environment

variables, not write them.

Having got a value stored in an environment variable, how do you access it from within a batch file? The answer (not described anywhere in the DOS documentation, incidentally) is yet another variant on the use of percentage signs. To extract the value of variable 'envvar' in a batch file, simply refer to it as '%envvar%.' For example, in a user logon batch file:

IF '%HELP%'=='ON' TYPE LOGON.HLP

This will type a help file should the user require it. You can similarly store passwords and other information in the environment.

Wildcard Expansion

Several DOS commands, and other programs, do not accept wildcards in the filenames passed to them. For example, the DOS FIND command, a very useful little Chinese copy of the UNIX grep command, accepts a list of filenames, but no wildcards, which is rather inconvenient. Its syntax is:

FIND [flags] "string" filelist

This means that to search all .LET files for a particular name, you would have to give the full list of all filenames — in other words, run a DIR command to find all the .LET files first. Isn't this the kind of repetitive task the computer is supposed to do for you?

A solution comes to us courtesy of the DOS FOR batch command. Wildcards are permissible in the parameter list of the FOR command, and are automatically expanded. So, we can easily create a batch file to search all .LET (or any other type) files for a string:

```
ECHO OFF
FOR %%V IN (%2) DO FIND %1 %%V
```

If we call this batch file GREP.BAT (cheeky, but meaningful!) we can invoke it with a command like

C: C86>GREP "printf" *.C

which will search all the C source files in this subdirectory to find those containing calls to the printf function. Likewise:

C: C86>GREP "Smith" *.LET

will find all letters which mention a person called Smith.

Redirection and Batch Files

If you want to save all the output from the GREP batch file into a text file for later perusal with a word processor or editor, you cannot simply type –

C: C86>GREP "Smith" *.LET >GREP.OUT

This will just create an empty GREP.OUT file, and the output of the FIND commands will go to the screen as usual. Instead, the redirection must be applied inside the batch file. However, you cannot simply use output redirection, because each time the FIND command is run, its output will overwrite the file created by the previous run — so only the output from the last FIND will be saved.

To get around this, we must use **append redirection**, which sends its output to the end of the target file, after any existing material. Now the problem is that if we write append redirection into the batch file, it will simply append its output onto any previous run of the batch file, instead of creating a fresh, new file. No problem: I had already written a program called MAKE.C which creates an empty file, in connection with a command logging system I had developed — see Listing 1.

```
/* Make empty file for history and similar utilities */

#include "stdio.h"

main(argc,argv)
int argc;
char **argv;
{
        FILE *f;

        if(argc != 2) {
                printf("Usage: make filename");
                exit(1);
        }
        if((f = fopen(argv[1],"w")) == 0) {
                printf("make: Unable to make file %s",argv[1]);
                exit(1);
        }
        fclose(f);
}
```

Listing 1. MAKE.C

Listing 2 shows a rather smarter batch file, which will send its output to the screen or to an optional output file. It is left as an exercise to the reader (shades of school textbooks!) to add optional append or overwrite of the file %3.

```
echo off
if '%3'=='' GOTO nosave
make %3
for %%v in (%2) do find %1 %%v >> %3
goto end
:nosave
for %%v in (%2) do find %1 %%v
:end
```

Listing 2.

Redirection is useful for other purposes, too. For example, in a batch file, you may want to change the PATH searched for program files, and then set it back the way it was later. How can you store the current PATH setting?

The answer is this technique:

```
PATH >OLDPATH.BAT
.
(batch processing)
.
COMMAND /C OLDPATH
```

The batch file OLDPATH.BAT will contain a single line of the format

PATH=C: ;C: BIN;C: C86

or whatever applies to your system. When it is executed it sets the path back the way it was.

Dynamic System Configuration

A common problem with departmental PCs is the sharing of PCs between users who have conflicting requirements. For example, one user might use the machine with dBase III, and might want a 256 Kbyte memory disk drive, while the other user wants as much main memory as possible in order to run large Lotus 1-2-3 spreadsheets.

Since (under DOS 3.1) the memory drive is set up by the CONFIG.SYS file, changing the system around means editing that file, saving it and then rebooting. This process is tedious and prone to error but it can be automated thus –

First, create the two different CONFIG.SYS files, in your BIN subdirectory, under two different names. For example, LOTUS.SYS:

```
COUNTRY=061
```

and DBASE.SYS:

```
DEVICE=VDISK.SYS 256
BUFFERS=30
FILES=20
COUNTRY=061
```

Now, create two batch files, as follows. First, DBASEMEM.BAT:

```
ECHO OFF
COPY BIN DBASE.SYS CONFIG.SYS
REBOOT
```

and then LOTUSMEM.BAT:

```
ECHO OFF
COPY BIN LOTUS.SYS CONFIG.SYS
REBOOT
```

giving the command

```
C: BIN>LOTUSMEM
```

will copy the appropriate contents into CONFIG.SYS and then reboot the system, while

```
C: BIN>DBASEMEM
```

will set it up for dBase. The only thing you need is the REBOOT command, which is given in Listing 3. (A machine-readable version will be found on the YC Bulletin Board).

The same technique can be applied to selecting one of multiple copies of AUTOEXEC.BAT. The only restriction is that REBOOT.EXE does not work if there is co-resident software — like Sidekick — in memory.

```
main()
{
        int sysint();
        sysint(0x19,0,0);
}
```

Listing 3. REBOOT.C

Memory Drives

DOS 3.1 comes with a device driver — VDISK.SYS — which implements a memory virtual disk drive; in other words, it uses part of memory as a pseudo disk drive. Most multi-function and memory cards come with a similar piece of software. I'll refer to these memory drives as vdisks.

To the user, the vdisk appears to be a small hard disk. It is very fast — typically three times faster than a hard disk — and quite reliable (it has no moving parts). However, it has one major drawback — unlike a real disk, it is volatile; the contents are lost when the power goes off.

While the probability of that may be low, there is still the possibility of someone tripping over the power cord — that's not too bad, since you can always hit them. But when you finish work for the day and switch off, only to realise that you haven't copied the vdisk contents back to a real disk, the frustration reaches a high point.

In order to avoid disaster, therefore, some guidelines should be followed for the use of vdisks:

1. Never, never put anything valuable into a vdisk. Live databases, for example, should not be placed in vdisk; however, database index files, which can be automatically recreated, are fair game.
2. Automate the operation of the vdisk by the use of a batch file.
3. Put the most frequently accessed files in the vdisk.

For example, in running dBase applications (a typical application where a vdisk

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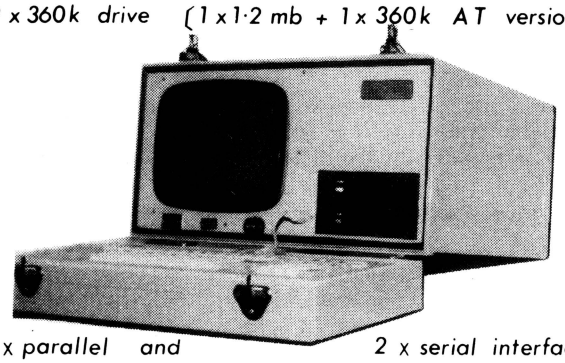

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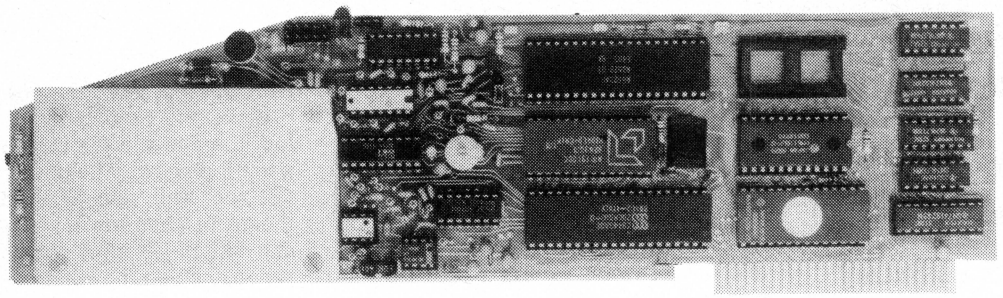

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Sending/receiving files is very simple:—
— Press "ESC" to display menu.
— Select "(S) END A FILE" option
— Answer the prompt "FILENAME?:"

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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makes a big difference) files should be handled as shown in Table 1. And the system should be automated with a batch file as shown in Listing 2 (assume hard disk C: and vdisk D:).

What Does It All Mean?

In this article, I hope I've shown you some of the power of batch files, some of the intricate things you can do with them. I hope I've also corrected the poor documentation from both Microsoft and IBM on this subject, and provided you with some useful tips and techniques. In addition, I've suggested ways in which the batch processing facility can be made more useful with the addition of some simple C or assembler utilities.

Where do you go from here? Undoubtedly, you'll have some problems of your own which are particularly amenable to batch file solutions. If you want to practice your batch file programming skills, here are some suggested applications:

- Menus,
- System configuration in response to user login,
- Electronic Mail,
- Security,
- Subdirectory clean-up,
- Location of overlay files, and
- Moving files between subdirectories.

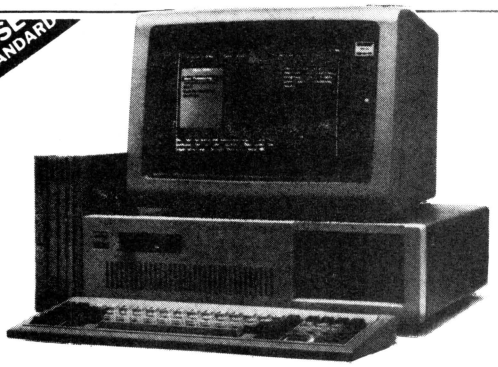
.DBF (database files)	left on hard disk (too valuable)
.NDX (index files)	possibly placed on vdisk
.PRG (command files)	definitely on vdisk
.FMT (screen format files)	definitely on vdisk
.FRM (report format files)	left on hard disk (slow anyway)
DBASE.COM	left on hard disk (accessed once only)
DBASEOVR.COM	definitely on vdisk (accessed very frequently)

Table 1.

```
ECHO OFF
ECHO Copying files, please wait
COPY C:*.PRG D:
COPY C:*.FRM D:
COPY C:DBASEOVR.COM D:
COPY C:*.NDX D:                 <- if room
D:
C:DBASE <application name>
COPY *.NDX C: /V                <- copy index files back
C:
```

Listing 4.

Good luck with your batch file programming. If you come up with an interesting technique, share it with other YC readers by sending it to us at the magazine. I'll persuade Natalie to pay for contributions used, or even offer a prize for the best! □



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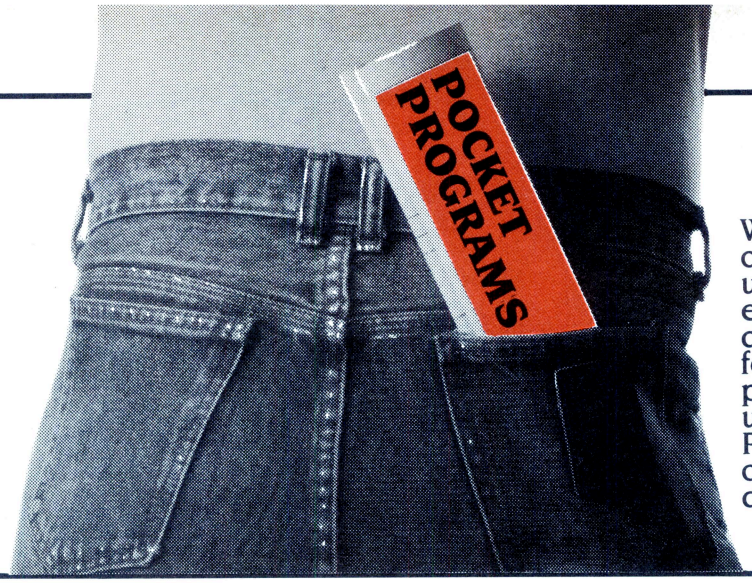

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EXPR.C

(A program to evaluate expressions)

EXPR IS AN EXAMPLE of a recursive descent parser. It accepts an arithmetic expression, such as ((9+9)*(4^3)), parses the expression, evaluates it and returns the value of the expression. This is useful as a stand-alone routine and as a library routine for incorporation into programs.

The grammar (that is, the format of the expressions which can be successfully evaluated) is as follows:

expr –> fterm {sign term}
fterm –> sterm | term
term –> sign term
term –> factor {multop factor}
factor –> efact {^ efact}
efact –> number | (expr)
multop –> * | /
sign –> + | –

The vertical bar indicates alternatives, and the braces indicate optional parts of the expression.

I have not defined number in the grammar. The function 'number' will evaluate just about any number expressed in standard scientific notation.

This grammar means the power operator (^) has highest precedence, followed by multiplication and division, then addition and subtraction. Parentheses may be used to alter the order of evaluation of expressions. Evaluation of operators is from left to right for operators of the same precedence.

A special case is the null string. If a null string is passed to the parser it will return an error. This error can be tested by the calling program. In some other routines, such as VAL() in BASIC, a value of zero will be returned to the calling program if a null string is passed.

```
/* expr.c
 Parses an arithmetic expression and prints the result
*/

#include "stdio.h"
#include "math.h"
#include "ctype.h"

#define null  0
#define false 0
#define true  1

double parse();
static double expr(), term(), factor(), efact(), number();
/*****************************************************************/
main ()

{
char buf[80];
int i, errpos, err, end;
double lval;

printf ("Enter expression or <CR> to exit\n");

end = false;
while (!end)
    {
    printf ("----> ");
    if (gets (buf) == null || !*buf)
        end = true;
    else
        {
        err = false;
        lval = parse (buf, &err);
        if (err)
            {
            printf ("%s\n", buf);
            errpos = (int)lval;
            for (i = 1; i < errpos; i++)
                printf(" ");
            printf("^\n\r");
            switch (err)
                {
                case 1 : printf("No valid number found\n\r"); break;
                case 2 : printf("Illegal character\n\r"); break;
                case 3 : printf("Missing parenthesis\n\r"); break;
                case 4 : printf("Null string entered\n\r"); break;
                default : break;
                }
            }
        else
            printf ("%s = %f\n", buf, lval);
        }
    }
}
```

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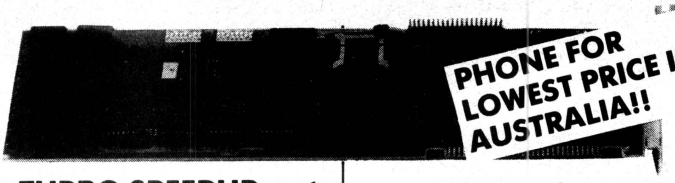

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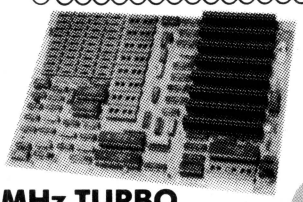

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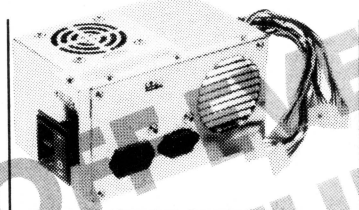

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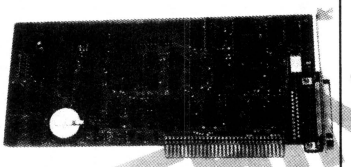

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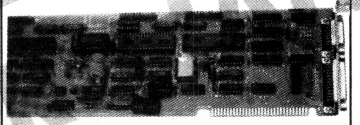

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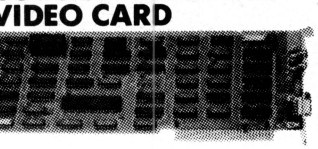

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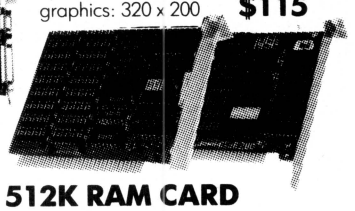

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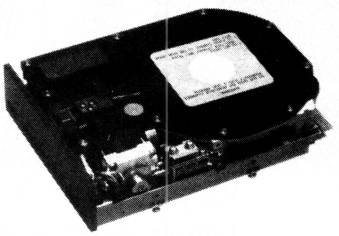

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TULDIN ES/4

Compiling the Program

This program has been compiled on an Apple II using Aztec C, and on an NEC APC III using Hi-tech C. The program uses standard K&R C and should compile with any compiler. The stdio and math (floating point) libraries are used.

One possible problem is the way in which carriage return (CR) and line feed (LF) are handled by the compiler. Unix uses LF as a line terminator, Apple DOS 3.3 uses CR and MS-DOS uses CR/LF. Your compiler may use some sort of conversion to try and sort out this confusion, so be prepared to change some of the n and r metasymbols in the printf statements.

The program can be used as a standalone utility by compiling it as it stands, or as a library routine by deleting the main routine and compiling to an object file which can be linked in to a calling program. In the latter case it would have to be declared in the calling program as 'double parse()'.

The variable 'str' and the functions called underneath 'parse' are all declared as static, so when compiled as a library function they are not visible. The only function visible to the calling program is 'parse'.

'Str' points at the next character to be processed in the input string. It is global, so all called functions can use it. Most parsers use a special routine to get the next character (or 'token') from the input string. This is a fairly simple parser, so I thought it would be easier if each function did its own token-getting.

The function 'number' is itself useful for evaluatingnumbers, and could be compiled separately with very little additional work. The 'return' statement at the end of the function contains a quite complex arithmetic expression, and this may cause problems with some compilers — it shouldn't, but you never know . . .

How it Works

The program is a good example of the power of recursion as a simple means of evaluating complex expressions.

```
/*************************************************************/

static char *str;
/*******************************************************/
double parse (expression, err)

char *expression;
int  *err;

{
double rval;

if (*expression == null) {
    *err = 4;
    return (1);
}
removespaces(expression);
str = expression;
rval = expr(err);
if (!(*err) && *str != null) /* parsing aborted by error char */
    *err = 2;
if (*err)
    return (str - expression + 1);
else
    return (rval);
}
/*******************************************************/
static double expr(err)
int *err;

/* evaluate :
expr  -> fterm { sign term }
fterm -> sterm | term
sterm -> sign term
*/

{
double lval;
int sign;

switch (*str)
    {
    case '+'  : sign =  1; str++; break;
    case '-'  : sign = -1; str++; break;
    default   : sign =  1; break;
    }
lval = sign * term (err);
if (*err)
    return (0);
while (*str == '+' || *str == '-')
    {
    switch (*str)
        {
        case '+'  : str++; lval += term (err); break;
        case '-'  : str++; lval -= term (err); break;
        default   : break;
        }
    if (*err)
        return (0);
    }
return (lval);
}
```

The main routine passes to parse a pointer to a buffer containing the expression to be evaluated, and a pointer to an error flag. The address of the error flag is passed down all the routines in the program and is tested at each level. The computed value of the parse string is returned, unless an error is detected when the position (first character of the expression = 1) of the illegal character is returned.

A value of zero in the error flag indicates no error. A value of –
1 = no valid number found,
2 = illegal character detected,
3 = missing parenthesis, and
4 = null string.
In this program I have tested the case statement for the return of a null string error, but in practise an error will never occur because this has already been used as the test for termination of the program. I put it in to demonstrate how it might be done.

The function parse tests for the special case of a null string, removes white space from the string, then calls expr to start the hard work. When expr returns, parse returns the appropriate value to the calling routine.

To demonstrate how it works I will show how the program handles the two strings '1' and '(1+2)'.

The main routine accepts the string '1' and passes its address (the pointer 'buf' — don't forget that an array variable is treated by C as a pointer) to parse, along with the address of the error flag. Parse removes the spaces (there aren't any in this case) and calls expr. Expr doesn't find a sign, so assumes the expression is positive, and calls term. Term calls factor immediately, to evaluate the first part of the expression — it doesn't know yet that there is no multop for it to evaluate. Similarly, factor calls efact, which has to decide whether to call the number function or to recurse back to expr. In this case it calls number, which figures out that the string '1' has a value of 1. By this time, str is pointing at the null character marking the end of the input string. The value 1 is then returned back through efact,

```
/*******************************************************/

static double term (err)

int *err;

/* evaluate :
term -> factor { multop factor }
*/

{
double lval, rval;

lval = factor (err);
if (*err)
    return (0);
while (*str == '*' || *str =='/')
    {
    switch (*str)
        {
        case '*'  : str++;
                    rval = factor (err);
                    if (*err)
                        return (0);
                    lval *= rval;
                    break;
        case '/'  : str++;
                    rval = factor (err);
                    if (*err)
                        return (0);
                    lval /= rval;
                    break;
        default   : break;
        }
    }
return (lval);
}

/*******************************************************/

static double factor(err)

int *err;

/* evaluate :
factor -> efact { ^ efact }
*/

{
double lval, rval;

lval = efact (err);
if (*err)
    return (0);
while (*str == '^')
    {
    str++;
    rval = efact (err);
    if (*err)
        return (0);
    lval = pow (lval, rval);
    }
return (lval);
}
```

factor, term and expr, which check that the character being pointed at is nothing to do with them. Parse accepts this value and checks that the end of string has indeed been reached. It then passes the value back to main, which prints the value on the terminal and asks for the next string.

With the string '(1+2)', events proceed similarly until control reaches efact. Efact finds a '(' and calls expr to evaluate what we know is the expression '1+2'. The first character of this expression is '1', so evaluation proceeds as in the previous example, with control passing down through term, factor, efact and number, which returns 1, then back through efact, factor and term until control returns to expr. Expr sees that the next character is a '+', so it again goes through the same sequence to evaluate '2'. Expr adds the values 1 and 2, and returns the result of 3 to its calling routine, which is efact. Efact checks for the closing parenthesis and control passes back up the sequence to parse, which checks for end of string and returns control to main.

It's easy to see why this is called a recursive descent parser. A simple string went down the series of functions three times before a result was returned. In fact, the sequence occurs once for every number and every pair of parentheses in the expression to be evaluated, and the parentheses generate a recursive call each time.

If you want more information on the techniques used here, a good reference is Aho and Ullman's text *Principles of Compiler Design*.

Peter Greenacre,
Camperdown, NSW.

```
/*******************************************************/

static double efact(err)

int *err;

/* evaluate :
efact -> number ! (expr)
*/

{
double lval;

if (*str == '(')
    {
    str++;
    lval = expr (err);
    if (*err)
        return (0);
    if (*str == ')')
        str++;
    else
        {
        *err = 3;
        return (0);
        }
    }
else
    {
    lval = number (err);

    if (*err)
        return (0);
    }
return (lval);
}

/*******************************************************/
static double number(err)

int *err;

{
double sign = 1;   /* sign of number */
double numpart = 0;     /* number part */
double nfrac = 0;  /* number of digits in frac part */
double esign = 1;  /* sign of exponent */
double epart = 0;  /* exp part */
int numfound = false;      /* to test if a valid number has been found */

/* get optional leading sign */
switch (*str)   .
    {
    case '+'  : sign =  1; str++; break;
    case '-'  : sign = -1; str++; break;
    default   : sign =  1; break;
    }

/* get the whole part */
while (*str && isdigit(*str))
    {
    numpart = (numpart * 10) + (*str - '0');
    numfound = true;
    str++;
    }
```

```
/* if dp found get frac part */
if (*str == '.')
    {
    str++;
    while (*str && isdigit(*str))
        {
        /* contine to get the numeric part */
        numpart = (numpart * 10) + (*str - '0');
        numfound = true;
        str++;
        nfrac++;
        }
    }
/* check now for a valid number */
if (!numfound)
    {
    *err = 1;
    return(0);
    }

/* if 'e' found get epart */
if (*str == 'e' || *str == 'E')
    {
    str++;
    /* get optional leading sign of epart */
    switch (*str)
        {
        case '+'  : esign =  1; str++; break;
        case '-'  : esign = -1; str++; break;
        default   : esign =  1; break;
        }
    while (*str && isdigit(*str))
        {
        epart = (epart * 10) + (*str - '0');
        str++;
        }
    }

/* put the whole lot together */
return (sign * numpart * pow (10.0, (esign * epart) - nfrac));
}
/*****************************************************/

static int removespaces(sp)
    /* remove white space from the string pointed to by sp */

char *sp;

{
char *np; /* points at the end of the crunched string */

np = sp;
while (*sp != null)
    {
    if (*sp != ' ' && *sp != '\t')
        {
        *np = *sp;
        np++;
        }
    sp++;
    }
*np = null;
}
/*****************************************************/
```


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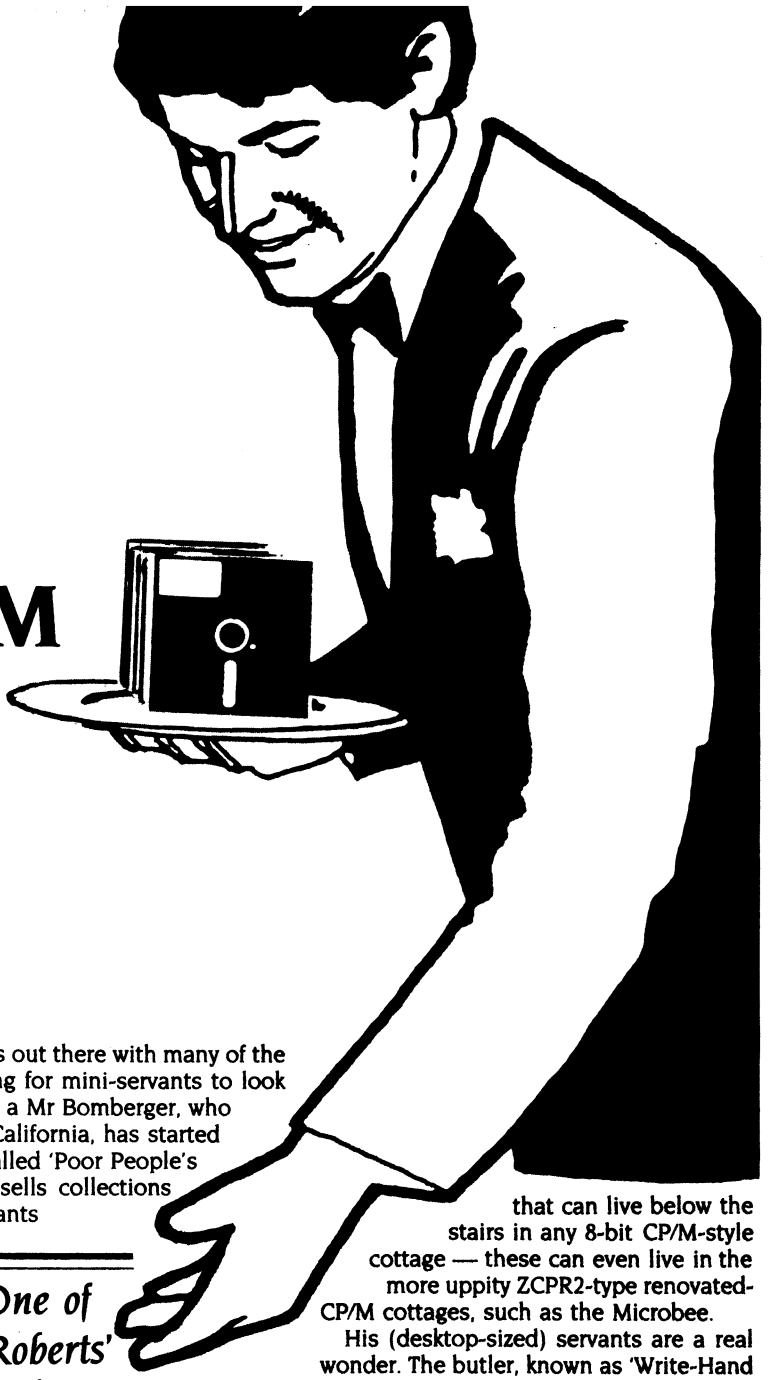
KEEPING THE 8-BIT CP/M HOUSE IN ORDER



I HAVE A PASSION for programs that poke themselves away in corners of my computer's memory ready for instant service whenever I need them. It's like having a squad of servants at my beck and call.

In a back room, behind my (16-bit) word processing secretary, I keep my clock man, note-taking maid and keyboard engineer. The clock man rushes out every hour and beeps at me. The maid and engineer *never* go off for tea breaks. They are always there whenever I press the key that summons them.

However, they do have a dreadful appetite and are quite fat. If I packed all my (16-bit memory-resident) servants in at once, they would fill over 200 Kbytes of memory. As I also have a penchant for setting aside part of my house for use as an ultra-fast RAM disk, my 16-bit servants are mostly confined to living out in the garage, with only the slimmest and most versatile ones allowed a permanent room in the manor.

Now anyone would think that the 'humble' 8-bit computer, which usually has a mere gardener's cottage of 64 Kbytes, only one-tenth the size of a 16-bit mansion, would have no room at all for live-in servants.

Have Hired Help will Budget

But necessity is the mother of invention. There are hundreds of thousands of sturdy 8-bit machines out there with many of the owners begging for mini-servants to look after them. So a Mr Bomberger, who lives over in California, has started a company called 'Poor People's Software'. He sells collections of dwarf servants that can live below the stairs in any 8-bit CP/M-style cottage — these can even live in the more uppity ZCPR2-type renovated-CP/M cottages, such as the Microbee.

One of Jan Roberts' favourite things is having lots of memory-resident programs to call on for assistance. Write-Hand Man has achieved permanent residency in the back room of Jan's Bee bringing with it a staff of poor people's servants — they don't eat much and never take a break.

His (desktop-sized) servants are a real wonder. The butler, known as 'Write-Hand Man', is only 1.5 Kbytes in size. When you summon him by pressing the key you have designated, he appears instantly, right in the middle of your document or spreadsheet, and asks what other servants you require. He has a dozen at his beck and call.

There's the Notepad. This is a very efficient secretary, who automatically adds pages to her notebook as you need them — so you can make as many notes as will fit onto the disk on which she normally lives.

In her notebook you can 'F'lip from page to page forwards or 'B'ackwards, insert or overtype, or delete either a character or a page at a time. You can 'J'ump to any page you wish.

By default, the Notebook takes up the top-left portion of the screen — but you can tell her to go elsewhere.

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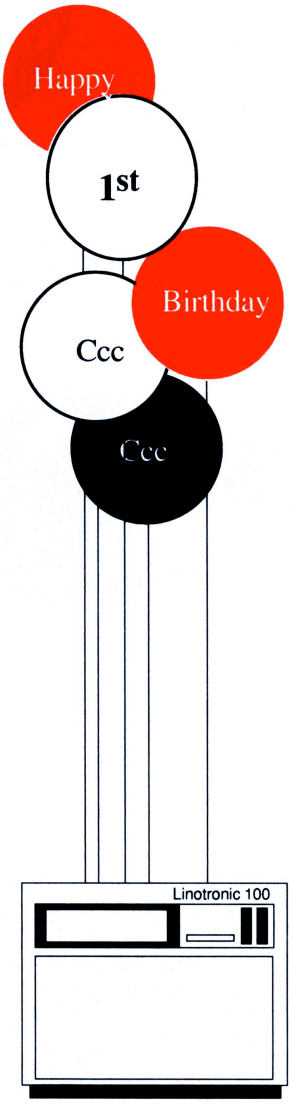

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She will rush off and save your notes safely onto disk as soon as you give her permission to go (by pressing Escape). She's up with things modern: you can 'C'ut notes out and put them onto a function key so they can be moved to other documents or to a calculator — she doesn't have a great memory for these notes,- but more about this latter.

You can also toggle the printer on and off and thus get an immediate hard copy of her notes. She's extremely efficient for so petite a person — under 2 Kbytes.

RELatively Speaking

All the servants (apart from the butler) are known as REL programs, and none are bigger than 2 Kbytes in size. They do, however, operate different-sized data tools, known as DAT files; the notepad's dat file, for example, grows in size as you use it.

Then there's the telephone clerk, known as the Phonebook, which comes in two sizes (one is a 'gigantic' 20 Kbytes). You can page through the book, or summon any group of names by their first letter. As with the notebook, basic Wordstar editing commands are utilised to enter text. If you really want to update your communications, the Phonebook can arrange to send any selected telephone number automatically to your modem — but you must have a 'smartmodem' for this to be of any use.

The dat files of this troupe of helpers only come into memory as required — and if (and only if) any alterations are made they are immediately saved to disk when you finish with them.

As I mentioned before, it's only the 1.5 Kbyte butler that sits in memory all the time, and he also requires another 1.5 Kbytes, to give him some elbow room into which to load servants (applications). He will always go out and look for the servants both on the default drive and the A: drive (though I have found he is sometimes reluctant to go from a RAM drive to look at the A: drive.)

All the servants (apart from the butler) are known as REL programs, and none are bigger than 2 Kbytes in size. They do, however, operate different-sized data tools, known as DAT files; the notepad's dat file, for example, grows in size as you use it.

There are lots more servants on the butler's roll-call yet.

Many Hands Make Light Work

The appointments secretary (Calendar) keeps records two weeks in advance (okay, 16-bit calendar's have an elephantine memory — but they're sized like elephants, too). As you finish with one week, the next week's appointments become the current batch and a new blank week's diary appears for the following week.

Then there's the parking attendant, good old DIR, who manages the directories. The directory of any drive can be given on request, including those of specified user areas — they can even sorted by wildcard.

The librarian allows you to VIEW any document on request, giving programs such as Wordstar a windowing ability. You can't edit the documents you view, but the Librarian does have a magic pair of scissors: lines can either be truncated to allow for fast scrolling, or wrapped around to allow all words to be read. You can zip to the last page, back to the first, even set how many lines forwards or backwards you want to move each time you scroll. The magic scissors will also allow you to 'C'ut a selected part of the document to function key one, and to then PASTE this into the notepad or any other document. Only three lines of characters at a time can be moved using this method — short servants have short memories.

The accountant, Calculate, is pretty basic, but it has some useful functions. It has a floating point and takes numbers of up to 14 digits. It has memory — but only for one number at a time. The result of the calculation can be 'C'ut to function key 8, and thus be shifted into your work document or into Write-Hand Man's Notepad.

The final regular staff member is Ms. Key, who manages the household. She can program the number keys on the keyboard to perform any number of tasks — you chose (and can constantly change) a character to act as a 'trigger' or 'Alt' key, to change the number keys from humdrum numbers to programmable function keys.

The function keys are humble; they can only remember up to 15 characters each, which is enough for most control sequences, but very little if you are moving text. However, if you request more than 15 characters to be saved, the other function keys' memories will be utilised to save up to a maximum of 95 characters (linked to function key 1, so you only have to press '1' to recall them). You can reload the previously loaded set of Functions onto the keys with a simple Control 'O', for 'old' command. The function keys are best used for control sequences, addresses, formulae and numbers, rather than for general text.

However, if you want to store more on a key, you can use Smartkey (though not

```
 Write-Hand-Man      |
Enter Choice [ ]     |
  A - Notepad        |
  B - Phonebook      |
  C - Calendar       |
  D - Dir            |
  E - View           |
  F - Calculate      |
  G - Keys           |
  O - Other          |
-------------------
```

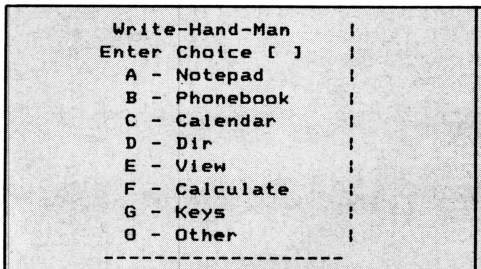

Figure 1. *WHM's Selection Menu appears in the upper left of the screen when the (user defined) call-up key is pressed.*

```
S  - Begin at START of file
E  -    Go to END   of file
F  - Scroll forward  ONE block
B  -   "    backward  "    "
+n -   "    forward   "n" blocks.  n ranges from 0 to 9
-n -   "    backward   "    "   .  "   "      "  0 to 9
T  - toggle the TRUNCATE flag.  The last character of the window
     indicates the truncate mode.
     If "|"  is visible, then the lines are being wrapped.
     If "T" is visible, then the records are being truncated.
     A change takes effect when the next block is displayed.
C  - Cut function, see below.
<ESC> - Return to file name prompt
```

Figure 2. *The files selected with WHM's VIEW are displayed in 128-byte blocks — the options are shown above.*

with the enhanced 8-bit Microbee system) or Qwikkey or Flashprint!! alongside Write-Hand Man. When I use Wordstar, I commonly have Write-Hand Man, Qwikkey and Flashprint!! tucked into memory alongside Wordstar. The combination of all four programs is incredibly useful. I have about 300 function keys available!

The Others

There are still more servants — but they stowaway under the final menu item of 'Other', which, when chosen, will prompt you for a filename to summon one of the following inflatable servants –

- There's another calculator which can toggle between decimal and hex.
- An ASCII listing.
- The powerful Wizard known as 'SWAP', allows you to run another program without exiting from the first. It does this by saving nearly the whole contents of memory onto disk and then reloading it after the chosen program has run. Thus you must have at least 50 Kbytes free on the default disk if you intend to use this utility — even if the program you are running is relatively small. SWAP is surrounded with cautions. Most importantly, you're warned about changing the directory of the disk; if you move or delete a program or part of a program which is required by your first program, when you return to it, it could well crash.

For Megalomaniacs

And if this mob of servants is not enough for you, Write-Hand Man — WHM to his friends — is supplied with instructions on how to use a relocatable assembler, to turn any of your favourite programs into a REL form that can be called up under WHM. A partially prepared telecommunications program is also provided, which only requires fine-tuning to meet your particular needs.

Write-Hand Man is not copy protected. It even comes with MAC files, to allow programming freaks to pry into its workings and make changes if desired. It doesn't have fancy graphics, but it is one of the neatest bits of programming around. I wish 16-bit programmers would take note. Many of their programs spread luxuriously through oceans of computer memory, making operations painfully slow if you haven't a hard disk.

WHM will run on most CP/M machines, including any 8-bit (ZCPR) disk Microbee (but Microbee owners must quit their Shell program to run WHM), Apples with CP/M, and with most implementations of CP/M Plus. I have tested it with Wordstar and dBase II without problems, and ran Qwikkey at the same time.

I think this must take the prize for the neatest, most useful and versatile, tiny program available. It is distributed in Australia by Glyphic Software, PO Box 391, Pennant Hills 2120,and costs $45 (including tax and postage). It is supplied in most CP/M formats, including Microbee (both disk sizes), Kaypro 2, Morrow Decision, Osborne DD and TRS-80. □

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You've probably heard of Modula-2, Niklaus Wirth's newest language: It's now available for a range of machines from JED Microprocessors.
This implementation was written in Australia, and is being sold world-wide. Jerry Pournelle in Byte, (April '86) loved it: now it's available for MS-DOS systems as well as CP/M Z-80 systems, with 68000 based versions in the mill.
It contains an integrated full-screen editor with fast compilation and linking from libraries, which makes it more powerful than Turbo-P., and much easier to use on large programs. You get 1 meg of software on three full disks, with full sources of the editor and many other modules and utilities. It produces fast, PROM-able code which closely follows Wirth's third edition, with 8087 and LONG support.

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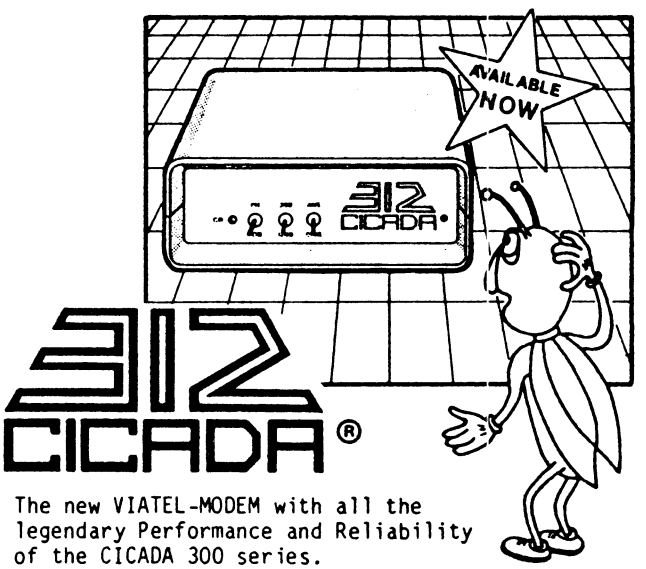

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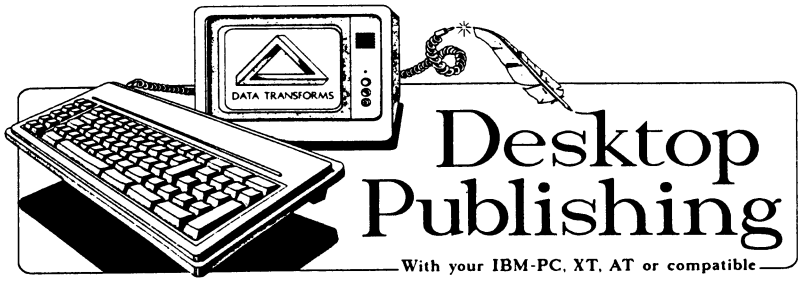

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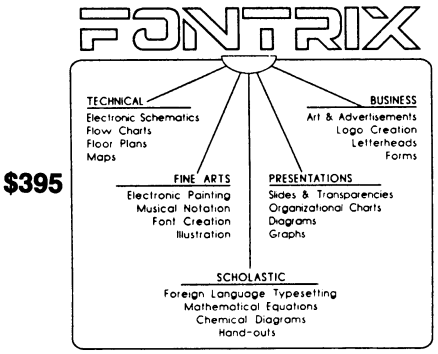

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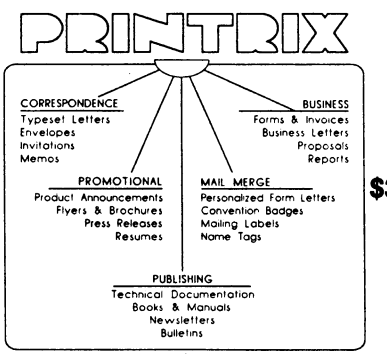

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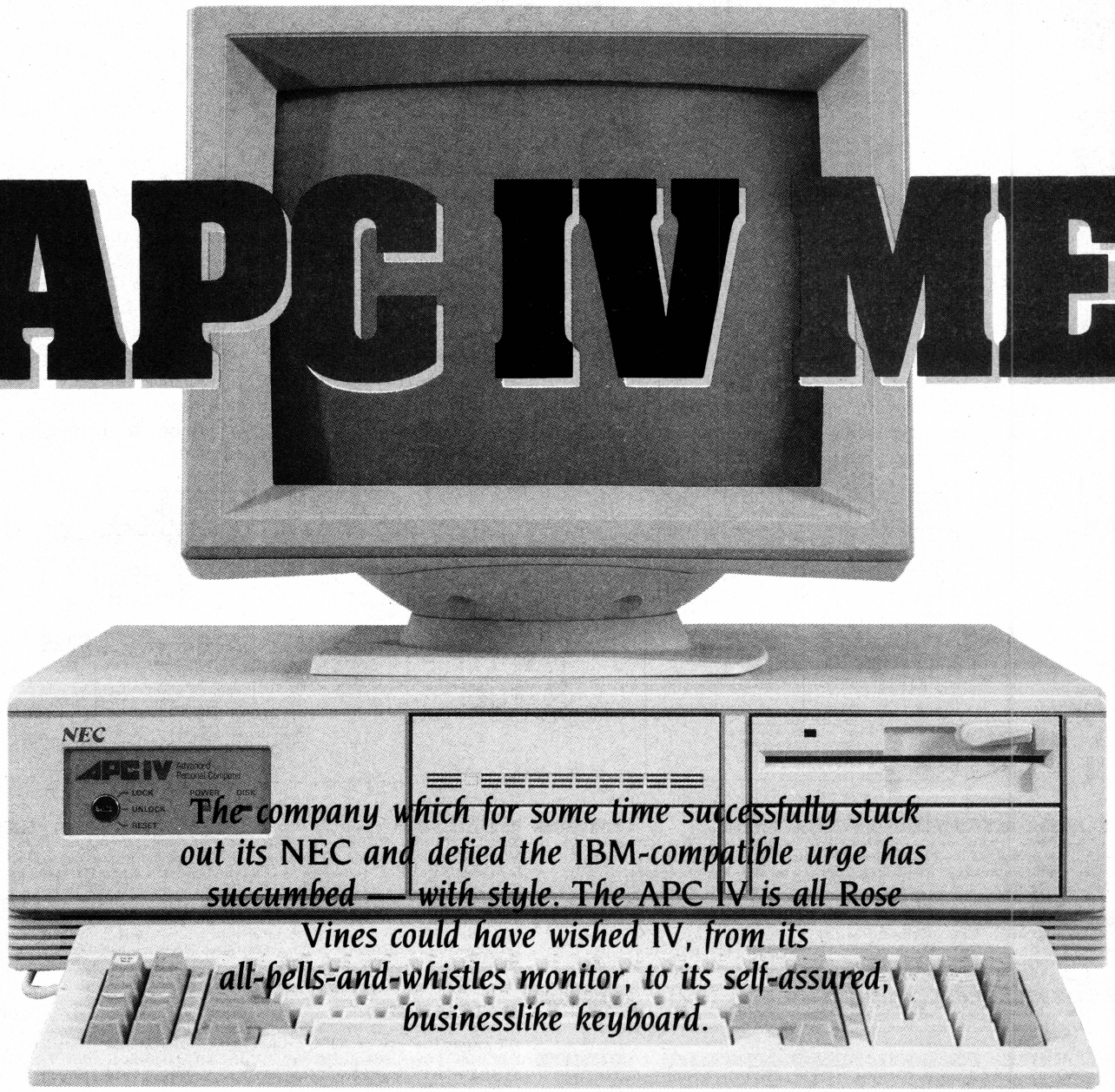


The company which for some time successfully stuck out its NEC and defied the IBM-compatible urge has succumbed — with style. The APC IV is all Rose Vines could have wished IV, from its all-bells-and-whistles monitor, to its self-assured, businesslike keyboard.

FOR YEARS, NEC has profited from its policy of splendid isolation; shunning the safe but dreary world of IBM compatibility, the company has carved out a good-sized niche in the Australian microcomputer market with its excellent MS-DOS-based machines.

Signs that this isolationism was beginning to crumble appeared last year, when the company announced the Software Library Expander for the APC III. The SLE enabled that machine to run almost all IBM PC software. Now, with the introduction of its APC IV, NEC has leapt headlong into the maelstrom of compatibility. And, of course, has done it with style.

An AT IV NEC

Not bothering with producing anything as boring as a straight PC compatible, NEC has come in at the top end of the scale and produced an IBM AT compatible. And it's a heavyweight: the APC IV comes in three configurations, with the entry-level system containing 640 Kbytes of RAM, one 1.2 Mbyte floppy disk drive, a 40 Mbyte hard disk, an IBM CGA-compatible, colour graphics card, and an Advanced Graphics Colour Monitor with 800 by 560-pixel resolution.

Taking a look inside the APC IV involves undoing five screws and removing the top of the system unit; that's five screws too many as far as I'm concerned — why not a simple catch as on some other machines? Or, better still, a set-up like on the Ferranti 2860, which lets you get at the expansion slots without even taking the monitor off the system unit. No big deal, perhaps, but frustrating, especially if you don't have a Philips-head screwdriver on hand.

Inside, boards, cables, drives and power

supply are fairly tightly packed. The 40 Mbyte hard disk takes the same amount of space as the half-height 1.2 Mbyte floppy, with room for another of each. There's space on the motherboard for an 80287 maths co-processor (the main processor is the 8 MHz 80286-8). Of the eight expansion slots, three (one short and two long) are already occupied by the disk controller, a memory board (1 Mbyte of extended memory) and the colour graphics card. Everything is solidly built, with the exception of the battery pack for the internal clock, which is stuck onto the rear inside of the unit with Velcro.

The array of connectors at the back of the machine includes two serial ports, one parallel printer port, a DIN socket for the keyboard, a mains input and a mains output, and the monitor connectors on the graphics card. The front of the machine has a key-operated lock/unlock/reset switch, LEDs indicating power-on and disk activity, and, tucked away at the bottom left, a switch for changing the processor speed from 6 MHz (fully IBM compatible) to 8 MHz. Changing processor speed also requires resetting the machine — so don't try doing it while in the middle of processing; if you do, the machine will hang and you'll lose your data.

The keyboard is not quite as flash as the APC III's, but I found it very relaxing to use. It's similar to the IBM AT standard, with LEDs indicating caps-, num- and scroll-lock, an enlarged enter key, function keys grouped at the left, and cursor keys incorporated in the numeric keypad. It has adjustable legs (which stay adjusted — not all of them do!) and a delightfully long, coiled cable linking it to the system unit. The keys feel light and distinct.

The monitor is excellent, with an aircraft-like array of knobs and switches to control it. (See the accompanying box for more on the monitor.) At the top of the monitor are controls for vertical hold, size and position; horizontal position and width; brightness; contrast; and text mode (which gives you monochrome, in a choice of colours). The particular colour of monochrome you desire is chosen by adjusting the RGB dip switches at the rear of the monitor, which also provide control over the number of colours (8, 16 or 64) you get when out of text mode. Also round the back is the power switch, a TTL (transistor-to-transistor logic)/Analog switch for selecting the type of RGB input you require, and a Manual switch which, I think, provides a choice between the colour setting on the dip switches and the default setting for the monitor. I say "I think" because I wasn't supplied with a manual for the monitor, and you definitely need one.

Overall, the hardware design is first-rate. Instead of the usual piercing drone of most AT clones, the APC IV has a less intrusive and more reassuring bass rumble, and everything functions smoothly and with precision.

The excellent resolution of the monitor is not put to proper use by the CGA card supplied, but the next machine up in the APC IV line comes with an EGA-compatible card. Even so, the stability of the output in combination with the tilt-and-swivel stand, made this monitor a pleasure to use.

Overall, the hardware design is first-rate. Instead of the usual piercing drone of most AT clones, the APC IV has a less intrusive and more reassuring bass rumble, and everything functions smoothly and with precision. Matt Whelan speed tested the machine against the other AT compatibles (see the November 1986 issue of *Your Computer* for details) and found it ranked well up the scale.

Software – IV Whom the Machine Toils

As the APC IV is NEC's first outing into IBM compatibility, the company went straight to Phoenix for its BIOS (Basic Input/Output System). Phoenix supplies IBM-compatible BIOSes to many of the clone makers, and does an excellent job walking the tightrope between as-good-as-complete, legal compatibility, and actually complete, copyright-infringing compatibility.

The APC IV I reviewed came with MS-DOS 3.1. In addition to the standard Microsoft DOS features, NEC has provided a few of its own. SIZE gives you the total number of bytes in a set of files — a feature I've regularly missed since losing the SDIR command of CP/M. Among other things, it provides an easy way of checking whether a group of files will fit on a disk.

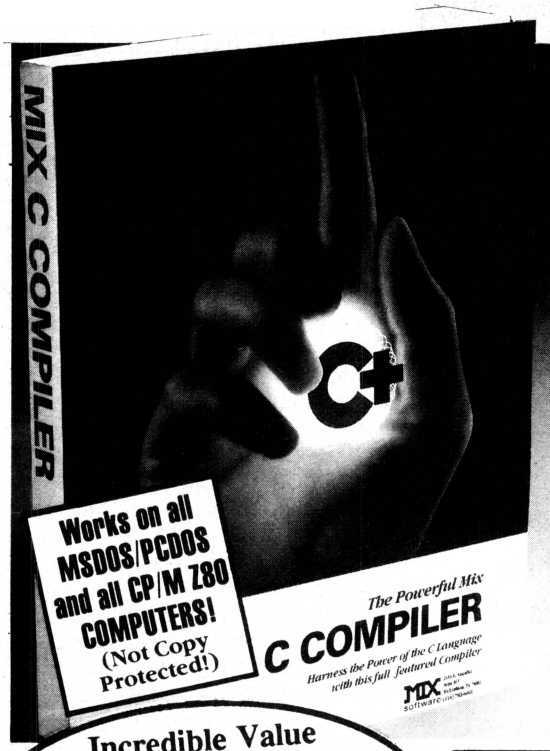
CHMOD is a souped-up version of ATTRIB, which lets you view and alter file attributes including read-only status, archive status, and hidden or directory status. XASSIGN performs the same function as ASSIGN (routing calls from one drive to another), as well as routing calls for a specific file to a different path or drive. Your Wordstar overlays will no longer have to appear all over the place.

XTREE displays all sub-directories and, if desired, all files within the current directory; more importantly, the /D/Q option lets you use XTREE to delete specified files, with DOS checking it's okay to continue before each deletion. This is great if you have 17 files with names such as FRED.001, FRED.002, and so on, and you want to delete nine of the files. Instead of having to issue 17 DEL commands, or renaming the files you want to save, you just type XTREE FRED.* /D/Q and answer the prompts.

There are other NEC-designed commands, but most of them are standard 'custom-designed' fare. Except, perhaps, CRTDUMP, which lets you dump the contents of the screen to a NEC printer — including colour (with the the right hardware).

A comment on the relationship between the hardware and the operating system: the hardware has definitely outgrown the software. While the standard hard-disk size on the APC IV is 40 Mbytes, MS-DOS can only count up to 32. This doesn't mean you can't use all your disk space, but the maximum size you can set aside for a logical drive is 32 Mbytes. Thus, the review machine came with floppy drive a: (it will also answer to b:), and the hard disk divided into a 32 Mbyte drive c: and an 8 MByte drive d:. I have visions of little Microsoft gnomes working throughout the nights, trying to produce MS-DOS 5.0 or 23.7, or whichever version is supposed to start using the power and storage of the current wave of machines, let alone the fearsome powers of the 80386 mob Compaq is already leading into the fray.

On the applications front, I tried all sorts of things on the APC IV and couldn't get it to falter. Memory-resident utilities which have stumped some of the other AT clones ran perfectly. Flight Simulator, which was rumoured to cause the NEC problems, performed perfectly (that is, I crashed when I should). The only thing I



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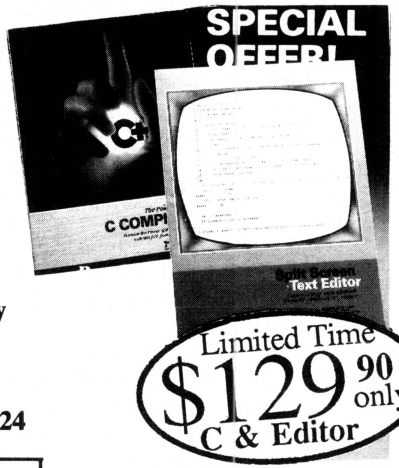

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didn't get to try was a Softguard-protected program; Softguard seems to stop many otherwise compatible machines in their tracks, making it impossible to use such programs as dBase III Plus. As Ashton-Tate has announced the release of un-copy-protected dBase (at last), I'm not too fussed about this anymore. If you're worried about it, take along some copy-protected software when you check out your prospective machine (and remember to uninstall it before you leave!).

Earlier models of the APC have gained wide acceptance in the computer-aided-design market, based on the machines' high resolution graphics combined with Autocad software. The APC IV — with its excellent colour monitor — should help NEC retain its footing in this market. While the entry-level machine is fairly impressive itself, two higher-level configurations provide even more graphics power: the APC IV/AG (Advanced Graphics) adds an IBM Extended Graphics Adaptor (EGA) compatible board, and the APC IV/PG (Power Graphics) comes with a Power Graphics card and display, providing 1120 by 750-pixel resolution. It's also possible to put an IBM Professional Graphics Adaptor into the AG model.

Documentation – IV Shame, IV Shame

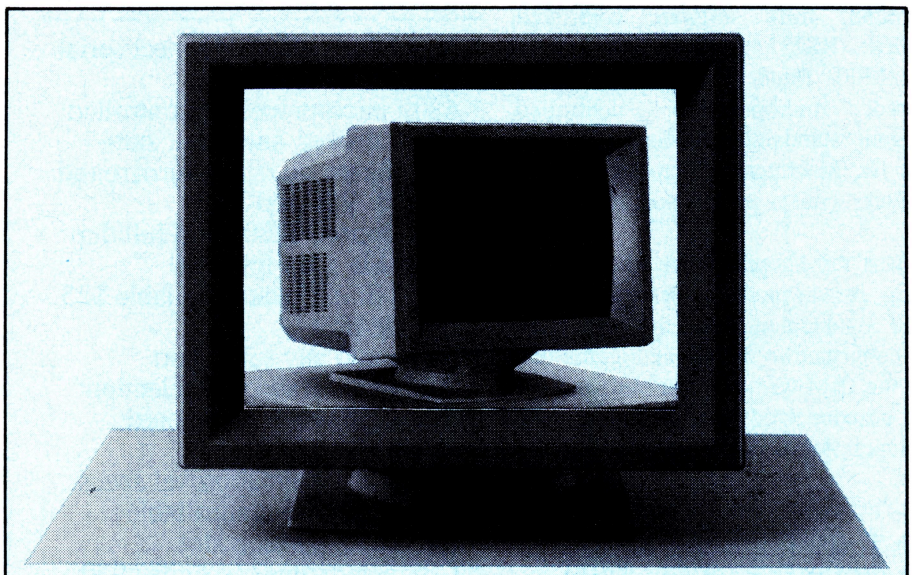
Oh well, I guess there had to be something to complain about! The documentation I received was the pre-release version of the DOS manual. It's slack. NEC has done its old trick of using Microsoft's original documentation for MS-DOS and then adding a separate section with the NEC DOS utilities and enhanced utilities. This means you're never quite sure where the information you want is located, and sometimes there are two versions of information on the same command. If you're going to produce a machine as good as the APC IV, it's worth putting a little more effort into the manual — at least putting all the information about commands into one alphabetical section.

Evidently there are separate user's guides for each part of the hardware, but I didn't receive copies. I assume they are better than the DOS manual, as NEC would have had to do all the work itself; I hope so anyway.

And Now IV the Conclusion

NEC has a reputation for producing well-made, reliable hardware, and backing it up with good service. The APC IV fits into the mould, doing its job quickly, efficiently, quietly and compatibly. The entry-level model sells for $9935 including tax, which is certainly competitive. The Advanced Graphics machine costs $10,448, and the Power Graphics model $12,244. If you want to add a 360 Kbyte floppy drive to allow you to transfer data to and from an IBM PC or compatible (something *no* 1.2 Mbyte drive will do reliably), it'll cost you another $450.

It may not be the fastest AT on the market, but it's certainly one of the smartest. If NEC's marketing matches its engineering, the company should do as well within the IBM arena as it has done without. □



Everything but the Kitchen Multisync

BORING, BORING we said. Review a monitor? What can you say about a monitor is a monitor is a monitor?

The man from NEC Home Electronics (quite a different kettle of chips to the Computers and Communications division) insisted we'd like his new gee-whizz screen, so we gave in.

Don't get us wrong, we like monitors. Computing could be really hard on the eyes without them. But we had a monitor atop every PC we were using, and we figured our office could do without another box (you should see our office . . . you should try to *move* in our office).

The man from NEC was right. We loved his new multisync monitor (model JC-1401P3E/EE/R, or "The Intelligent Monitor" for short). For those who haven't run into the problem it solves, we should mention the various standards of IBM graphics cards — the Colour Graphics Adaptor (CGA), the Enhanced Graphics Adaptor (EGA) and the Professional Graphics Adaptor (the golf tournament) — run at different frequencies, and require different monitors. Switching graphics cards can turn out to be an expensive pain.

The NEC multisync automatically scans all the frequencies from 15.5 KHz to 35 KHz, and adjusts itself to suit, with a resolution of 800 by 560.

It offers both TTL and analog inputs, and has a Text Switch which allows a choice of one of seven colours for a monochrome word processor or spreadsheet display. The screen is a crisp, clear 36 cm diagonal, with a large viewing area.

We moved the multisync from machine to machine and it worked like a charm. The picture from the EGA board was excellent and the ability to switch graphics cards at will was ideal for people like us who are constantly changing machinery.

It's just the shot for AT buyers who want high-resolution graphics from packages like Autocad, Graftalk and so on. Unless you're convinced you'll never need graphics you should be investing in an EGA card and a monitor like this straight off. If nothing else, it makes the IBM easy on the eyes instead of the 'ugly' provided by the CGA.

The NEC multisync costs $1760 retail — a little frightening at first, but when you look at the cost of high-quality monitors with this resolution it starts to make sense. The flexibility of its automatic adjustability is a bonus. □

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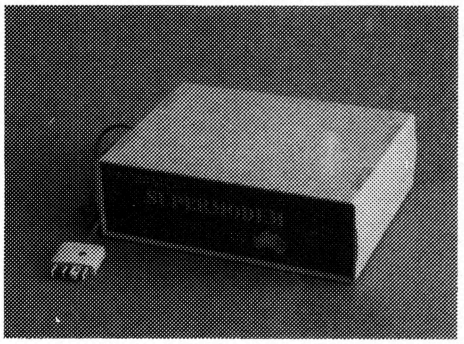

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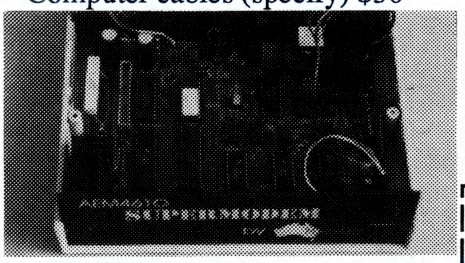

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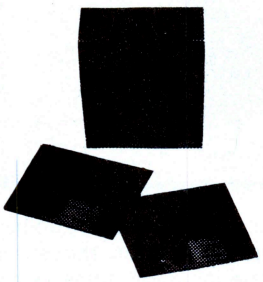

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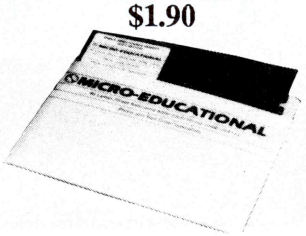

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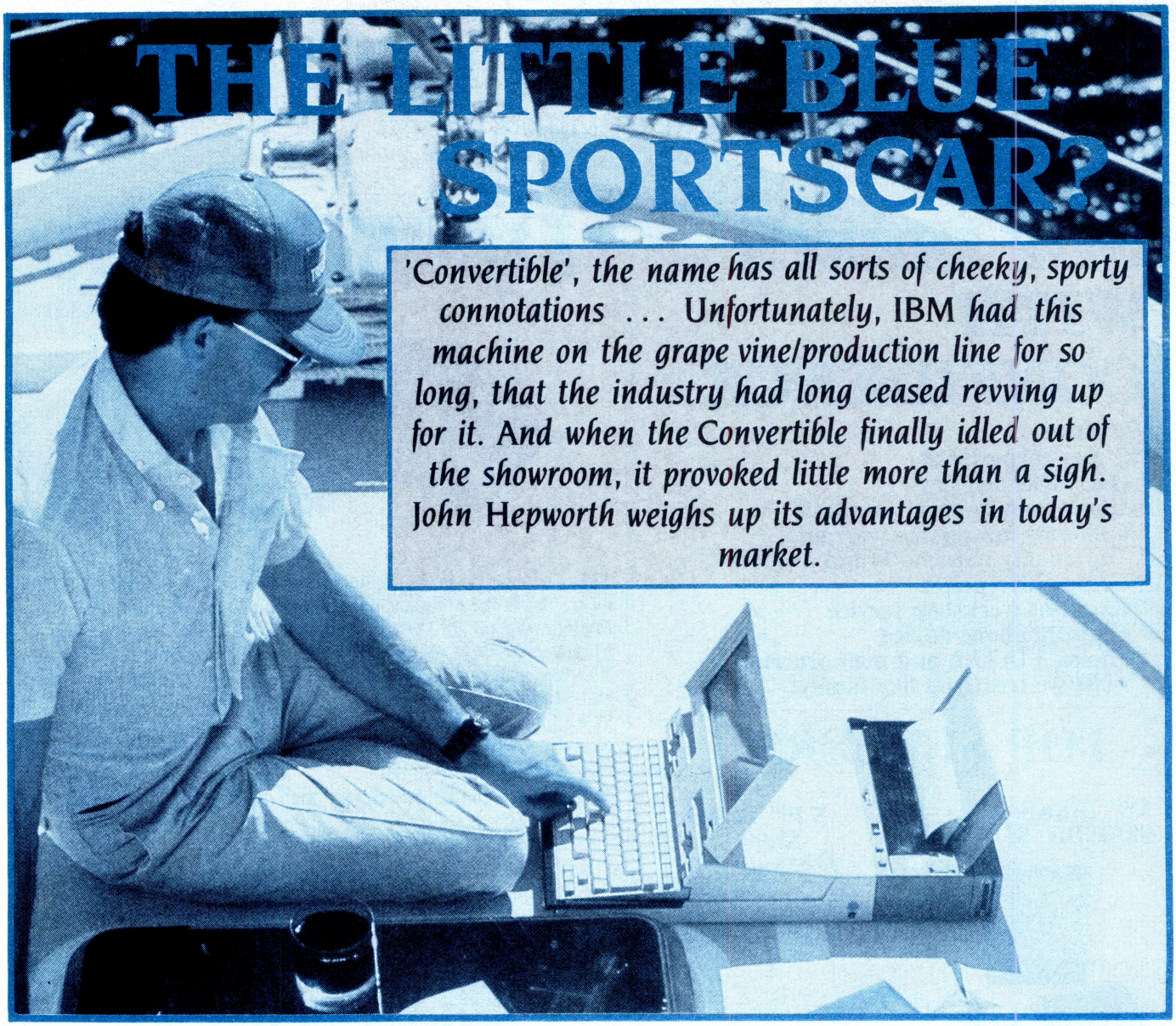
THE LITTLE BLUE SPORTSCAR?

'Convertible', the name has all sorts of cheeky, sporty connotations ... Unfortunately, IBM had this machine on the grape vine/production line for so long, that the industry had long ceased revving up for it. And when the Convertible finally idled out of the showroom, it provoked little more than a sigh. John Hepworth weighs up its advantages in today's market.



THE LONG-AWAITED 'clamshell' has arrived. For nearly two years rumours were rife about an imminent laptop PC from IBM that would run all the software written for the desktop PC. Coming from IBM, it *should* be the definitive laptop ...

A quick look around the basic machine sees it to be slightly larger than most other laptops; with the screen closed, the Convertible is 310 mm wide, 375 deep and 70 thick. Little else can be seen when the Convertible has its top shut, except for clips on the rear panel for the attachment of external modules, the expansion bus cover and a battery hatch. A pushbutton power switch and DC inlet socket are on the right side towards the rear.

When you open the screen, the disk drives (mounted under the screen hinge) rise, as does the keyboard, giving a good operating angle. All these mechanical movements feel reassuringly sturdy.

Contrast of the 80 by 25 display is controlled by a horizontally sliding control near the lower-right corner of the screen. The display is not as good as that on some other laptops, having lower contrast and apparently less sharpness — that's basically a bit of a foggy windscreen.

With only about 120 degrees of swing, the LCD screen cannot be laid back flat against the top of the machine when an external monitor is used; instead, provision is made for the whole LCD display assembly to be removed. The inability to lie it right back on the top of the machine makes it a little difficult to get a good viewing angle when using the Convertible on your lap, outdoors, or in poor light — this machine really is better off on a small table.

The Convertible has its own, unique dashboard (keyboard layout). The 78 keys have an excellent feel, with good initial pressure followed by easy travel. It's a bit of a shame, and an inconvenience, to have to learn yet another layout, though! At least, the key spacing is the same as that on a PC, so there's no cramped feeling using the main keyboard.

The internal, rechargeable, battery has a life of six to 10 hours, depending on how hard you drive it. In addition, the RAM has battery back-up. The system can be set to automatically turn off after one to 255 minutes without keyboard activity, or to run continuously. Another option sets the system to either resume or reboot when turned on. If the option set is for 'resume', processing starts where it left off.

Internally, the Convertible has 256 Kbytes of RAM, expandable to 512. An internal modem can also be installed. No serial or parallel ports are built in, nor is there a built-in towbar for an external monitor. These 'options' are added by clipping external modules to the rear of the machine. Three such modules are

available: a CRT adaptor, a serial/parallel adaptor and a printer. Adding the modules considerably increases the bulk and weight, and hence the turning circle, of the machine.

With the Convertible came DOS 3.2, and a DOS shell, the Applications Selector. This takes over most of the grease-and-oiling tasks, such as formatting disks, copying, diskcopying, erasing and so on. The Applications Selector allows simple configuration of the system, including setting the system date and time, the display mode, auto power-off period, and auto LCD blanking delay. It also shows available memory, the connect state of parallel and serial ports and the modem, and the number of drives. Most actions are single key, and F1 consistently gives help, while F10 exits the current task. The Applications Selector also includes a simple notepad, scheduler, phone list and calculator.

Notewriter

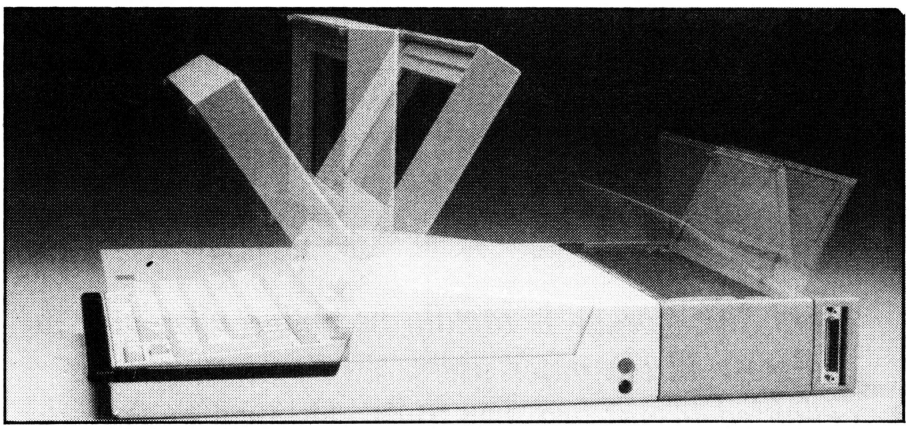
Notewriter seems to be a cut-down version of Displaywrite. It wordwraps, and supports standard word processing features, such as margins, block moves and insert. Like all versions of Displaywrite, in insert mode this program only reformats and wordwraps the current line, and simply moves down all subsequent lines in the paragraph. Pressing F6 with the cursor anywhere in a paragraph reformats all lines in that paragraph. The left and right margins appear on screen. Creating a top margin is done by using the Carrier Return (IBM's terminology) to make a few blank lines. Pagination does not rate a mention in the manual — and could not be empirically determined without a parallel printer adaptor.

Schedule

This is a useful little diary. The display can be condensed to show a particular week or month; in this mode no details of entries are shown, but markers are placed to indicate on which days you have appointments.

Phone List

A very natty phone list program is included. Names, addresses and phone numbers are entered and saved on disk. Subsequent searches can be made on the leading characters of an entry, so searching for 'sm' will display all the Smiths, Smalls, Smigginses, and so on. The phone list also offers auto-dialling, if the Convertible is fitted with a modem.



Calculator

The Applications Selector also has a nice calculator program, which emulates a four-function (plus percent) calculator on screen. It also displays all entries in the calculation with a symbolic 'tape'.

Compatibility

The Convertible runs on most standard PC-DOS fuels. I tested it with DOS 3.20, and found no problems with a relatively limited range of software. Normally I would take a whole swag of my software and try it, but the machine came without a means of transferring programs from 13 cm disks to the Convertible's 9 cm format. IBM makes an external disk drive for its desktops — which would have provided me with some means of converting formats — which was unavailable at the time of review. There's no external 13 cm drive designed for the Convertible and, to make matters worse, without a serial port I could not even do a computer-to-computer file transfer by cable. I have heard reports that the Convertible has problems running some packages designed for the PC, if DOS 3.20 is used, and that these problems were corrected with DOS 3.21. The disks and format are compatible with those used by Toshiba laptops.

Power Supply

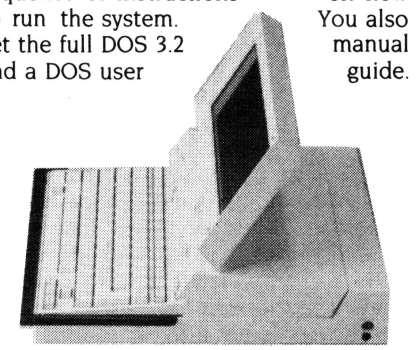
The Convertible's external power supply also functions as a battery charger while the computer is being used. It automatically adjusts for supply voltages, and can be used with 100 to 240 volts. Cords for United States 3-pin and standard Australian power points were included. (And the optional power supply adapter for the cigarette lighter means you could run Travelling Sidekick while waiting at the traffic lights.)

Speed

The Convertible shows the age of its design in its speed. The Peter Norton Sysinfo program gave a speed index, relative to a standard PC, of 1. (The 80C88 microprocessor is rated at 4.77 MHz.)

Documentation

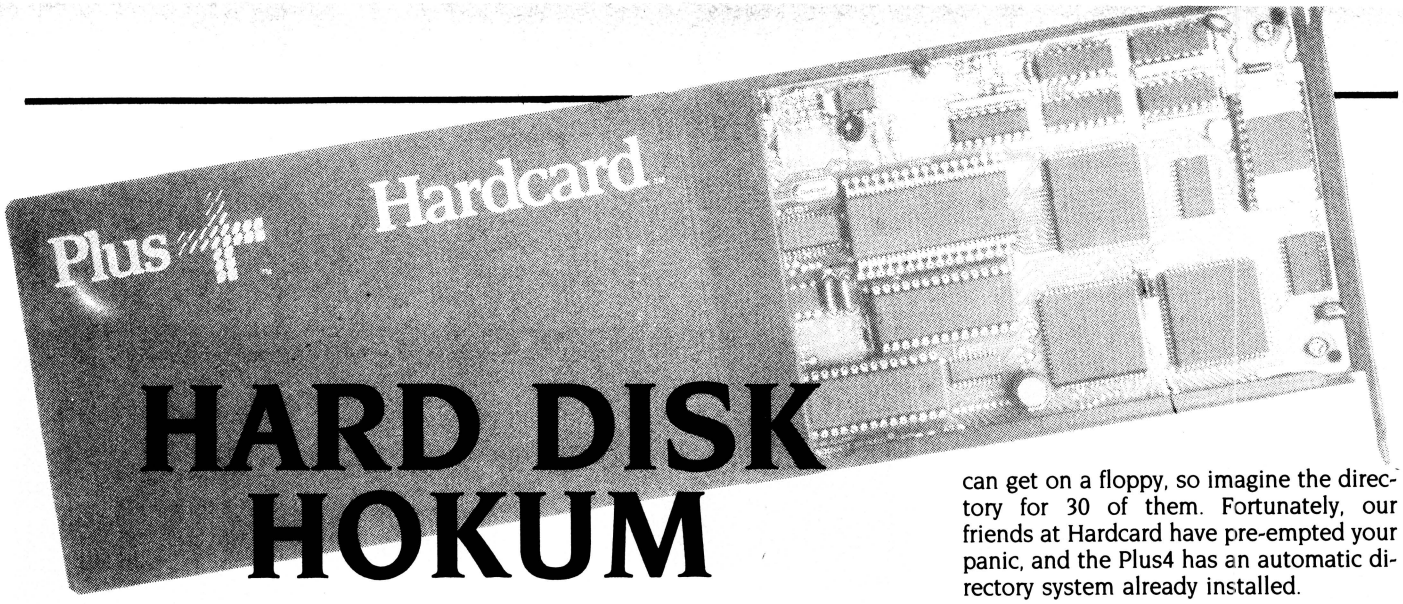
The Convertible comes with three manuals. The user guide is excellent, and is ringbound with strong covers. It supplies little technical detail, but includes a good sequence of instructions on how to run the system. You also get the full DOS 3.2 manual and a DOS user guide.



Roundup

Is the Convertible the definitive laptop — the little blue sportscar everyone will be dying to drive this summer? Unfortunately for IBM the answer has to be no. A couple of years ago it would have been revolutionary, but now other vendors have cheaper, smaller laptops with more memory, faster processors, and more features as standard (such as serial and parallel ports and a clock/calendar).

While desktops with 640 Kbytes and 20 Mbyte hard disks are selling for under $4000, buyers will walk past the Convertible at $4100. It's a sturdy, reliable machine that should keep putting along year after year — pity about the price ... □



HARD DISK HOKUM

Hard disk storage is rapidly becoming affordable to almost all computer users. Ewart Stronach was delighted to put two new units, designed to slot into the IBM PC, through their transportable paces.

COMPUTING NEVER seems to progress in smooth transitional stages, but rather takes quantum leaps. The first step into hard disk storage was such a leap, the development of a hard disk on a single card is another.

For those of you still in the dark (to whence I must return when Techpacific want the trial unit returned) let me tell you what a hard disk is. You all know floppies: those little flat envelope-like things you graduated to after cassettes? Well, they typically have the capacity for 360 Kbytes of data, be it programs or the output from programs. They consist of a disk of recording material encased in an envelope of flexible plastic and spin in your disk drive at 300 rpm, while the clever little computer reads the directory and finds whatever you have asked for. Now, 360 Kbytes is not a lot by today's standards, and the time it takes for information to be found is also quite slow. Granted, it's much faster than cassette, but in business applications where disk access is going on all the time, it is a limiting factor.

The first hard disks were almost as big as a modern computer, but they held massive amounts of data and accessed it much faster than the floppies. Todays's hard disks are small enough to be mounted inside the cabinet of most micros, and are driven by a circuit board controller, which slots into an empty connector on the main board of a PC.

THE PLUS4 HARDCARD

The Plus4 Hardcard from Techpacific takes up a minimum of space inside your pet, and is capable of storing and retrieving up to 10 Mbytes of data — that's the same capacity as approximately 30 floppies. It actually replaces a lot more than 30, as most disks are never filled with data. More importantly, all this information is alive and well the minute you turn on your computer. The time taken to find and read a program is significantly less on a hard disk, and there is seldom any need to change over floppy disks in the middle of an application.

Hard Disk Heaven?

All this and heaven too? Are there any disadvantages to this wondrous thing? Not many. Failures are rare, but when they do occur ... imagine losing over 30 of your most prized floppies.

So it becomes essential to regularly back-up the information stored. While most of the programs you'd have stored on a hard disk would have been copied from master disks, and can be re-installed, you'll need back-up protection for any data you've generated yourself.

You can back-up to floppies, a method quite acceptable for most small businesses, but there are a number of other methods of protecting your data. Streaming tape back-up, for example, is an add-on unit which records the total content of the hard disk onto magnetic tape, which can be re-played into the hard disk if required. Use of streaming tape is generally restricted to large businesses.

The only other disadvantage of products like the Hardcard is the complexity of directories. You know how long a directory can get on a floppy, so imagine the directory for 30 of them. Fortunately, our friends at Hardcard have pre-empted your panic, and the Plus4 has an automatic directory system already installed.

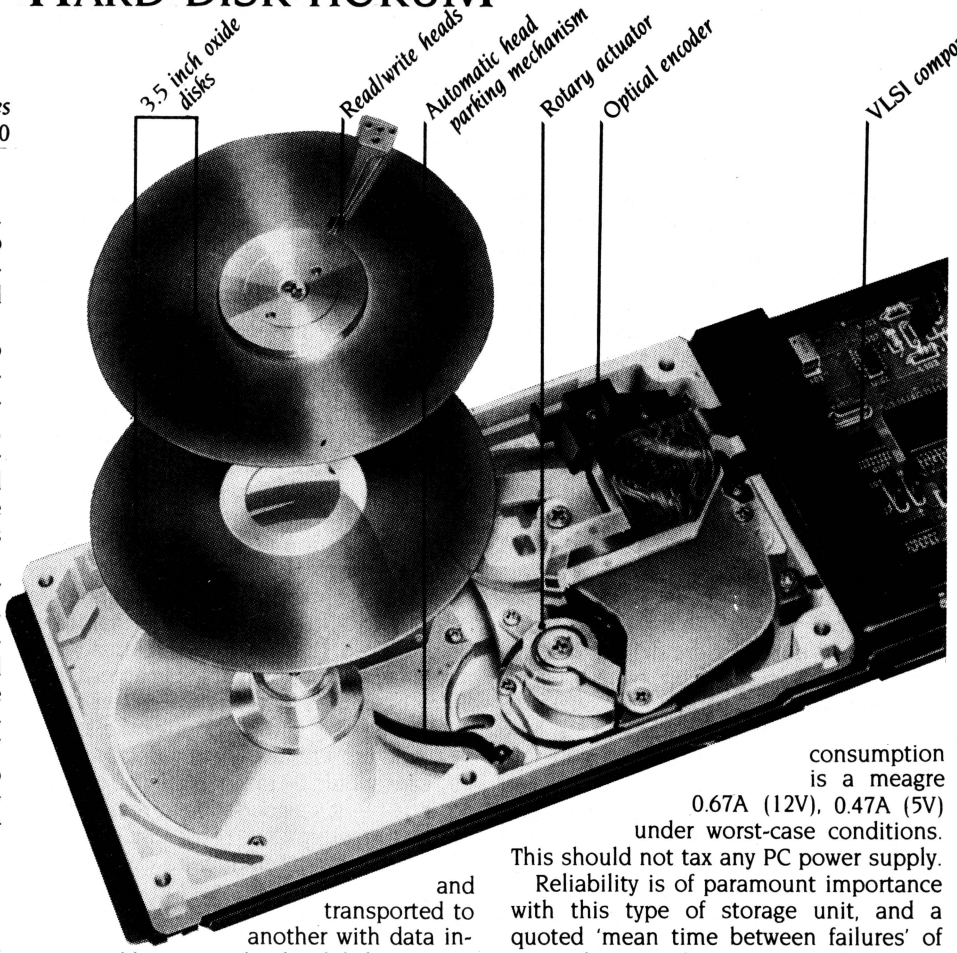
Hassle-Free Installation

Installation of the Plus4 is clearly described in the manuals provided, and poses no significant problem. The only minor setback I found was the installation program already on the Hardcard seems to rely on DOS's being a genuine IBM version. The DOS supplied with my new Lingo PC-88 XT has minor differences, and the first couple of attempts to set up the disk for operation failed. After changing to an original IBM DOS, I managed to install the card at the first attempt.

Physical installation is easy; simply remove the cover of your machine and plug the Hardcard into an available slot — it should only take about 10 minutes. From there on the procedure is almost automatic. You power up your revitalised monster on a normal DOS disk and simply type C:INSTALL C. You'll hear a new noise, not obtrusive, and quieter than many floppy drives I have heard, and a small cross will appear in the top-right corner of your screen. This cross stands in place of a disk-active light, and indicates that the Hardcard is being accessed. If your physical installation was correct, the screen will clear and instructions for proceeding will be displayed.

The Hardcard comes already formatted for PC applications, and all the installation program does is transfer your DOS, complete with utility files, onto the boot sector of the Hardcard. It also writes a new disk for you, which will serve as a re-installation disk should you ever need to repeat the process. This whole task should take about a further 10 minutes. (During this time, the computer seems to be working its little heart out with no result, except for the regular friendly progress reports popping up on the screen — "Installation is 40% complete," and so on.

After going through this process, you are prompted to switch the machine off, wait 10 seconds and turn it back on, leaving your A drive open. The computer will look at drive A, decide that's fruitless and



The Plus4 Hardcard can store up to 10 Mbytes of data — that's about the same capacity as 30 floppies. ▷

go directly to the DOS on the Hardcard. After booting it will automatically drop into the menu program I mentioned earlier. This displays a series of numbered menu items for single-key selection.

The disk has already been divided into 16 sub-directories, the first five are arbitrarily named Word Processing, Spreadsheet Analysis, Database Management, Presentation Graphics, and Modem communications. These are dummy titles and may be re-assigned. The next 10 are marked "Not in Use", and the sixteenth is a program-help file.

With the 10 Mb unit installed, the F1 key calls a basic help screen, F2 offers instructions and F4 allows direct DOS commands. F5 lets you modify the menu, and F6 offers you the choice of re-titling the menu and entering up to 12 DOS commands in the same form as a batch file. F7 exits the menu and drops you back to DOS, ready and logged on to your new drive C. The 20 Mb Hardcard has a similar set up with the function keys.

The Hardcard-Program Relationship

"Hang about," I hear you cry, "What about my favourite game which can't be copied and needs to be in drive A at power-up?" Don't panic child, simply proceed as you did before the miracle, put King's Quest in drive A and boot up. The computer always checks drive A first and operates on that drive if it finds anyone at home.

Most application programs, such as Lotus 1-2-3, Wordstar or other word processors, and databases, have full installation instructions for loading them on to the Hardcard. These can be inserted in the menu system and called with a single keystroke after initial boot-up. Most copy-protected games cannot be installed on a hard disk of any description.

Most other hard disks come as two units, the controller board and the disk itself. These must be mounted inside the computer case, often requiring special brackets and cables. The space taken up inside the case can preclude other slots being utilised, and do-it-yourself installation is not recommended. The Hardcard could not be simpler to install. On my Lingo, the lid hinges open like a car bonnet and removal of the Hardcard takes only seconds.

This simplicity of installation and removal is the key to Hardcard's flexibility. It may be loaded with data in one computer and transported to another with data intact. Unlike many other hard disks, it automatically 'parks' the head after use — a prerequisite to transporting any hard disk.

The software contained on the Hardcard also allows easy owner installation. As the disk comes pre-formatted with installation programs ready to be used, the time elapsed from receipt to use should be no more than 35 minutes. Other hard disks require formatting and a fairly complex set of installation routines, often beyond the understanding of a casual user.

The price difference between Hardcard and regular hard disks is minimal, and well worth it for the convenience and ease of use it affords.

Tech Specs

For the technically minded, let's look at the spec sheet. The Hardcard 20 Mb formats to 21.20 Mbytes (min.) and seek time, including settle time, is 10 milliseconds track to track with an average of 49 ms. The disk rotates at 3600 rpm, and has a recording density of 13,917 bpi. It has 2460 tracks, with four read/write heads.

The 10 and 20 Mbyte units are the same size, with a thickness of 25 mm, a height of 106 mm and a length of 341 mm. This means it will take up one long slot on your PC without protruding over other cards or blocking access to another slot. The power consumption is a meagre 0.67A (12V), 0.47A (5V) under worst-case conditions. This should not tax any PC power supply.

Reliability is of paramount importance with this type of storage unit, and a quoted 'mean time between failures' of 40,000 hours and a component life of five years is most encouraging. The Plus4 Hardcard is capable of continuing to operate in quite a hostile environment, with a temperature range from 4 to 50 degrees Celsius and the ability to withstand a shock while working of up to 10 Gs.

All in all, the Plus4 is a well-engineered piece of equipment, viable in any situation, but of particular relevance to those who have a need to transport data between machines. The minor price difference between Hardcard and more conventional hard disk units is a small price to pay for such convenience. If I miss two payments on the car, one on the fridge and one on the telly, I might have enough for a deposit on one ... No, seriously folks, I do own the telly.

THE QUBIE BT20 HARDPACK

The Qubie BT20 Hardpack shares most of the attributes of the Plus4 Hardcard. While it is shorter than the Hardcard, it is substantially thicker — it's designed to fit into slot 5 of a PC, behind the power supply. It's controller board, attached to the unit, is capable of supporting two disk drives, and it requires an additional power cable to the power supply. A 'Y' connector is available to split existing disk connectors, if required. ▷

Installation is a fraction more complex than with the Hardcard. Being wider, the Qubie will overlap another slot if 5 is already in use, and some moving around of existing boards may be necessary. As it does not derive its power from the slot, moving the Qubie from machine to machine is not so convenient.

After fitting is completed, the computer should be booted in the normal manner and you'll hear a faint chirruping sound — a flock of hungry little sectors waiting to be fed. The disk comes already low-level formatted, so all you need do is partition if required, and format.

Partitioning the disk gives you the opportunity to place more than one operating system on the same disk, and therefore be able to boot to say, either DOS 3.2 or Xenix. When you opt for two operating systems, the computer sees two hard disks on power up, and can be directed toward your choice.

To format, the hard disk invokes a program called FDISK.COM, present on most DOS disks, which immediately looks at the hard disk and reads the menu contained on the floppy supplied with the package. A screen of options appears and formatting takes place, all inside 10 minutes. The DOS of your choice is loaded into the root directory, and you are prompted to load the free directory program supplied with the unit. This program, called 1DIR, is a menu-driven directory manager which allows you easy access to any disk in the system.

From there on, it's business as usual; just load your software into sub-directories and tuck those floppies away somewhere safe in case of emergencies.

What's in the Ute?

A full set of hard disk utilities is also supplied, which allows you to re-format, check tracks, lock out bad tracks and alter the interleaving factor. This interleaving factor describes the placement of data on the hard disk. As the disk spins at 3,545 rpm, data is written every seven physical sectors, not sequentially. This is a standard setting and it is recommended that it not be changed. Under special circumstances, minor speed improvements in access time may be gained by alteration. Attempts to verify the disk surface or alter the format parameters will destroy any data present, so care should be taken in the use of these utilities — it's a good idea to re-name the format program QUBIEFMT.EXE as a BAK file to prevent its accidental use.

The specifications of the Qubie are pretty much like those of the Hardcard, but access time is a little slower. Average access time is 80 milliseconds, with a track-to-track time of 18 ms. Power consumption is +5V, 2.0 amp and +12V, 175 Mamp. A component life of five years, with a mean time between failures of 10,000 power-on hours should provide a very useful service life. The quoted mean time for repairs is a meagre 30 minutes.

The Qubie lacks the automatic parking facility of the Hardcard and so has to be parked, with the supplied parking program, before being moved about. When this program is invoked, it moves the disk heads off the recording surface and locks up the computer.

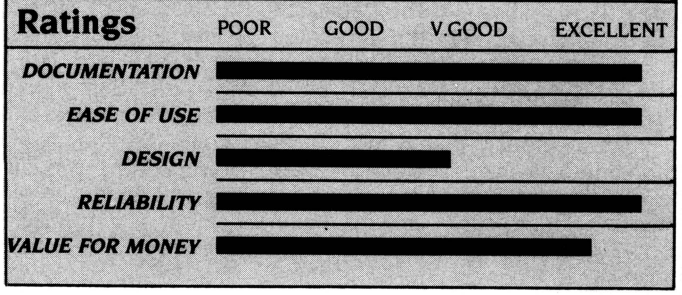
From a comparative point of view, each unit has its advantages. The price of the Qubie, at $1599 retail, is about $400 below that of the Hardcard. Although the Qubie has a slower operating speed, this isn't a bother in practical terms, and the loss of easy mobility would only inconvenience a small number of users.

As with so many of these things, price becomes the ruling factor in my decision-making process. I will reluctantly return the Hardcard and joyfully accept the minor shortfalls of the Qubie. My personal contact with the Sydney staff of Qubie lead me to believe that service and advice are near at hand and willingly given. (Note their *new* address and phone number.) The ability of the controller to operate a second drive is a strong point; we all feel we would never need more than 20 Mbytes of storage, but data has a habit of expanding to fill the available space, and the ability to add a second drive at a lot less than the first could be most welcome in the future. □

PRODUCT DETAILS

Product:	Plus4 Hardcard
Manufacturer:	Plus Development Corp. Milpitas, California, USA
Review Copy From:	Techpacific 7 Bank St, South Melbourne 3205 Vic. (03) 690 9055
Price:	Hardcard $1254 Hardcard 20 $1934

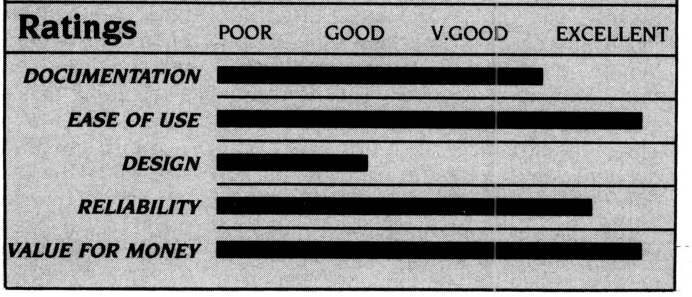
Ratings

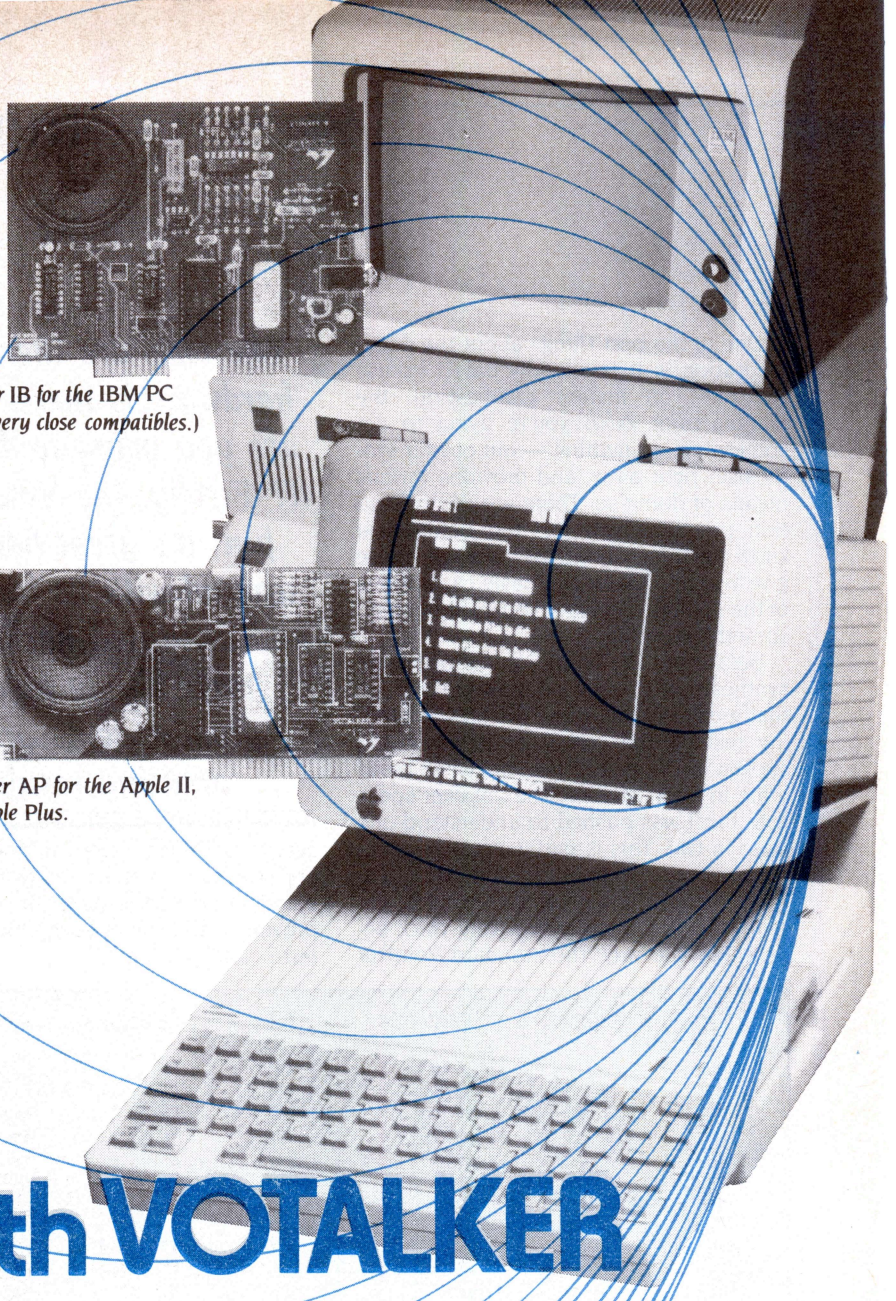


PRODUCT DETAILS

Product:	BT20 Hardpack
Manufacturer:	Qubie
Review Copy From:	Qubie 10/16A Hearne St, Mortdale 2223 NSW (02) 534 6000
Price:	$1599

Ratings





The Votalker IB for the IBM PC and XT (or very close compatibles.)

The Votalker AP for the Apple II, IIe and Apple Plus.

Speech synthesis has been plagued by an inability to recognise and replicate the diversity of human output. The most successful methods to date jaw their way through vast amounts of memory. Votalker offers a reasonable compromise between output quality, appetite and cost. Rose Vines spoke to this new product on the phoneme.

say it with VOTALKER

THERE ARE three basic methods of speech synthesis commercially available: waveform, formant and phoneme. Waveform synthesis uses samples taken from a digital recording of a human source at high frequency, to reconstruct a time-varying wave shape of the voice. Each sample indicates the magnitude of the signal at that instant. This method gives a fairly close approximation of the human voice, but requires heaps of data storage space — depending on the hardware used, it can require 10,000 to 80,000 bits per second to perform the synthesis.

Formant synthesis measures the bands of frequency in the human voice, and uses filters to approximate these bands in the synthesiser. This is much less expensive in terms of data rates (about 1000 to 2000 bits per second), but some of the identity of the human source is lost in the process.

Phoneme synthesis uses frequency bands, too; but, instead of extracting the bands from a human source, language building blocks, called phonemes, are used as the basis for synthesis. The phonemes must be properly sequenced to build pronunciations and words. This form of synthesis is characterised by low data rates (100 to 400 bits per second) and reduced accuracy in mimicking the human voice.

The Votalker Speech Synthesiser — from United States company Votrax — uses phoneme synthesis to get your computer talking. I reviewed the Votalker IB, which runs on IBM machines and (very close) compatibles. There is also a Votalker AP for the Apple and a Votalker C64 for the Commodore. The IB and AP are based on the SC-02 synthesiser chip, while the C64 is built around the SC-01.

The Votalker IB package includes a board containing the synthesiser chip, speaker and various switches; Speech Operating System (Sonix) software from Artic Technologies; and two manuals — one for the hardware and one for the software. The board fits into any slot in the expansion board, leaving filter and voice mode switches and the volume control easily accessible from the rear. The main software components are the Kernel, the Text-to-Speech module and the Phonetic Speech Editor.

First Words

The documentation for the Votalker fits into the parson's egg category — good in parts. The hardware manual is brief and easily digestible, with enough detail to get you going, but not enough to clog your brain. The software manual is informative, with lots of examples of the synthesiser in use, but it sometimes leaves you up in the air and assumes you have a lot of background knowledge.

One of the best things about the documentation is it is soundly based ('scuse the pun) on instant gratification: the manufacturer *knows* you're dying to get something — anything — out of your synthesiser right away, and provides various means of doing so. There are demonstration programs you can run before you know anything about the package; these give you an idea of the basic capabilities of the system, and leave you wanting to do something better.

Because of the limitations of phoneme synthesis, the basic sounds are not all that great. I found it fine when I was reading text on the screen as it was being spoken by the synthesiser; but when I read a file in blind and had the Votalker speak it to me, I was pushed to understand one word in two. This is partly a matter of accustomisation — the more you listen to it, the more you understand it, just like listening to someone with a very thick accent. (By the way, the standard Votalker accent is United States mid-west.) However, the sound can be vastly improved by using an external speaker (a connector is provided) and the Speech Operating System's software tools.

The tools are there, the hardware is there. What are you going to do with it? Firstly, the Votalker is fun; it's great fiddling around with its features, and dedicated hackers will probably be able to produce some pretty amazing results.

HEX	SYMBOL	EXAMPLE	HEX	SYMBOL	EXAMPLE
00	PA	(pause)	20	L	lady
01	E	keep, eat	21	L1	Louvre
02	E1	become	22	LF	call
03	Y	marry	23	W	want, why
04	YI	year	24	B	big
05	AY	made	25	D	said
06	IE	ear	26	KV(HVC)	give
07	I	mit	27	P	part
08	A	made	28	T	taste
09	A1	attainment	29	K	kite
0A	EH	said	2A	HV	(voiced)
08	EH1	enter	2B	HVC	(g)
0C	AE	can	2C	HF	hand
0D	AE1	happy	2D	HFCT(k)	
0E	AH	pop	2E	HN	(m, n, ng)
0F	AH1	honest	2F	Z	zip, pays
10	AW	lost	30	S	sing, city
11	O	for	31	J	measure
12	OU	told	32	SCH	ship
13	OO	look	33	V	vault
14	IU	you	34	F	fat, phone
15	IU1	should	35	THV	the, lathe
16	U	you	36	TH	thing, with
17	U1	unit	37	M	man
18	UH	under	38	N	name
19	UH1	common	39	NG	long, finger
1A	UH2	constant	3A	:A	Marchen
1B	UH3	what	3B	:OH	Lowe
1C	ER	word	3C	:U	fun
1D	R	ring	3D	:UH	bluhen
1E	R1	error	3E	E2	bitte
1F	R2	Mutter	3F	LB	bluhen

NOTE: ch = T-SCH, j = D-J
g = KV-HVC q = K-W
x = K-PA-S

Figure 2. *The 64 different phonemes available with the* SC-02 *chip used in the Apple and* IBM *versions of Votalker.*

Becoming Talkative

The Kernel is the heart of the Speech Operating System, providing an interface between the Votrax SC-02 chip and applications software. You can write programs in assembly language, BASIC or other languages which access the Kernel routines, to produce speech. The Kernel must be loaded into memory before using the rest of the system.

Text-to-Speech (TTS) combines with the Sonix Kernel to convert arbitrary English text into phonetic speech. This module is also memory-resident, and must be loaded before running any program which uses its features. The TTS module converts strings of characters passed to it from a program into a sequence of phonemes. It does this by comparing the input to a set of letter-to-sound rules: when a rule is found matching the current position in the input string, the phonemes for that letter (or letters) are transferred to the speech output buffer.

Over 600 rules are used by the TTS module. However, this is not enough to cope with the delightful illogicality of English pronunciation, and thus, to improve the performance of the TTS, you can either fool the system by misspelling a word, or use an Exception Table. An Exception Table contains a list of words likely to cause the TTS module trouble, and offersappropriate phoneme sequences. TTS first checks the Exception Table before attempting to translate a character sequence.

The demonstration program is provided to show off TTS's capabilities. You need BASICA to run it. The demonstration will convert files or keyboard input into speech, and gives you control over four speech parameters — frequency (rate), amplitude (volume), inflection (pitch) and filter frequency. Playing around with these parameters gives you a variety of different voices and tones. However, don't do what I did — read in a file with the headings double-underlined; the program read the heading and then started intoning "equals ... equals ... equals ... equals ... ".

The Phonetic Speech Editor (PSE) is a menu-driven program providing editing functions for creating phoneme sequences with associated speech parameters; using this, you can build up vocabularies (called VOCs) and lexicon files. Several modes of vocabulary storage are available, giving you the choice between control over all the synthesiser's registers

or conserving disk space.

VOCs are collections of phoneme sequences, with each sequence representing the pronunciation of a word, phrase or sentence. Lexicons are collections of VOCs, and PSE uses a look-up table to access the correct pronunciation.

Using the PSE takes a lot of patience. In fact, getting the best from the Votalker in general takes a lot of patience. But once you've put in the time creating solid lexicons, you then have a great deal of flexibility and power.

A lot of useful information is provided in the chapter on 'Creating Your Own Speech'. Once you understand how to use phonemes, the PSE is a useful tool. Not only does it let you design phoneme sequences, but it also gives you instant playback, so you can assess their accuracy. Exception Tables can be created with the editor, by entering VOCs in alphabetical order.

A few lexicons are provided on the program disk. They're useful as examples and in the demonstrations, and also give an idea of disk usage. The 200-word WORDS-0 lexicon takes almost 10 Kbytes — about 50 bytes per phoneme sequence. Apart from words, you can create sounds, musical tones and singing. Using the Song:24 vocabulary storage mode — the others are Chain, Speech:16, Speech:24 and Speech:32 — with the numbers indicating the data storage rates in bits), you can create a VOC containing the phoneme sequence for a song's lyrics. It is then possible to adjust the phoneme rates for the proper rhythm, insert pitch information to create the melody and then refine the overall song. Tunes and sound effects can also be created using the amplitude filter and offset controls, or by direct control of the synthesiser from a programming language.

Making Sense

The tools are there, the hardware is there. What are you going to do with it? Firstly, the Votalker is fun; it's great fiddling around with its features, and dedicated hackers will probably be able to produce some pretty amazing results. But at $629, it's not exactly a toy.

Because the Votalker interfaces with a variety of programming languages, you can produce applications that speak. You may use it to confirm input, prompt or alert a user, attract attention (good for sales demonstrations) or anything else you can think of. An important area in which it could be put to use is in creating software for disabled users, especially those who are blind. While the sound reproduction quality is limited by the phoneme synthesis method, the software tools provided really do let you get the most from the SC-02 if you're prepared to take the time.

To make the job simpler and more flexible, there are some optional software packages available for the Votalker. Port Talk makes the Votalker appear like a printer or serial device by redirecting text sent to a selected port to the TTS module. This means speech can be controlled like a sequential output device or file. Port Talk also provides controls over pitch and rate, which let you continuously alter the speech output until you achieve the desired result. The Sonix Toolbox is a set of utilities for managing lexicons, and a Sonix-Turbo Pascal Speech Interface is also available. The programs cost $89.90, $79.90 and $45, respectively. Votalker AP retails for $470, and the Commodore version is available as a plug-in cartridge for $264.

If you have an application which could benefit from the addition of speech, and you're happy with both the constraints and advantages of phoneme synthesis, the Votalker gives you all the tools you need to do the job. □

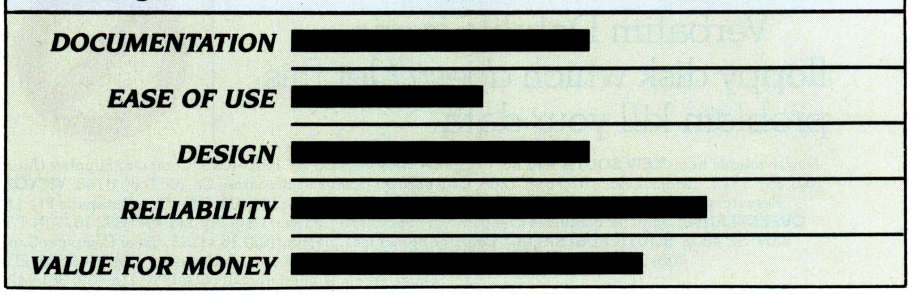
Mode	Phon	Dur	Infl	Sl	X	Amp	Ra	Tran	Global	BITS
Chain									yes	16
Speech:16	64	4	16			4	4	no	no	16
Speech:24	64	4	32			16	16		no	24
Speech:32	64	4	32	8	16	16	16	8	no	32
Song:24	64	4	4096			16	16		no	24

Figure 1. *Votalker's vocabulary storage modes and the number of settable values available in each.* **Phon** *is the phonemes available — see Figure 2;* **Dur** *is the duration of the sound;* **Infl** *is the pitch;* **Sl** *is the slope of the inflection which is used to make smooth transitions from one inflection to the next;* **X** *is the rate adjustment for* Dur *to differentiate between, say, accented and unaccented syllables;* **Amp** *is the amplitude values which decrease at, say, the end of a sentence, or increase to stress a word;* **Ra** *is the speed of speech, that is, how fast the sounds follow one another;* **Tran** *is the transition time from one pitch to another; and* **Global** *indicates that global settings can be changed in Chain mode. The last column,* BITS, *is the number of bits required per line of data in a particular mode.*

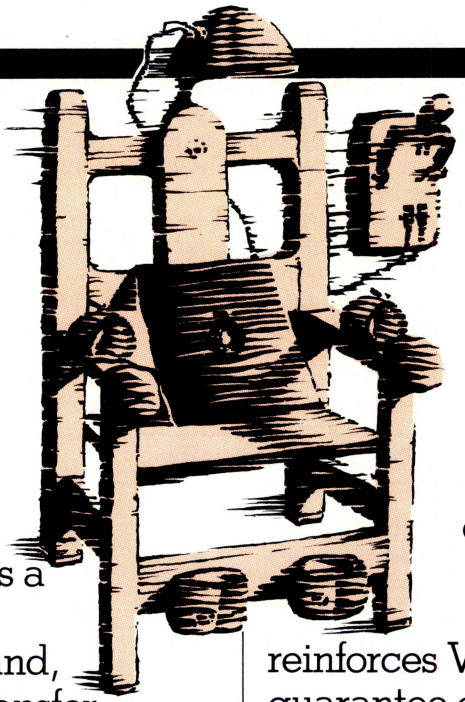
Product Details

Product:	Votalker Speech Synthesiser
Manufacturer:	Votrax Inc,Troy, Michigan, USA
Distributor:	Mike Boorne Electronics 3/61A Hill St, Roseville 2069. (02) 46 3014
Retail Sales:	Dick Smith Electronics Stores
Price:	$629 (IBM) $470 (Apple) $269 (C64) — See text for details.

Ratings



Will your data be sentenced to death, or word perfect for life?



The invaluable data stored on most floppy disks can meet a sudden, untimely death from the most unexpected enemy.

Static charges.

In every office, they're everywhere.

Take a stroll across a carpeted floor with a floppy disk in your hand, and you can easily transfer sufficient static to the disk to cause serious damage. Even total data loss.

Verbatim Datalife is one floppy disk which *doesn't* let this problem kill your data.

A patented liner, called DataHold, disperses static charges before they can penetrate the magnetised disk.

So, instead of sentencing your data to death, Verbatim, with exclusive DataHold, reinforces Verbatim's guarantee of safe data storage and retrieval for at *least* a human lifetime.

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When the Commodore 128 was released a little more than a year ago, the predictions were that the C64 would be phased out. However, the popular little 8-bitter gathered about it the ranks of its army of software and peripherals, and made a show of strength convincing enough to prompt Commodore to virtually re-release it, with a few significant changes. Ian Allen took one of the new C-64Cs home.

WHENEVER YOU read figures on computer sales, you see names like IBM, DEC, and Apple, but you won't see names like Microbee, Amstrad and Commodore. That's because the people who compile the figures only count what they define as 'business' computers. 'Home' computers don't figure, ostensibly because they are not powerful enough for 'real' computing, but the unstated truth is that they just don't pay well enough.

Home computers are aimed at people who pay for their purchases themselves (rather than the company they work for). The home market demands value, and the intensively competitive area of supporting

software and hardware add-ons has meant relatively low profit margins. The home computer market simply doesn't support the lucrative infrastructure that developed around business computing, and hence the lack of interest from the compilers of figures.

But if the measure of success were truly counted in terms of sales volume, the Commodore 64 would have to outrank any of the business machines. What other make or model can claim to have well over five million 'installed' units?

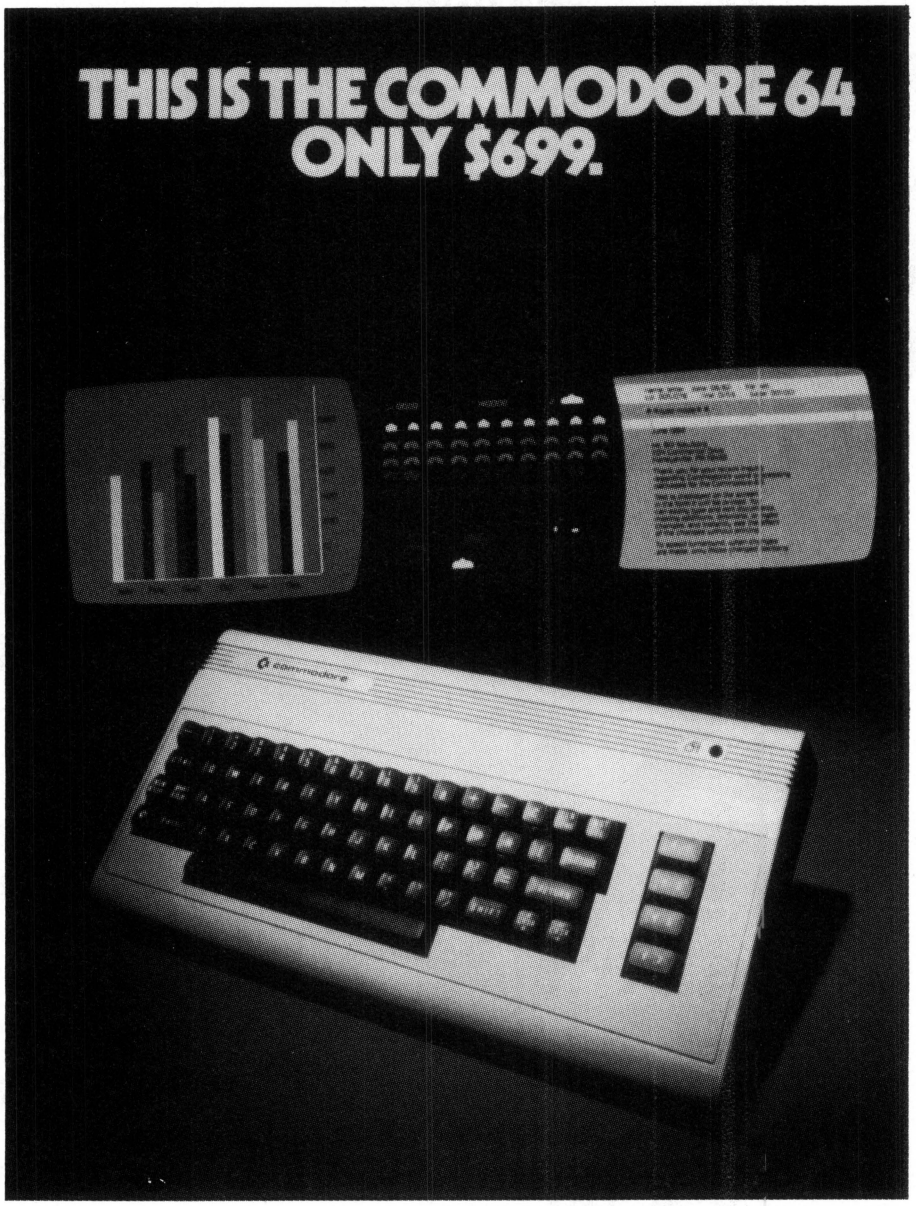
The Commodore 64

The C-64 made it's debut about the same time as the 16-bit IBM PC. While most pundits were predicting the end of 8-bit machines, Commodore had deliberately designed such a machine for the home market. The C-64 combined extraordinary graphics and sound capabilities into a package that retailed for the then amazingly low price of $700. It was also well thought out.

It used the same V.2 BASIC of the VIC-20 and PET machines, which meant a substantial pool of software was already available. It had RF output for a standard television (although a monitor output was also supplied) and it even used a joystick pin configuration compatible with that of the Atari 2600 video game, which most stores already stocked.

Many people attribute the success of the C-64 to Commodore's victory in the price-cutting war which developed between itself, Atari and Texas Instruments. True, Commodore could manufacture and move product more cheaply than anybody else (partly because it owns chipmaker MOS Technologies), but the C-64 was also a technically innovative computer. The concepts it introduced have kept 8-bit computers alive ever since — even the Apple IIe uses them, and so do some 16-bit models.

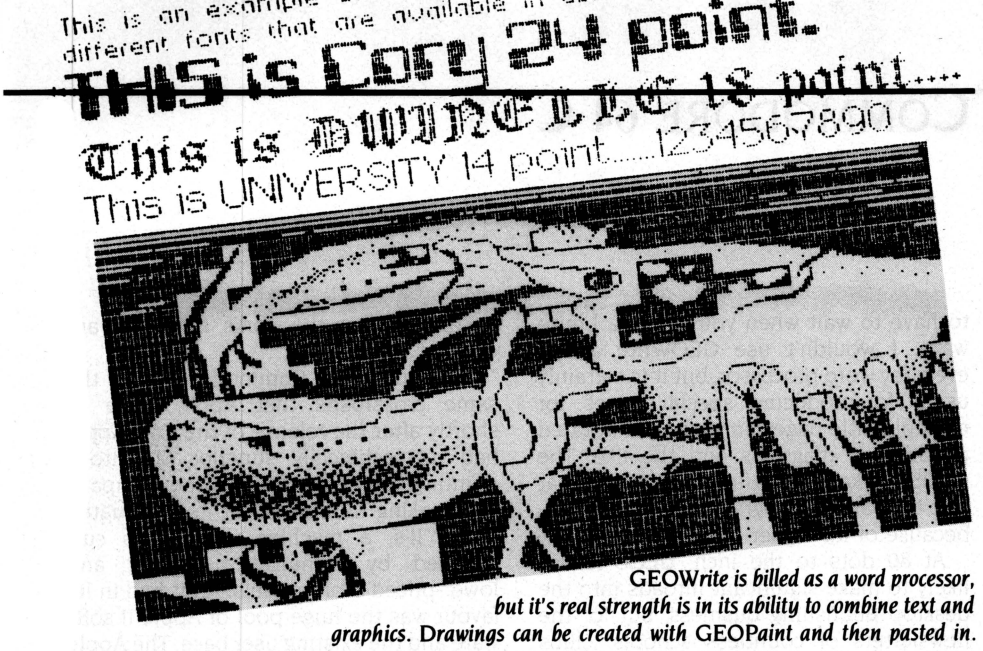
There were two major breakthroughs. The first was the use of 'gate' arrays, a technique which enabled memory banking and therefore access to more than the theoretical 64 Kbyte limit of memory for 8-bit machines. Commodore achieved this by adding additional address lines to the 6502 processor, creating a hybrid chip called the 6510. This new processor used the same Op Codes as the 6502 and was therefore fully compatible with all machine code written for it, but the extra lines enabled the 64 to access some 88 Kbytes of ROM and RAM, although not all at once. (Nowadays, it's not uncommon to find 8-bit machines accessing up to 512 Kbytes of memory, but it was CBM which showed the way).



July 1983 saw the launch of the original C64 in Australia, heralded with the above advertisement. The accompanying text proclaimed: "The Commodore 64 could be the microcomputer industry's outstanding new product introduction since the birth of this industry." Hyperbole aside, the C64 has certainly had an impact on the industry: the concepts it introduced have kept 8-bit computers alive ever since.

The second breakthrough was the use of multiple processor chips. The Atari 400/800 series were actually the first computers with this approach, but Commodore implemented a slightly more refined version. The technique increased the power of the computer by giving off some of the processing to dedicated graphics and sound chips. In effect, it's a form of parallel processing, and this was was the real secret of the C-64's graphics capabilities. Despite the computer's apparently slow 1 MHz clock speed, it can still run 'Flight Simulator II' in colour, just as fast and as smoothly as any IBM clone.

But for all that they got right, the Commodore designers missed one very important development — the rise of the disk drive. When the C-64 was developed, disk drives were expensive and in the preserve



GEOWrite is billed as a word processor, but it's real strength is in its ability to combine text and graphics. Drawings can be created with GEOPaint and then pasted in.

of business users. It was thought that cassettes would be the medium for the home market, and so only token provision for disks was made on the 64. Commodore copied the Atari principle of daisy-chaining peripherals, so the 64's 1541 disk drive shared the same serial bus as the printer. The result was a very slow disk I/O rate, faster than a cassette, but not by very much. Transmission speed is not that important with a printer, because the printer head mechanism is always going to be slower than the data transmission, but the same does not apply to disk drive access.

Ironically, back in 1982, Commodore had a reputation for building the best drives in the business. The company's IEEE 4040 dual drives were the mainstay of its business operations and there is no doubt Commodore had the technology to produce something equally good for the 64. Perhaps it was deliberately trying to differentiate its 'home' products from its 'business' ones. Whatever the reason, the lack of a fast disk drive has become the Commodore 64's biggest weakness. It's second biggest weakness has been the limited V.2. BASIC. It may have been fine on the VIC-20, but it doesn't support any of the 64's graphic and sound abilities. Programmers are reduced to PEEKing and POKEing, or are forced into machine language in order to effectively manipulate these features.

Last year Commodore released the C-128. This machine provided both fast disk access and a dramatically improved BASIC, and then threw in C-64 compatibility and CP/M as a bonus. It looked like the logical successor to the 64, but was about 50 per cent more expensive. The price differential has now gone down to about $100, but the C-64 continues to outsell its more powerful cousin. When the 128 was released, Commodore probably had plans to phase out the 64, but its continued strong sales performance has obviously changed the company's corporate mind ... and now we've seen the release of a new model 64.

C-64C

It's called the 'C-64C', and is functionally and practically identical to the standard 64. It has the same processor, the same I/O ports and the same memory map. The only differences are that it has even fewer chips inside it, a much tidier main circuit board, better RF shielding, and a completely new case modelled along the same lines as the 128. It's also a little heavier, giving a more solid, quality feel. I'm not sure exactly where the extra weight comes from, but the psychology is right!

It's difficult to criticise this machine because it doesn't claim to be anything other than a 64 in a different case. It still lacks a reset switch. It still uses the antiquated BASIC V.2, and it still has a very slow disk I/O that can't even take advantage of the fast mode of Commodore's smart 1571 disk drive.In other words, it's a 64 and not a 128, (and Commodore is again passing up opportunities in order to differentiate it's products!)

GEOS
(Sounds like a new aftershave)

Commodore hasn't completely condemned 64 users to an eternity of slow disk access. Co-released with the 64C is a new operating system from Berkeley Software, called GEOS (General Operating System?). It is an icon-driven system which provides a five to seven-fold increase in disk access speed, in *both* read and write modes. Although GEOS was not developed by CBM, the company has an arrangement with Berkeley, whereby GEOS is to be developed as the 'approved' operating system. Other software companies are to be encouraged to write their applications to function within the GEOS environment.

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Whether this happens remains to be seen, but the basic GEOS system comes complete with two applications, GEOPaint and GEOWrite. (If you have a Macintosh, you'll probably feel a certain *deja vu* in response to all of this!)

GEOPaint is designed to create high-resolution colour pictures and then print them. It can handle a maximum printed resolution of 80 dots per inch. The screen becomes a small portion of your image (a 330 by 180-pixel window of the 640 by 800 total). The disk drive is used as a virtual memory, and is accessed when you scroll about your picture. GEOPaint has all the standard features you would expect from a paint program, including a wide variety of brushes, a zoom, a 16-colour palette, extensive editing tools and even the ability to enter text in a number of fonts. GEOPaint images can be included in GEOWrite documents.

GEOWrite is billed as a word processor, but its real strength is in its ability to combine different fonts and graphics. GEOWrite types in proportional text, in any of six fonts in several styles. It doesn't appear to be able to import text from non-GEOS word processor files, and it suffers from the need for disk access when you want to scroll sideways or through your document. Even at the vastly superior disk access speeds of GEOS, it's always a pain to have to wait when you've got a brainwave. I wouldn't use GEOWrite as an everyday word processor, but it is certainly useful for producing 'special' pages; for example, title pages, importing annotated graphics or diagrams and the like. The GEOS package is definitely going to eat into the sales of programs like 'Printshop', because of its higher-resolution result.

At 80 dots to the inch, GEOS is not likely to make significant inroads into the desktop publishing business, but for the newsletters of countless schools, clubs and smaller 'small' businesses it is going to become a standard. It supports most printers, but not, alas, Commodore's 1526/802 models. (I say *alas* because I've got one of these unsupported orphans).

GEOS will allow you to load non-GEOS programs from its desktop main menu, but to do so requires the creation of a special GEOS file on your program disk. This is no problem if you are booting one of your own originals, but with commercial software you run the risk of corrupting your disk when you write to it. For the time being, the most useful applications of GEOS are going to be the two that come with it.

GEOS retails for $118, but buyers of new 64Cs or Family Packs receive a voucher which will give them a copy of GEOS for an additional $20. A version for the C-128 is said to be in the works, but that's another story.

In many ways Commodore is at the same crossroads that Apple came to shortly after the release of the C64. Apple had its technically superior Macintosh pointing to the future, but the company was making money out of its antiquated Apple II's, a machine which was surrounded by technically superior and lower-priced 8-bit models. All it had in its favour was the huge pool of Apple II software and the existing user base. The Apple II not only survived but went on to earn it's place as something of a hardy perennial. Even now you will find few who predict its demise.

Meanwhile

Commodore now has its innovative Amiga at the high end of the market, but it's still climbing the path to establishment. Meanwhile, in the company's traditional market, it faces renewed competition from the cost-cutting companies, such as Amstrad. Commodore is gambling that the 64C and GEOS, together with the huge and established C64 software base, will carry the day. If the Apple experience is anything to go by, Commodore has probably got it right.

Ian Allen has a closer look at the games in the Family Pack in his regular 'Your C64' column. □

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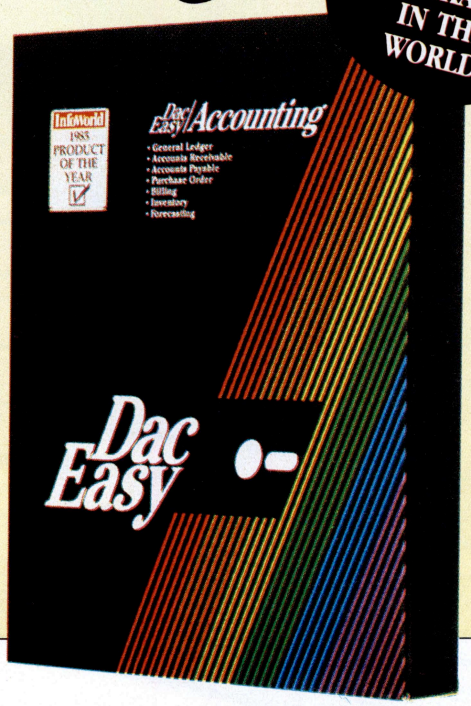

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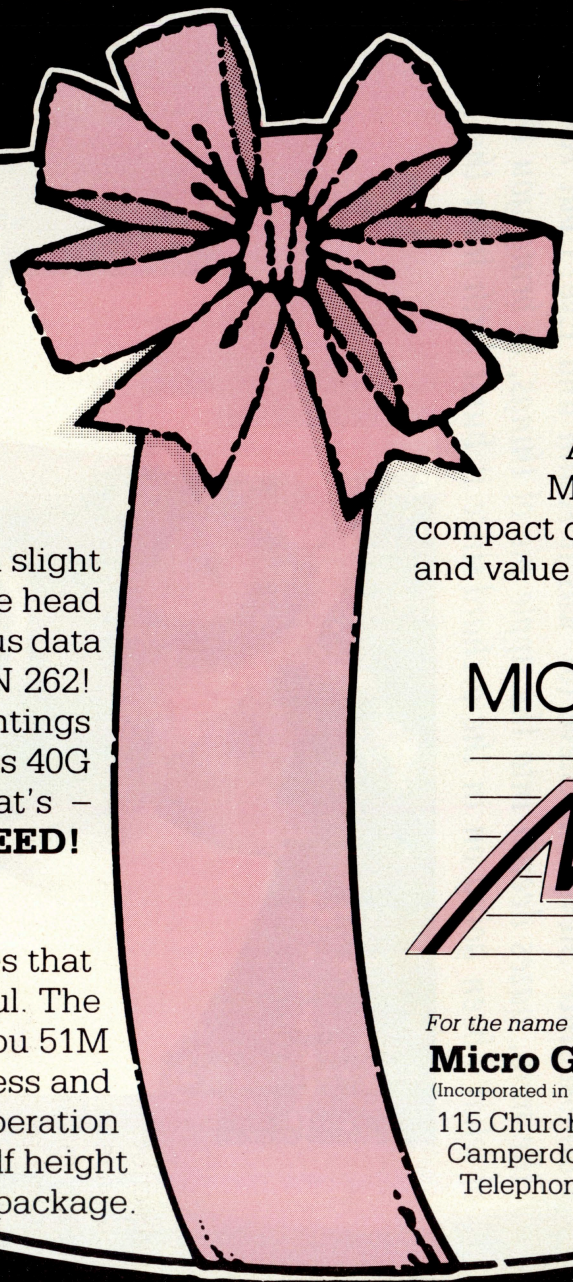

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AN APPLE A DECADE . . .

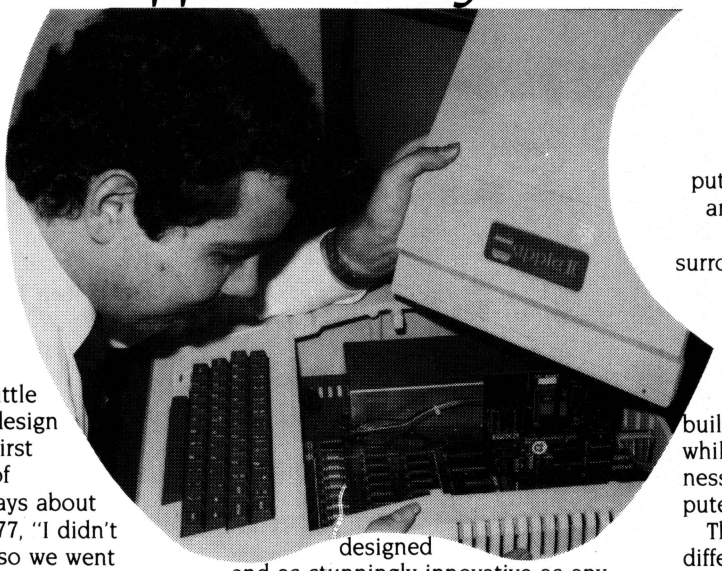
Apple is celebrating its tenth birthday! Stewart Fist, an Apple aficionado almost since Steve and Steve (or was it Adam and Eve?) put Apples on the map, gazes deeply into the apple pie of things, to bring you the core of what's been going on in the orchard since it burst forth from the garage



WHOEVER SAID crime doesn't pay couldn't have known about Wozniak and Jobs. They turned a two-bit telephone rip-off device into a multi-million dollar empire. As the story goes, John Draper, known throughout the '70s counterculture as Captain Crunch had discovered he could generate tones that gave him free access to the phone company's long-distance circuits. He used a whistle from a box of Captain Crunch breakfast cereal to make the tones — but that took considerable skill. His friend Steve Wozniak ('The Woz') designed an electronic tone generator which did the same. It was quickly dubbed the 'blue box', and Wozniak and his friend Steve Jobs made a small fortune (by their standards at the time) selling these blue boxes to counterculture friends.

This year Apple, the company that grew out of this illegal activity, celebrates its tenth anniversary, and is still playing

Apple Birthday to You



David to IBM's Goliath in the world of microcomputers. It's the only real competitor to dominating blue rinse in which IBM has immersed the micro world. Wozniak was a man with self-admitted little knowledge of computer design at the time he built the first Apple, but he had a lot of native ingenuity. As he says about his design skills in 1976-77, "I didn't know it wasn't possible, so we went ahead and did it."

Legend has it that he used a processing chip produced originally as an 'auto-mat washing machine' controller (the 6502) because it was cheap. At $20, the CPU was one-tenth the price of the Intel 8008, the only other usable 8-bit microprocessor at the time.

Bill Gates (of Microsoft fame) had already written a BASIC for the Altair — the first minicomputer kit, which was publicised in the January 1975 issue of *Popular Electronics*, so the micro revolution was already under way.

In Blessed Ignorance

Wozniak, in his ignorance, decided to write a BASIC for the 6502 and then later to design the machine to run it. His approach was a bit like designing the cockpit controls for an aircraft beforedesigning the overall structure which enables it to fly.

But it worked, and became the Apple I, which shortly after became the Apple II. And Apple has remained an innovative company, often doing things the wrong way round, and constantly doing what hasn't been done before — on the premise that if there's no reason why something shouldn't be possible, perhaps it is.

The company still makes mistakes, but its innovations regularly bring IBM and the other lumbering clone-makers temporarily to their knees. The IBM world is still hard at work trying to design a user interface similar to that of the five-year-old Macintosh, and good colour graphics have come nearly eight years late to MS-DOS systems.

Still in its Birthday Suit

This year, with Apple celebrating the end of its first decade, the Apple II is still around, but as the II GS — a machine which appears to be as brilliantly designed and as stunningly innovative as anything on the market since ...well ... since the Macintosh.

This is beginning to read like a spiel from Apple's own PR department, but it's not. I work all day in an environment dominated by MS-DOS, Unix, minis and mainframes, but I come home to write and program, by choice, on an Apple IIe. And I'm not alone; a couple of million other Apple users feel the same. (Apple recently sold its two-millionth Apple II.)

Like many other computer writers, I broke my baby-teeth on an early Apple II, and though I've upgraded a few times since, I have never seen the need to go the 16-bit path — until the GS came along.

I guess that if I'd been a junior executive working in a large multinational corporation, where playing in the sand-pit of forecasting spreadsheets was *de rigeur* for promotion, then I would have bought Lotus 1-2-3 and an MS-DOS machine to drive it — but I'm not, and I haven't.

So if you're looking for an unbiased view of Apple from a distanced, non-partisan observer, this article isn't for you. In my opinion the Apple II is simply the best machine ever made for basic computer education and small-business use — and my reasons are as much emotional as rational.

Again, I'm not alone in this view. The Apple cult has dominated the small-computer scene ever since Wozniak and Jobs wheeled the Apple II out of their Palo Alto garage.

Cult vs Business Culture

This cult-creation is the real story behind Apple. It's not merely a question of technical wizardry (though there was plenty of that), or of marketing expertise (though Apple shows itsheels to most high-tech marketers), but Apple's success has to do with why such a simple home-brew computer continues to generate such loyalty and affection.

The emotional climate which has surrounded the company and the product is more the creation of Wozniak than of Jobs who ran the company for many years. Wozniak was the technocrat, but he never lost sight of his following. He built (and still builds) simple computers for enthusiasts, while Jobs became caught up in big-business culture and began designing computers for executives.

The difference of approach was the real difference between the two Steves in the period when Apple was developing into a fully-fledged member of the Fortune 500 companies; Wozniak remained a member of the counter-culture, while Jobs assumed the mantle of young-executive.

Wozniak continued to emphasise the importance of keeping the Apple II simple and versatile, advocating the need for open architecture and a simple user interface. He believed enthusiasts provided Apple's base in the world's computer markets, and that the maintenance of the Apple cult was all-important to the company.

Jobs, on the other hand, believed Apple should shake off its 'hacker' image and confront IBM head-on in the 'real world' business market. He was ready to abandon the long-term supporters of the company in favour of seducing new corporate users with high-level, powerful, and expensive, machines.

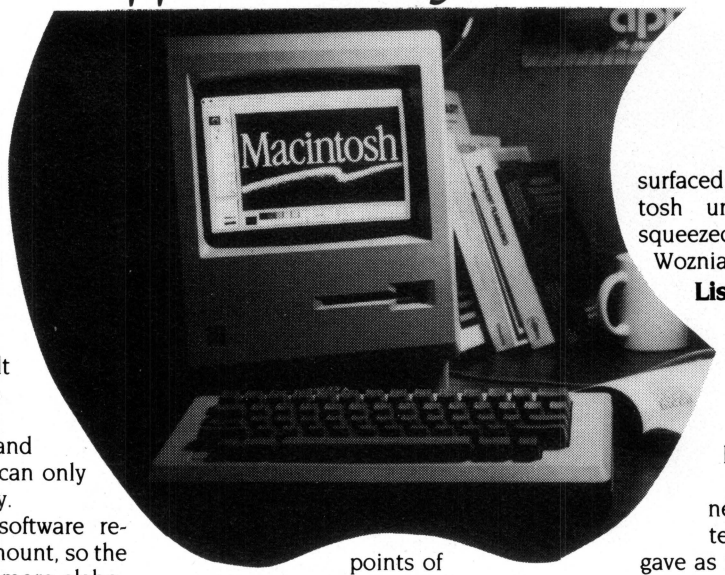
Jobs brought marketing expertise to Apple — but he didn't always use it very well. To give him due credit, he was a young, inexperienced executive under attack from IBM, one of the world's largest corporations and definitely a world leader in the marketing field.

Bobbing for Apples in a Sea of Blue

IBM very successfully sold the public on the idea that 8-bit computers were for home-hacker use only, and that 16-bitters were needed for serious business use. The fact that most of these computers were used for word processing, and fact that IBM'sown chip was an 8/16-bit hybrid didn't even embarrass Big Blue.

In retrospect, it's doubtful whether there was anything the IBM PC could do in its first two years which couldn't have been done better and more easily on an Apple II — and the Apple II had a much more extensive range of software. It is only in the past few years that

Apple Birthday to You



the IBM line has reached beyond the Apple.

The problems with the Apple II didn't come from its 8-bit data bus, or necessarily from its low-capacity disk drives — though a multi-megabyte hard-disk cult has now swept the corporate world. The problems arose from the fact that the 6502 (and later 65C02) microprocessor can only address 64 Kbytes of memory.

Modern, memory-hungry software requires two to 10 times that amount, so the Apple II couldn't run today's more elaborate business software without employing some 'tricks', and business users saw it as being incapable of doing serious work.

Apple partly solved the problem of the II's memory in 1983,when it introduced the IIe, which has one expansion slot different from the others. This is called the auxiliary slot and is tied directly into the motherboard's video-generation circuitry.

Even more importantly, Apple built support for bank-switching (using the auxiliary slot) in to the motherboard, by tapping directly into the memory-management unit. Bank-switching allows the micro to access multiple 64 Kbyte banks of memory, and therefore to appear to handle much larger memory addresses than seems possible.

Under bank-switching, only one bank of 64 Kbytes can be active at a time, but with skilful programming, some large and powerful programs can be made to work on bank-switched machines.

In the standard business configuration, the IIe is fitted with an 80-column card, which provides both the second bank of 64 Kbytes of memory and the 80-column screen display. And in the past few years, RAM and memory-expansion cards with up to four megabytes have been added to the machine — though not all of these work in exactly the same way, or with all software.

So, from a technical point of view, Wozniak's emphasis on providing slots paid off, and while a whole range of the early competing machines gradually faded into distant memory, the Apple II series kept on.

Compromise — The Worm in the Apple

For a while, the Jobs-Wozniak partnership existed through compromise. The Apple III and the Lisa provide testimony to both points of view. Wozniak kept pressing the open-architecture principle, but slots are expensive to provide, and Apple was constantly being undercut in price by machines like the Tandy and Commodore.

Without slots, the basic machine was much cheaper — but you pay more than the difference every time you try to add to your system, since the machines have to be returned to the maker for soldered modifications.

Jobs could also see the economic sense (from the company point of view) of having control over all upgrading and modifications to Apple machines — a system Tandy had taken to the extreme. Why let the user make the modifications when you can cut initial purchase costs, then charge for the upgrades?

Wozniak, on the other hand, felt open architecture encouraged development by enthusiasts and third-party developers, and that this, in turn, fed free research and development back to the company.

In the short-term Jobs was right. Price-cutting became essential, and the enormous range of semi-standard add-on boards created a nightmare for further development of the Apple IIseries. Any company upgrade of the motherboard guaranteed that around 50 per cent of the old plug-in boards wouldn't work.

The Lisa was the last of the machines to be designed with roughly equal input from the two founders, but by this time the partnership was beginning to crumble.

In the shakeout, Jobs, with the support of his business associates, dominated, and it was during the ensuing period that the Macintosh and the Apple IIc — both with closed architectures and aimed at business users — came into being.

Wozniak remained at Apple for a while on a part-time basis, and worked on the design of a super-Apple IIx, which has now surfaced as the GS. Jobs took the Macintosh under his wing and gradually squeezed the Apple II development and Wozniak out.

Listen Mac, the GS Came First

It's not generally known that the GS was in the early design stages back in 1983 when the Mac was moving from concept to reality, but when Wozniak left the company Jobs put the GS on the back-burner. So while the new GS may look as if it has taken technology from the Mac, it in fact gave as much as it took.

The GS, thus named for its graphics and sound capabilities, has at its heart a microprocessor chip developed by Bill Mensch at Western Digital.

Mensch has designed numerous advanced forms of the old 6502 chip, but none more significant than the, 65816 which is a true 16-bit processor, able to address up to 16 megabytes of RAM. Even more to the point, it can still be used in an 8-bit mode, where it is able to emulate the 65C02 chip of the IIe, and therefore run about 90 per cent of all available Apple software.

When Sculley replaced Jobs at the top of Apple, he had enough sense to realise the Apple II series still had a lot to offer, and he bought Wozniak back to complete the GS project. So the GS remains a true member of the Apple II series, while at the same time providing a bridge to the Macintosh world.

The emphasis on open architecture is back, while the ease of use provided by the Mac-and-mouse interface has been retained. Apple II GS users now have the best of both worlds, and with the new open-Mac due to be released next March, the two lines are being merged into one.

Sculley has also turned Apple's R&D skills to the problem of MS-DOS compatibility, and both the Mac and the GS should have a plug-in MS-DOS card to run IBM software within a year.

Multi-function cards are helping carry the II series into the next decade. In addition to MS-DOS, CP/M, Unix, memory expansion, and a whole range of other functions, these boards offer serial and parallel interfaces, clocks, red-green-blue colour capabilities and many other features.

So after 10 years, we're not only wishing Apple a happy birthday, but we can confidently wish the II family many happy returns. □



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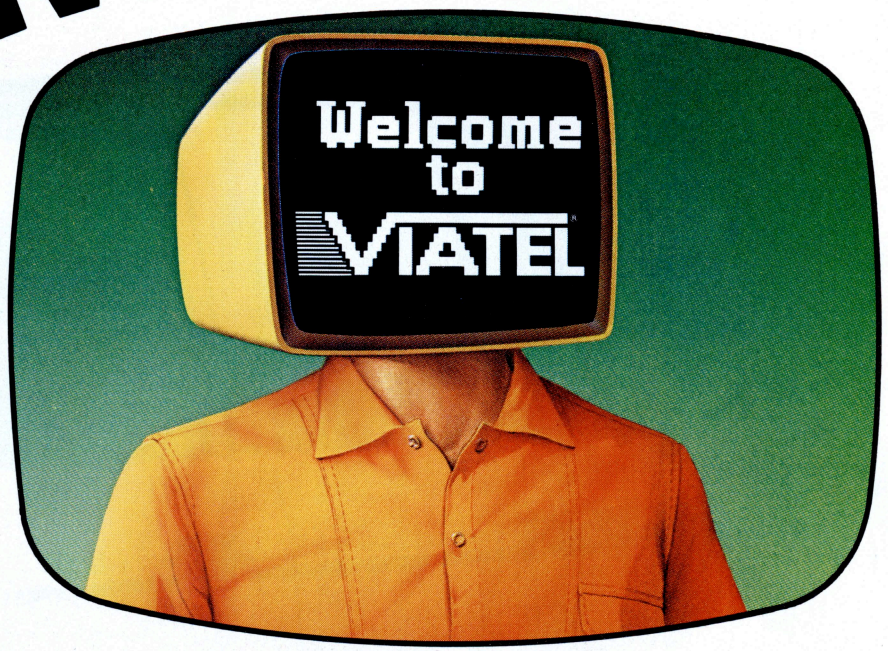

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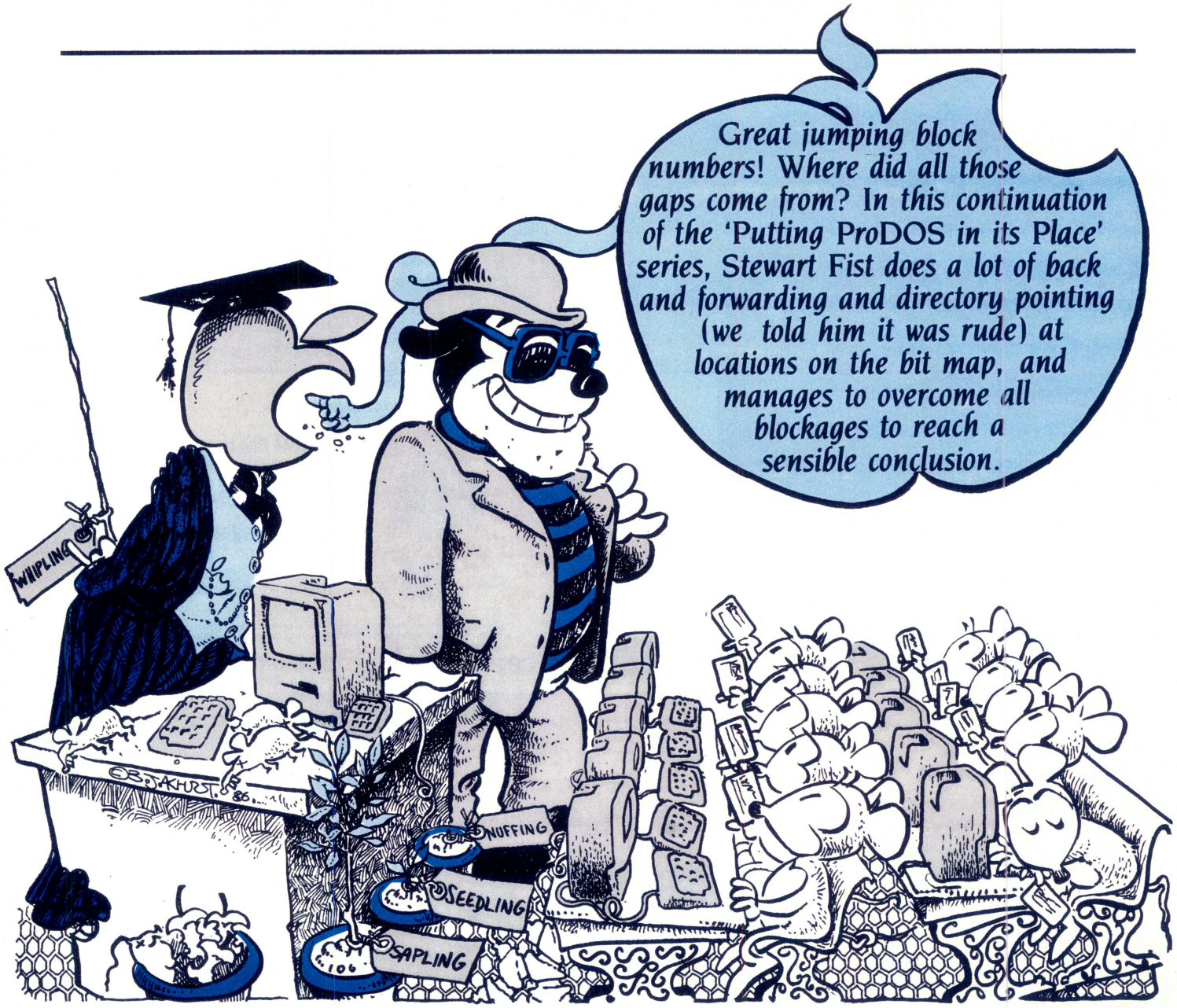

BYTING PRODOS BACK – Part 3

IN PART TWO, WE jumped a bit ahead of ourselves by looking at the formatting commands in Appleworks. We haven't yet finished dealing with the way the ProDOS system allocates and controls its disk space.

Remember the primary directory is at Block 2, and ProDOS supposedly allocates available space strictly in order from the lower free to the higher block numbers. One block equals two of the old disk sectors.

Figure 1 is again the main Directory block as it appears on Pro-Byter. And to give you an overview of what's on my example disk we have Figure 2, which is the disk map produced by Pro-Byter.

Ignore the Track column on the left — we are interested only in the blocks. Pro-byter uses a '+' sign to signify that a block is in use, and a '.' to show that it is either empty or available for use.

You can see from this map that the first 23 blocks are in use, then 16 blocks are free, followed by a further 31 blocks in use. If ProDOS strictly allocates space in order, from the lowest to the highest block numbers, why is there gap of 16 blocks in the middle?

A glance at the directory block gives you the answer. YC.PRODOS (which is an Appleworks W/P file) has been changed and saved again, so the space previously occupied by it, is now vacant.

There have been a number of other changes that aren't apparent, but which make interpretation of the map rather confusing. For instance, the directory (Figure 1) shows that the Appleworks database file ADDRESS.FILE begins at Block $0800 (decimal 8) and is $1E (31) blocks long.

There's a curiosity here that I don't understand — but here are the facts as they relate to Appleworks files, anyway. ProDOS takes up the first seven blocks, from $00 to $06, with $06 the bit map which keeps a running record of which disk blocks are used and which are still available.

Now, the first file on the disk starts at

```
00 00 03 00
   ----------------
F9 DEMO.DISK:::::: 00 0000 0000 000000
0000-0000 00 00 C3 270D 0300 0600 1801
   ----------------
2C ADDRESS.FILEEMP 19 0800 1E00 573800
FCAC-0000 00 00 E3 7E70 FCAC-0000 0200
   ----------------
18 SEEDLINGKS.TEMP 1A 1600 0100 4B0100
FCAC-0000 00 00 E3 0000 FCAC-0000 0200
   ----------------
00 YC.PRODOSS.TEMP 1A 1800 1000 E01C00
FCAC-0000 00 00 E3 2000 FCAC-0000 0200
   ----------------
29 YC.PRODOSS.TEMP 1A 3700 1000 CC1D00
FCAC-0000 00 00 E3 2000 FCAC-0000 0200
   ----------------
00 :::::::::::::::: 00 0000 0000 000000
0000-0000 00 00 00 0000 0000-0000 0000
   ----------------
00 :::::::::::::::: 00 00
BYTE      VALUE      A  BLOCK  PART     6
44($2C)   65($41)    A  2($02)    A     2
```

Figure 1. *The main Directory block. Note that* YC.PRODOS *has been changed and saved since Figure 1 in Part 2.*

```
          PRODOS(TM) BLOCK MAP

  TRACK        01234567 89ABCDEF
 $00-01  $0000++++++++ ++++++++
 $02-03  $0010+++++++. ........
 $04-05  $0020.......+ ++++++++
 $06-07  $0030++++++++ ++++++++
 $08-09  $0040++++++.. ........
 $0A-0B  $0050........ ........
 $0C-0D  $0060........ ........
 $0E-0F  $0070........ ........
 $10-11  $0080........ ........
 $12-13  $0090........ ........
 $14-15  $00A0........ ........
 $16-17  $00B0........ ........
 $18-19  $00C0........ ........
 $1A-1B  $00D0........ ........
 $1C-1D  $00E0........ ........
 $1E-1F  $00F0........ ........
 $20-21  $0100........ ........
 $22     $0110........

BLOCKS USED(+):54 / FREE(.):226
```

Figure2. *The disk map produced by Pro-Byter for the example disk.*

$08, but from the disk map we can see that $07 is in use. What with? When I did a trace of the ADDRESS.FILE file I found that it jumps from the directory, to Block $08, then back to $07, then on to $09.

This jump forward, the back and then forward again seems to happen on all Appleworks files, but all the books say that ProDOS allocates all blocks in strict order from the bottom up.

I don't pretend to understand this apparent contradiction, but it seems to apply to all files — except seedling files, of course, which are only one block in length. It is obviously a peculiarity of Appleworks rather than ProDOS.

ADDRESS.FILE is a database file, but the same applies to all Appleworks word processing files as well. The directory pointer points to the block reserved (in the longer files) as an index for that particular file. You can see the top couple of lines on Figure 3, which is a printout of Block $08 Part A.

```
::::::::::::  07090A0B 0C0D0E0F 10111213
::'()**+,-./0  14152728 292A2B2C 2D2E2F30
12345:::::::  31323334 35000000 00000000
::::::::::::  00000000 00000000 00000000
::::::::::::  00000000 00000000 00000000
::::::::::::  00000000 00000000 00000000
::::::::::::  00000000 00000000 00000000
::::::::::::  00000000 00000000 00000000
::::::::::::  00000000 00000000 00000000
::::::::::::  00000000 00000000 00000000
::::::::::::  00000000 00000000 00000000
::::::::::::  00000000 00000000 00000000
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::::::::::::  00000000 00000000 00000000
::::::::::::  00000000 00000000 00000000
::::::::::::  00000000 00000000 00000000
::::::::::::  00000000 00000000 00000000
::::::::::::  00000000 00000000 00000000
::::::::::::  00000000 00000000 00000000
::::          00000000 TRACE:ADDRESS.FIL
BYTE      VALUE     c@  BLOCK  1 OF 30
44($2C)   0($00)    @   8($08)    A     2
```

Figure 3. A *printout of Block* $08 *Part A of the* ADDRESS.FILE.

From the left we see the file first uses Block $07, then jumps to $09 and runs progressively to Block $15. it then jumps to $27 and continues on until Block $35. The second jump was probably due to another file getting in the way at the time of recording.

The index block actually uses two sectors at a time. Part B on this disk is nothing more than a series of $00s, but there could be some $01 in here if I had a full disk, or I was using a hard disk.

The program takes the least significant byte from part A (in this case $07 ... $09 ... and so on) and the most significant byte from Part B (in this case they are all $00s).

With this Appleworks database file, the actual information didn't start until near the end of Block $0A. Both $07 and $09 were occupied with the database formatting information.

With word processing files, only one block is reserved for format information, and the data starts at the top of the next block.

As I've noted before, Block 6 (Figure 4) on a ProDOS floppy is reserved for a bit map, and for those of you who haven't come across a bit map before, I'll describe it in detail. You need to know how it works if you are going to repair the damaged files.

You can see that the sequence goes: $00 $00 $01 $FF $FE $00 $00 $00 $03 ... followed by a whole log of $FFs. These

```
::: ~::::     000001FF FE000000 03FFFFFF
              FFFFFFFF FFFFFFFF FFFFFFFF
            : FFFFFFFF FFFFFFFF FFFFFF00
::::::::::::  00000000 00000000 00000000
::::::::::::  00000000 00000000 00000000
::::::::::::  00000000 00000000 00000000
::::::::::::  00000000 00000000 00000000
::::::::::::  00000000 00000000 00000000
::::::::::::  00000000 00000000 00000000
::::::::::::  00000000 00000000 00000000
::::::::::::  00000000 00000000 00000000
::::::::::::  00000000 00000000 00000000
::::::::::::  00000000 00000000 00000000
::::::::::::  00000000 00000000 00000000
::::::::::::  00000000 00000000 00000000
::::::::::::  00000000 00000000 00000000
::::::::::::  00000000 00000000 00000000
::::::::::::  00000000 00000000 00000000
::::          00000000
BYTE      VALUE     c@  BLOCK  PART     6
44($2C)   0($00)    @   6($06)    A     2
```

Figure 4. A *printout of* $06 *— the bit map — of the* ADDRESS.FILE. *Compare this with the disk map in Figure 2.*

$FFs are added when the disk is formatted, so they establish the length of available space on the disk. You can see that, with two parts, this block of bit map can handle a fair amount of disk space.

In binary, the hex $00 translates to eight zero bits (0000000) and is repeated twice. Hex $01 is binary 0000 0001, while $FF is eight ones, and FE seven ones and a zero.

If you space these out in groups of eight in table form, you get the following pattern:

```
00000000 00000000
00000001 11111111
11111110 00000000
00000000 00000000
00000011 ... and so on.
```

As you can see, this corresponds exactly to Pro-Byter's disk map in Figure 2, which is understandable since this is where Pro-Byter took its information from. The only oddity is that zeros are used to mark the presence of information in a block, and ones represent availability.

As the disk is over-written by changes and fresh files are added, this disk map is constantly changed. You can represent any combination of zeros and ones in an eight-bit group by choosing the right hex number.

The computer refers to this map before writing any information to a disk. The map doesn't play a part in reading from a disk — the computer has to refer to the individual file indexes since this records the sequence of blocks used — but for writing to the disk, the computer only has to find those blocks which are available, and these are any on the disk-map represented by a one. □

C FOR SMARTIES — Part 13

Les Bell continues his sojourn through the intricacies of the C programming language, with a discussion of functions and scope rules. (You can't say no - si, si.)

EARLIER, WE REFERRED TO Boehm and Jacopini's paper on structured programming, and we discussed several different kinds of flow control in the C language. However, we omitted a discussion of the most important of all: the function.

Functions are an important part of any modern programming language, as they are the foundation on which the programming concept of abstraction is built. In other words, when we design a program, we break the problem up into bite-sized pieces, each of which is soluble by a single programmer without working until 3 am.

This is the most important idea in good programming practice. If we can simply break a problem up into its constituent parts, using a strategy of divide and conquer, we are bound to be able to solve the whole problem without major drama.

Functions are designed to support exactly this idea.

The main programs we have written and examined so far have consisted of a single function — main() — and that's all. However, more complex programs will consist of many functions, which may even be kept in separate files and be separately compiled.

Library Functions

So far in this series, we have used several library functions. Your compiler manual should document the library functions supplied with the compiler, which are the standard (K&R) functions together with some that are unique to that particular compiler. I'd like you to take a look at these now.

You'll see that all functions, whether they are passed a parameter or not, are distinguished by the appearance of parentheses after the function name. If any parameters are passed to the function, they appear between these parentheses; if there are none, the parentheses still appear. That's how the compiler distinguishes between functions and variables, and why arrays are specified with square brackets.

In the description of some functions, you'll see an #include statement. This means the function uses a structure or definition from the named header file, and will not work unless the #include line is placed in your program.

Notice also all functions are specified to be of a particular type. That is the type of the result returned by the function. Some functions do not actually return a type, and these are usually specified of type *int*, although the modern trend is to give these a type *void*.

The returned value is sometimes the desired result, and sometimes a side-effect: for example, an indication of success or failure.

If a library function is used in a program without any type being specified for it, the compiler assumes it returns an int value. If you use a function which returns something else — say a pointer or float — then your program will probably collapse. Occasionally you will get away with it; you can sometimes treat pointers and ints as interchangeable, but it will cause you grief sooner or later.

Watch out also for functions which you would generally classify as floating point and naturally define as type float, but which actually return a double result. This can cause you problems.

If you want to store a double result in a float variable, or a long in an int, you can force the compiler to change the precision for you by using what is called a type cast. A cast is simply a type specifier, enclosed in parentheses, before the variable or function you want to convert.

If parameters are passed to a library function, it is the responsibility of the programmer to ensure they match in type with those specified in the function definition. Passing float values to a function which expects ints (or vice versa) will result in a crash. Casts will be helpful here.

Note some functions (most notably printf, scanf and their relatives) will accept a variable number of arguments. This involves some trickery on the part of the compiler — you cannot write functions to do this yourself.

User-written Functions

The major advantage of functions, as mentioned above, is the ability they give a programmer to abstract from a complex concept to a series of simpler ones. To this end, programs of any reasonable complexity should be written as a hierarchical set of functions.

A function definition is rather like a declaration for a variable. First comes the type of the function, then its name, followed by any parameters it will accept, in parentheses. On the next few lines, these parameters are declared, then the body of the function is opened with an opening (left) curly brace, and the function definition follows.

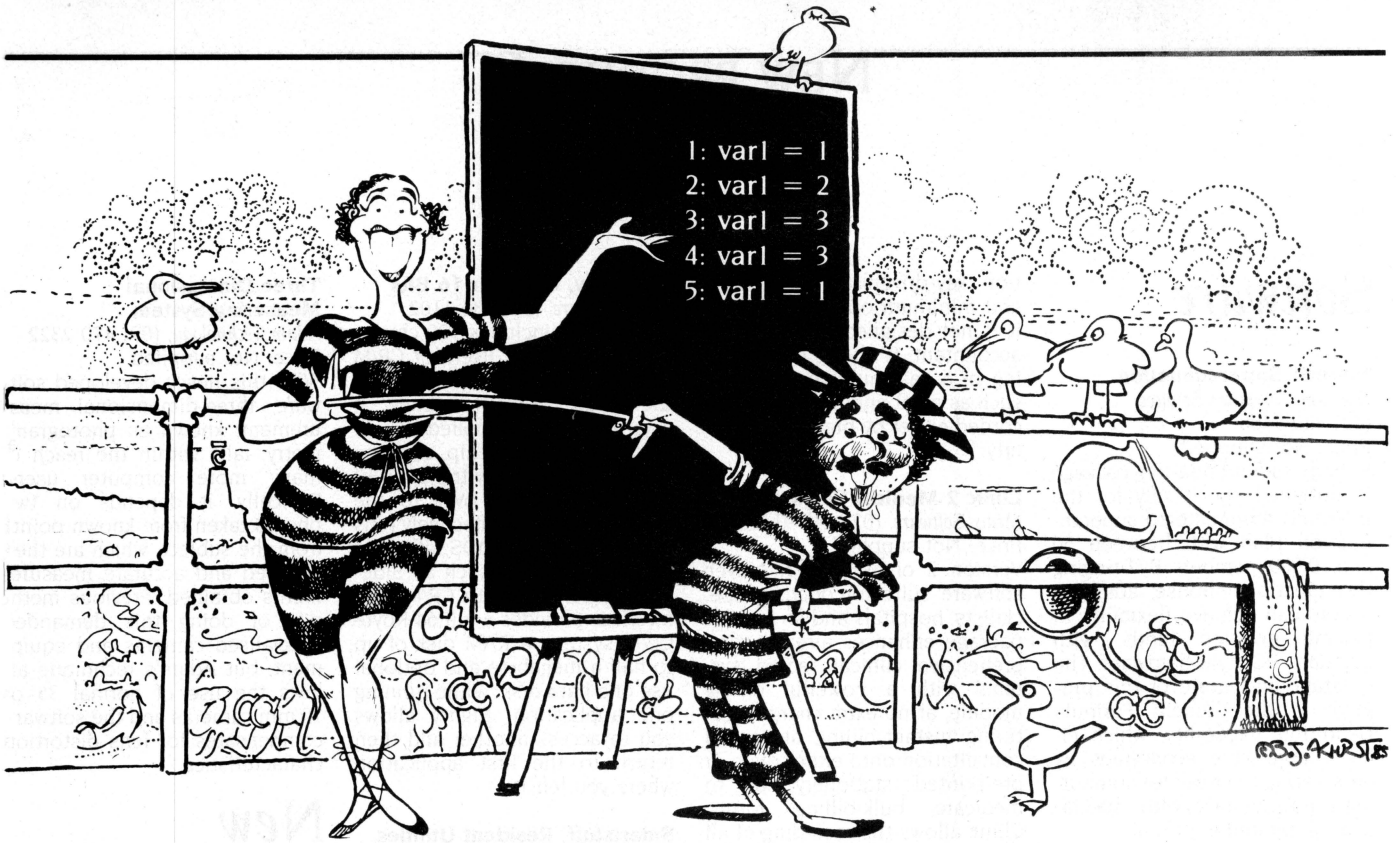
Scope Rules

Variables declared inside the body of a function are local to that function; that is, other functions have no knowledge of them, cannot access them, and most importantly, cannot change them. This also applies to the parameters declared just before the body of the function.

If a variable is declared outside the body of a function — whether the main function or some other — it is then a global variable. Global variables are known to all functions which are compiled together in the same file. If, however, functions are compiled separately, they cannot know of the existence of a global variable.

It is possible to over-ride this by declaring variables with the keyword extern. The extern keyword tells the compiler not to reserve storage for a variable in the current function (it is stored elsewhere), but the function does know about its name, type and storage location. The actual location will be resolved at link time.

C always passes parameters by value. This means the variables you use as parameters inside a function are *copies* of the parameters passed to a function. Changing these copies does not change the originals in the calling function. So the code in Figure 1 will not work.




```
/* Wrong way to increment a variable */

main()
{
     int num;

     num = 5;
     inc(num);
     printf("After incrementing, num is now %d\n",num);
}

inc(var)
int var;
{
     var++;
}
```

```
int var1 = 0;

main()
{
        int var1 = 1;
        printf("1: var1 = %d",var1);

        {
                int var1;
                var1 = 2;
                printf("\n2: var1 = %d",var1);
                {
                        var1++;
                        printf("\n3: var1 = %d",var1);
                }
                printf("\n4: var1 = %d",var1);
        }
        printf("\n5: var1 = %d",var1);
}
```

The answer is pointed out at the beginning of this Tutorial — if it doesn't make sense, try drawing lines linking the various curly braces, and try deciding which particular incarnation of var1 is 'alive' within each scope. It's easier to visualise than to explain, I'm afraid.

Exercise

Try the program in Figure 1 and verify that it does not work. Add a printf() statement inside the function inc() to print the value of var. Is it being incremented?

There are at least three ways to modify this program to make it work. First, we could make the inc function return a value. Modify the program to to this.

Another way is to pass a pointer to the integer we want incremented, and have the inc function increment it *in situ*. Try this way of doing it.

How could you use the scope rules to get it to work?

Blockheads

Another important point which many programmers forget is that C is a block-structured language This means that within blocks — that is, sections of code which are delimited by {curly braces} — it is possible to declare variables which have existence only within that scope, and which may, if necessary, redefine variable names already in existence in a containing or surrounding block. This means it is possible to use common names, such as i, for loop counters with relative impunity, through the use of curly braces.

With this in mind, what does the program in Figure 2 print? □

Gaps in Parts?

MISSED PARTS of any of our YC Tutorials? Well, you've got a second chance — We'll forward photocopies of any Parts of any Tutorial we've published in the last 2 years for $0.50 per Part plus $4.00 post and handling within Australia (overseas postage additional). Please identify the Tutorial by its complete name and specify your missing Parts (of the *tutorial*). All but the latest of our Tutorials are listed in YC's 5-Year Index, published with our July 1986 issue: refer to the Services page on how to obtain Back Issues. (*We've always got to read Les at* **least** twice.)

Software

'Superb' Superannuation
Co-Cam Computer Services,
(03) 420 5400
Price: Not supplied
Superb superannuation package is designed specifically for the internally administered superannuation plan with between 50 and 10,000 members. By bringing this function inhouse, administrators can achieve flexibility in placing invested funds, with standard PC-style hardware. The outstanding feature of this program is the 'Benefit Formula Definition' capability, which effects large-scale economies by eliminating the need for computing professionals with specialised programming skills.

All-Singing
All-Dancing Software
Roland Corporation, (03) 241 1254
Price: Not supplied
A complete series of music-teaching software, developed in Israel, lets students learn both how to play a keyboard, and singing, at their own pace, through a new technique which enables the computer to 'hear' and react to the student's efforts. Using instruments and microphones attached to an IBM PC, the Musicom courses enable students at different levels to learn and practice music correctly at their own pace. ▽

Clinic 2 Medical Software
Medix Software, (02) 449 9162
Price: Not supplied
Version 2 of an already-proven software suite for doctors, specialists, hospitals and so on, this package enhances already comprehensive clinical record systems with a powerful billing module, at no extra charge. Featuring 'instant billing' at time of consultation onto either plain or pre-printed stationery, or to medicare bulk-billing forms, Clinic allows the recording of all payments, including those made by credit cards, and processes the banking record on two-part paper.

MOPI Universal Assembler ▷
Ptizan Computer Services,
(062) 58 6823
Price: Not supplied
Just released in the United States, MOPI (Macro Oriented, Processor Independent) is a new assembler program which can generate machine code for *any* 8- or 16-bit and most 32-bit microprocessor. It produces .COM .HEX or .RLM files, and removes the need for cross assemblers. By its design nature, it can be readily used to program experimental processors. It can also operate on code written in manufacturer's mnemonics, or a new standardised set of universal mnemonics, and can produce job documentation.



Asset Control Package
CCH *Australia,* (02) 888 2555
Price: Not supplied
CCH Solvware offers a package designed to track and register all your company's assets. (I *can do that on the back of a bus ticket*). Function key-driven for easy input and minimum operator training, it is not designed solely for the accountant. It allows easy tracking of a vast number of assets, such as plant and equipment, recorded either by branch or property.

PC-Eighty, CP/M for 16 Bits
FBN *Software,* (062) 86 1102
Price: $140 (includes V20 chip)
PC-Eighty allows users of CP/M 2.2 to run their 8-bit program on their new 16-bit machines. It uses a V20 chip (supplied), which replaces the CPU chip, and the software allows easy transport of existing programs over to the new format. CP/M effectively runs as a 'Task' under DOS, allowing resident program, such as Sidekick, to be used with CP/M. The interface provides a full 64 Kbyte CP/M system, a RAM disk of up to half a megabyte and optional use of a hard disk. While running one application, Eighty allows you to access another and then return to the first application where you left it.

Smartstuff, Resident Utilities
FBN *Software,* (062) 86 1102
Price: $104
Described as a second-generation version of the Sidekick idea,



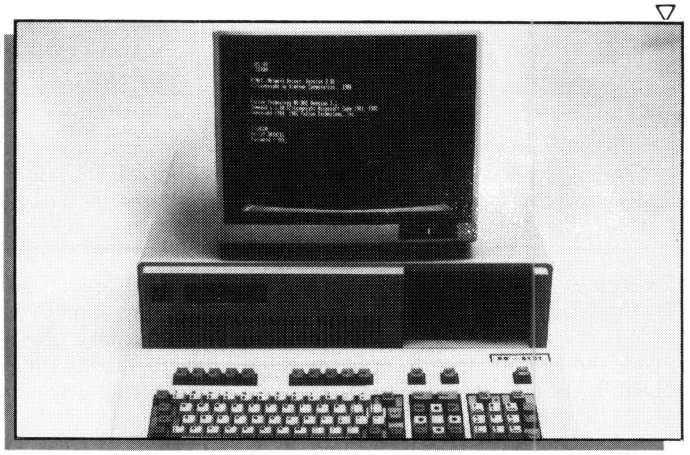
this package is a collection of 'pop-up' desk tools which you can tailor to your needs. Each tool can be loaded separately, to save memory. Smartstuff includes a powerful resident screen editor/notepad, a programmable calculator, an advanced financial calculator, a calendar alarm clock, a dialler, and a DOS command menu giving access to common DOS commands from inside an application programme.

Three Dimensional Measuring System
Adam Technology, (09) 470 2322
Price: Not supplied
With this newly developed software, three-dimensional measurement, known as photogrammetry, falls within the reach of many more computer users. Basically, it depends on two photos taken from known points from the subject, which are then scanned and accurate measurements obtained. Previous methods of doing this demanded specialised cameras and equipment, but Adam's technique allows the use of normal 35 or 70 mm cameras and the software compensates for lens distortion characteristics.

New Machines

Multistar 4
Computer Micrographic Services,
(07) 52 9966
Price: under $5000
The Multistar 4, by IBC, has been released in Australia, and offers an 8 Mhz Z80A CPU with 256 Kbytes of RAM, a hard and floppy disk controller, four serial and one parallel port. Able to compete with the low-end IBM system 36, it includes a real-time clock, an honest cache memory system and true user-accounting, logon, security, print spooler and minicomputer-like executive programs.

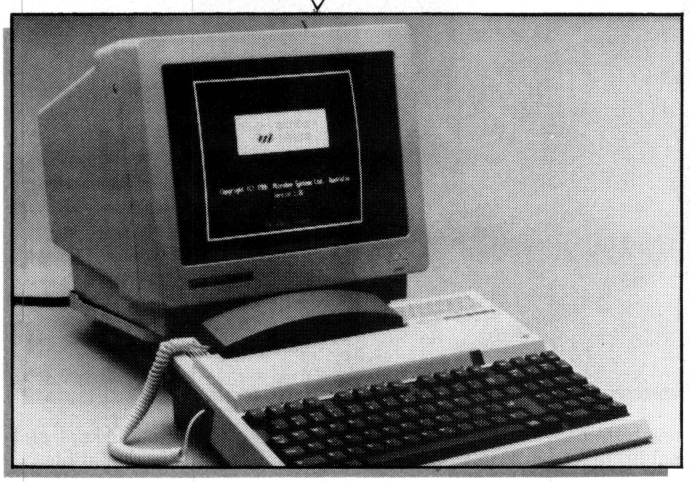
Datatel DPC Range of IBM Compatibles
Datatel, (03) 690 4000
Price: From $1568
Locally assembled and fully IBM ▽



compatible, the new range starts with the DPC-88, an XT turbo unit with 256 Kbytes RAM, 8 Mhz 8088, dual drives, colour card, parallel port, 150 watt power supply and 5151-style keyboard. Next is the DAT-286, an AT-style machine with 512 Kbyte RAM, an 80286, single slimline floppy and 20 Mbyte hard disk. This unit has a recommended retail price of $5410 and includes a high-res graphics card, a 200 watt power supply, security locking and a slide-top cabinet.

Gridcase Plus Laptop
Vicom Australia, (03) 529 8270
Price: Not supplied
This is claimed to be the first battery-operated laptop with an internal hard disk option, and includes a redesigned 71-key keyboard and an enhanced yellow or light-emitting plasma display, making the unit ideal for field applications. The Gridcase Plus has 1 Mbyte of ROM and 10 Mbytes hard disk capacity. Options include serial and parallel ports, an internal modem, RGB output and an IBM expansion box to access LANS.

Microbee Terminal
Microbee Systems, (02) 886 4444
Price: $828 plus monitor (B/W $149, colour $448)
The Teleterm, from Microbee, is a compact package which performs most of the information processing and communication functions required in the modern office, at a price far below what was previously possible. This is designed as a data terminal, but also includes a word processor, and a suite called 'Offsider' with pop-up utilities such as a phone index, clock/calendar and notepad. A built-in modem, pushbutton phone, 92-key keyboard with 12 programmable function keys and numeric key pad, together with all basic functions in ROM, make this an ideal Videotex station. Both 300/300 and 1200/75 baud rates, plus autodialling, mean the Teleterm can stand alone in an office environment where text handling and communications would otherwise demand a full-sized and full-priced computer.

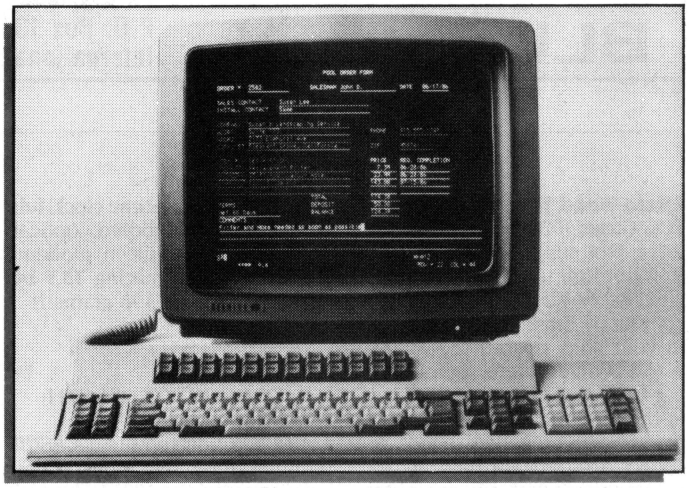


New Model BBC Compact ▷
Barson Computers, (03) 419 3033
Price: From $1332
Barson has announced a slimmer, more powerful BBC, with a lower price tag and a large bundle of software aimed at the Australian education system. Differences from the previous model include a numeric keypad, 128 Kbytes RAM and the incorporation of the computer in the keyboard. The price includes the computer, 640 Kbyte 9 cm or 13 cm drives, the WIMPS environment and software packages.



Peripherals and Extensions

Beehive Terminal Range
Datatel, (03) 690 4000
Price: Not supplied
Three new colour terminals have been released by Beehive, offering a modular design concept which permits the easy addition of enhanced features as required. The ATL179, 180 and 191 can all be provided with a 2 Kbyte record/play feature, with the ability to store user-selected data-entry sequences such as log-on log-off and various user prompts. The stored data is not lost at power down. Simple ASCII printers may be used for screen dumps and the ATL179 supports colour printers. All three units are designed around a 68000 microprocessor. ▽



Ekko-net Cordless Communication
Cyclops Systems, Marlow, UK
Price: Not supplied
Still in the final experimental stages in Britain, a new system for the transfer of data using existing mains power lines, is nearing fruition. Using a combination of hardware and specially written software, the system allows users to share information and data simply by plugging into a common power line, and promises networking facilities at about one-tenth the current (current?) cost. I bet the local power suppliers will find a way of charging for using their lines.

LP4000 Low-Cost Multi-Pen Plotter
Barrington Corporation, (08) 232 1333
Price: Under $10,000
With features such as: 0.001 inch resolution, 0.0025 repeatability, 70 cm/sec diagonal speed, paper size adjustable between A4 and A0, standard four-pen to 20-pen capacity, 0.01 per cent accuracy and a 12 Kbyte (optional 512K) buffer, it's no wonder Barrington thinks its new plotter will become the pseudo-standard plotter for CAD/CAM applications.

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XENIX 68K: Macintosh XL.
XENIX 11: PDP-11/23, PDP-11/73, Pro 350, Pro 380. (Note: XENIX 11 is not System V).

WHY XENIX?

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- Xenix has been installed on more microprocessor-based computers than all other UNIX based operating systems combined.
- Expanded and improved documentation.
- Xenix is full UNIX system V, only better.
- Xenix has superior multi-tasking design.
- Xenix is tuned for the micro-computer environment.

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- We have been involved with computers since our inception.
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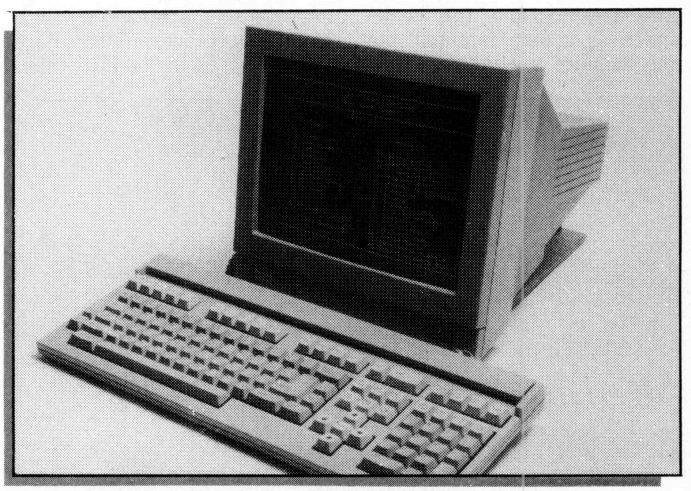
International: +612 419 5579. Telex: 74994.

Micro-Wand II
TCG Group, (02) 699 8300
Price: Not supplied
Roll up! Roll up! See the world's smallest 64 Kbyte programmable computer! Small enough to put in your shirt pocket, the Micro-Wand is an accurate, lightweight bar-code reader designed for use in the warehouse, inventory yard or anywhere the user needs to collect and process data. It can communicate with any computer and is designed to be compatible with already-installed equipment. It is essentially a data-capturing terminal which can accept data from barcodes or keyboard entry, and communicates with its host via an optical interface, down normal RS232 lines. Features include two-line data display to confirm acquisition of data, built-in date-time clock, full alphanumeric keyboard, optical scanner and a built-in modem. The size — an amazing 18.5 by 4.5 by 3.3 cm and 196 grams!!!

Opus-2 Terminal ▷
Mitsui Computer, (02) 451 7711
Price: Not supplied
A new addition to Mitsui's ASCII terminal line, the Opus-2 has been awarded the 1986 Industrial Design Excellence Award from the Industrial Designers Society of America. It has a 35 cm, dark-background, high-contrast, flat screen display, in green or amber, with 26 data lines, including two status lines, in either 80- or 132-column format, with a standard two pages of memory expandable to four pages. The



new terminals have 16 programmable function keys, plus another 38 programmable keys, and are Pick and Unix compatible.



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Parallel Digital I/O Board
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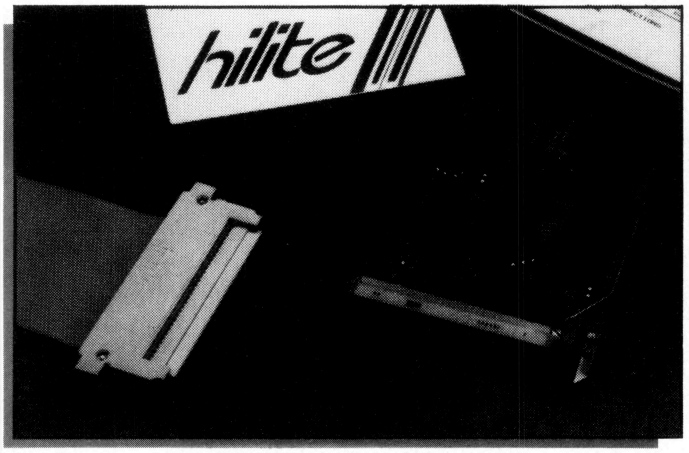
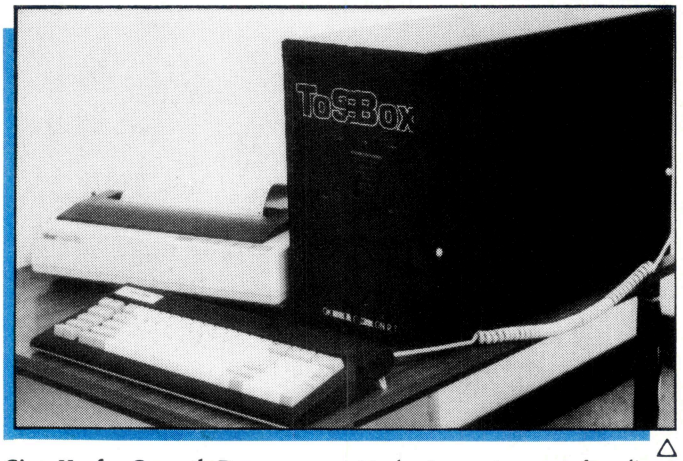
Australian-designed and manufactured, this new data-acquisitionboard is designed to plug into the IBM PC/XT and compatibles, to provide general-purpose parallel input/output. Features include a rear-mounted 64-way socket, direct interface with both CMOS and TTL devices, easy control from programming languages such as Borland's Turbo Pascal and Microsoft's GW BASIC, and is supplied complete with a comprehensive manual and a software read/write utility. ▷





△

Sine Up for Smooth Power
National Industrial Electronics, (03) 781 4006
Price: Not supplied
Beat those demons called transients, spikes, sags or surges. This new form of line filter is voltage-dependent only, precluding the necessity of matching the amperage rating of the suppressor with the amperage rating of the equipment. As a result, it is capable of protecting all the equipment on a single power source. It is bi-polar, protecting both the positive and negative sides of the sine wave, and offers a response time of two nanoseconds (max) and a clamping level of never more than two volts.

TOSBox Data Interface
Offcom, (02) 438 4199
Price: Not supplied
Incorporating Telecommunications Operating System (TOS) software, the hardware is an MS-DOS-compatible microcomputer designed to meet Telecom's Mode 1 requirement for direct connection to the Telex network. TOSBox has the throughput capability of three Telex machines, and can store data, switch messages, manage lease lines and keep trying engaged numbers without operator intervention. The unit includes expansion slots which will allow full PC function, and could reduce telex-line costs by 50 per cent.

Services

Country-Wise Rural Videotex Service
Visionhire Business Systems, (02) 959 5600
Price: Normal Videotex charges
Visionhire has been appointed preferred national distributor for hardware for the new rural service Country Wise. Accessed through Viatel, it provides continually updated agriculture, weather and market reports; and information on soils, water, environment, crops and vegetation, livestock and animals, and machinery and plant maintenance. A section called Country Manager provides vital property-management assistance.

PTFE PC Boards
Printronics, (02) 816 5066
Price: Quotes available
For the first time, polytetrafluorothylene boards can be made in Australia, following the introduction of manufacturing facilities by Printronics. For those of you who didn't know, polytetrafloureothylene (PTFE) is used in PC board manufacture where specific needs call for very high frequencies to be carried by the board. Previous demand for this style of board had to be filled by imports. Printronics is confident of its ability to handle volume production.

Publink Library Access
Box Hill/Doncaster Regional Library, (03) 647 9780
Price: Free
Publink allows any micro owner to contact this regional-library database and obtain information from the catalogue system. Users may enquire about the availability of a book or author without visiting the library. Publink can also tell users whether the book required is held by other libraries, and then call and request an inter-library loan. Full marks to Peter Stansfield, Chief Librarian.

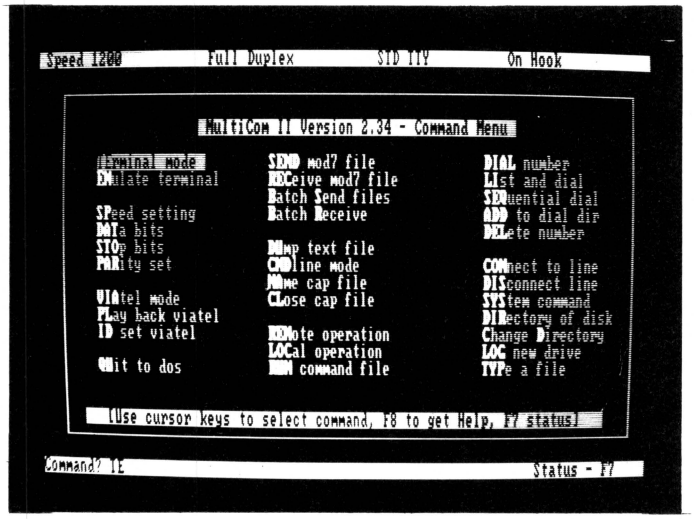
Unix and CP/M Courses
Labtam, (03) 819 4200
Price: Not supplied
Labtam has introduced an ongoing series of courses at its Hawthorn branch office. These include 'Introduction to Unix Systems', 'Unix System Administration', 'Introduction to Unplex Word Processing', 'Advanced Uniplex WP', 'Advanced Uniplex Package', 'Uniplex Administration', 'Systems Hardware (16- and 32-bit)', 'Unix for Service Engineers' and 'Introduction to CP/M Operating Systems'. Courses run for between one and five days every two calendar months.

Unprotected dBase
Ashton Tate, (02) 959 6411
Price: See below.
For those of you struggling with protected copies of dBase, Ashton Tate has not only released unprotected copies, but is offering upgrades to new versions. A conversion from dBase III Plus to III Plus 1.1 costs $114; dBase III to III plus 1.1 costs $432; and dBase II to dBase III plus 1.1 costs $684. All prices include freight and handling.

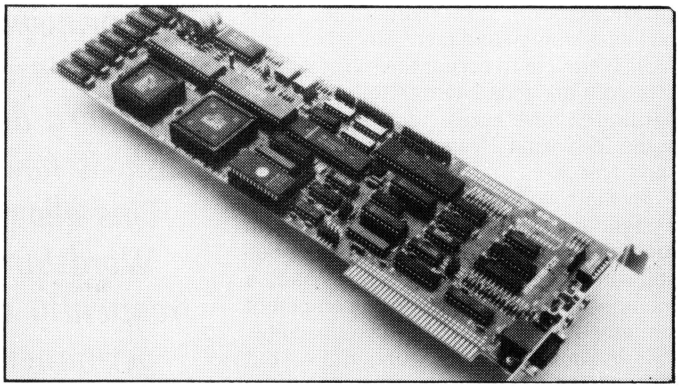
Miscellaneous

Audio Cassette Computer Courses
Barrington Corporation, (08) 232 1333
Price: Not supplied
There are 27 courses, produced on a 'fliptrack' system which allows branching of the learning curve to suit your needs. Students progress step by step through such subjects as computer operation, word processing, spreadsheets, database management and integrated software. There are also specific machine courses for Apple, IBM, Atari, Commodore, TI and Coleco Adam.

Mediaboard-100, The Brainy Whiteboard
L&M Electronics, (02) 959 56000
Price: Not supplied
Mediaboard is a multi-screen electronic whiteboard with built-in printer. Whatever is drawn on one or all of its four screens may be printed out in single or multiple copies for handing out to students or conference participants. Up to 99 copies may be reproduced at a time, and a reduction facility allows the entire contents of two, three or four screens to be printed on a single sheet. The Mediaboard is available for sale, or long- or short-term lease.



Multicom II △
PC Communications Package
Avtek Electronics, (02) 427 6688
Price: $149.50
Written by well-known Aussie software writer Barry Hall, Multicom II combines a conventional ASCII comms program and a Videotex package with a terminal emulator and a full screen-mapped 'remote' facility. The software supports emulation of more than 30 different terminals and can run programs remotely, even those which (like Lotus) access the screen directly. Multicom II also comes with autodialling plus automatic redialing (now you can get on to those busy bulletin boards). Amongst the useful features is the ability to dial and logon to Viatel and the like with a single keystroke.



△
EG-8 Graphics Expansion Card
Emulex Corp, (02) 858 4833
Price: ????
Billed as an eight function solution for users of IBM's PC, XT and AT Personal computers, the EG-8 emulates the IBM Enhanced Graphics Adapter (EGA) as well as the Color Graphics Adapter (CGA) and the Monochrome Display Adapter (MDA), with (they tell us) 100% software compatibility. The other five (to make eight solutions): a serial port, a bi-directional parallel port, a calendar/clock, lightpen interface, and RAM disk and print spooling software — all added through the one long slot. The EG-8 is provided with 256 Kbyte of display memory and supports the IBM 128-character set plus 384 user-definables in RAM.

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Price: $145.
From the Texan company that brought us DAC EASY and virtually revolutionised accounting software, we now have a powerful relational database, that can handle an unlimited number of records with up to 60 records per field and access three fields at any one time. For anyone looking for an 'accounting database', it offers a number of interesting features such as the ability to handle data arithmetic and the use of formula fields for calculations within files — and data entry can be through user-customised forms. There is also the facility to write memos outside the database itself. A handy feature is the ability to read and convert dBase II files as well as run dBII programs. □

HI, MICROBEE USERS, maniacs and sober business women and men! Since I've been foolish enough to accept the job of writing this column, I had better tell you what hardware I have access to — so you have some idea what I can review and what I can't (yet) do.

My main work machine started its life as a standard Microbee 128 Kbyte system running all the usual CP/M and Microbee software. However it recently had a memory transplant by a very competent surgeon and is now a 512 Kbyte machine. This has made it quite wonderful — but more about that later. It still runs all the standard software.

I graduated some two years ago from a ROM-based non-disk machine to a 128 Kbyte twin-disk (13 cm) machine. This is my favourite workhorse. Please note, I don't have easy access to a machine to run the smaller 9 cm disks. I have a modem (300 and 1200/75 baud).

I have not yet upgraded to the new Premium-version Bee, with its cursor keys and superior graphics. It is possible that I will upgrade to it later — it probably can still be done, despite all the extra memory in my machine.

I had resisted pressure to go 16-bit for ages, as I find the 128 Kbyte Microbee an excellent, friendly, fast and versatile machine, but I recently had occasion to review some 16-bit software ... So I now also have the Microbee Mitac machine with 512 Kbytes of memory, total IBM compatibility, two disk drives and a mouse! It is wonderfully silent compared to the fan-cooled IBM types around.

The Return of Dr Kildare

Now for the surgery! My machine has had its memory bumped up to half a megabyte. The surgeon was Peter Broughton of Broughton Engineering, an active member of the Melbourne Microbee Users' Group, who upgrades the memories of Microbees and Macintoshes in his spare time. He can do a couple of machines a week (Quick-draw McScalpel); and I've heard the Adelaide Microbee Users' Group has someone who can do even more machines a week (sheer recklessness — has someone told the union?).

Peter does an extremely good job, and supplies a very useful packet of accompanying software — all for $185.

The principal consequence of the upgrade is that my memory drive, or RAM disk, is now 412 Kbytes. This allows me to load Wordstar and all my frequently used programs permanently into the memory drive, and use both of the physical drives, a: and b:, for document and back-up disks — so my Bee operates with enormous speed.

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The Shell and all other utilities operate as normal. Peter's adaptation of the operating system is only visible at boot, when a message comes up on the screen before the Shell appears, telling you that it is now a 512 Kbyte system.

The mathematicians out there will be wondering where the missing 'page' of memory is; 412 Kbytes plus 64 Kbytes operating space makes up only 476 Kbytes. Peter uses the remaining memory to store the operating system. The Shell is automatically stored there on cold booting. If you set your machine with INIT.COM to start on CCP and then load the Shell, both will go into hidden storage. Then, once you've booted the machine, there's no need to keep either CCP.SYS or SHELL-.SYS present in a drive. Peter is writing all sorts of software for this hidden cupboard, including a graphics driver and function keys.

If a disk with the standard Shell and operating system is loaded, the machine instantly becomes a standard 128 Kbyte Microbee with an empty 62 Kbyte memory drive ready for use. Needless to say, I don't load an old disk when I have 400 Kbytes of valuable software sitting in the memory drive!

Peter supplies software with the machine, which allows you to copy the operating system away as a usable file on disk, and to load different copies of the system — a great help to anyone like him who likes changing the system.

His software can also set up the machine to run disk drives of varying types and sizes, including 800 Kbyte 9 cm drives. His programs are all easy-to-operate menu-driven utilities. You can also reverse drive names so the M: drive becomes A: — a great help when your programs expect to find their files on the A: drive. Peter also supplies programs to allow you to format either the whole disk or designated tracks on a disk — for both 40- and 80-track drives.

And Peter can upgrade CIAB machines to 256 Kbyte for $120 (CIABs cannot get up to 512 Kbytes).

He is contactable either on (03) 347 8114 (ah), or via the User Group Bulletin Board on (03) 882 1571.

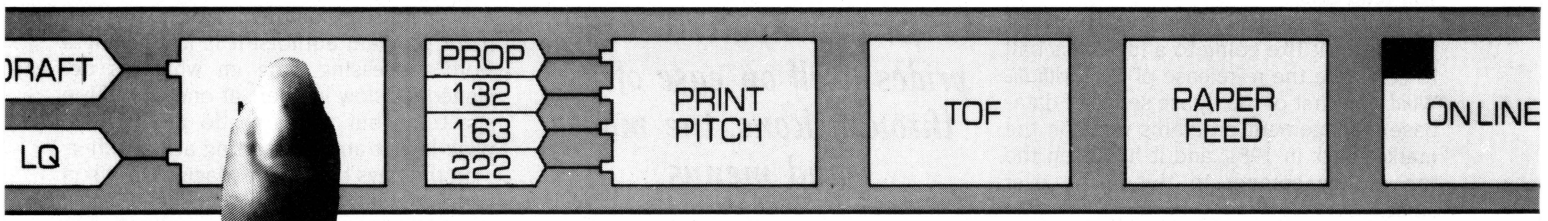
I have had my Microbee on constantly, sometimes for a week or more (with only the screen switched off when it's not in use) — and it does not overheat, despite the extra heap of memory chips inside it. Peter's operating system seems to be completely stable and bugless. Wordstar and the other programs are always in place — and are not disturbed even when I reset the machine.

Of course the speed is fantastic. I just had a 52 Kbyte document load from disk to the memory drive in nine seconds. Wordstar starts off practically instantly.

I wish I could get the Microbee 16-bit machine to perform as efficiently. You can configure it to have a somewhat slower RAM drive, but, under MS-DOS, every time you reset the machine the RAM drive is wiped out and remade. The Mitac can, however, run more deluxe-sized programs than the 8-bit Microbee.

I'll be back next month. Till then, happy computing! □

FOR TOUCH-CONTROL, TOUCH A STAR!!



In the Star range there's a printer that's tailor-made for any application.

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BY STEWART FIST

dBase Mac

They held a party recently to launch the new Macintosh version of dBase ... well, not actually launch it, but to announce that it would be launched in the near future. Unless disaster has struck down the Ashton-Tate Mac developers once again, they've probably got it on sale by the time you read this.

Having a party to launch a dBase in 1986 is a bit like going to a full-dress ball to celebrate the re-release of *Gone with the Wind*. The first of the dBase series of database management programs went on the market back in 1981, and it has been the top money spinner in this niche ever since.

Wayne Ratliffe, the program's author, started out with Version II, in case you are wondering why you never heard of dBase I, and now we are dealing with Version III and/or III+ (on MS-DOS machines anyway).

In dBeginning

Originally dBase II was written for CP/M, and a large part of the sales would have been to the business CP/M market, before the advent of the IBM PC. And being on CP/M it was copyable; especially for the Apple II with a Z-80 softcard, so dBase is probably the most pirated program of all time.

This is why the release of dBase for the Macintosh is actually a significant step ahead for Apple, even though it is a program with silver hair and a hearing aid. There are thousands of hackers and professional programmers out there who cut their teeth on this program/language; it is the BASIC of the database management world.

The traditional strength of dBase has always been with its programming language, which makes it a rather paradoxical choice for a computer which prides itself on ease of use, through icons, the mouse and menus. You can use the MS-DOS and CP/M versions of dBase without programming, but only as a simple list manager (it works quite well). For any serious work you need to master a quite complex language, with a large number of syntax peculiarities.

Hopefully, the use of icons and menus on the Mac will make programming a breeze — but a translation like this from a complicated conventional language/program to an idiot-proof Macintosh package is not easy to make. When many other programs have been translated (as distinct from re-written), they always look 'patched', and usually make use of only about half the Mac ROM routines open to them.

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dFining dCompetition

dBase's opposition on the Mac will not come from Microsoft's File. File is a very clever and substantial program, but not in the dBase class. I don't count Jazz as a competitor either, since it is really only useful as a list manager; and despite its recent improvements, Helix is not in the same race.

Taking the charge head-on, however, will be Blyth Software's Omnis 3, which I think is one of the best database management packages ever written. But to confuse the issue, I would say the same about dBase.

The difference is that Omnis 3 was written originally for the Macintosh, while dBase wasn't. Apple and Ashton-Tate assure us that "dBase has been completely re-written for the Mac — it's not just a translation", but I'll believe that when I see it.

Omnis 3 has another advantage that dBase will find hard to match: Blyth Software also produces Omnis 2, which is a super-list-manager with some database management functions, and as such is admirably suited for the low end of the database market.

Probably more than with any other program sector, users of database programs find they need to progress in complexity as their businesses find new uses for their computers. Companies start off wanting only simple computerised mailing lists, but once they have succeeded with this, they become aware of other possibilities.

Gradually they move into stock records, then detailed inventory and accounting, and before you know what has happened they want the whole she-bang automated so all business records can be updated overnight while the staff sleeps. This puts a lot of pressure on the database management program authors. It is like having a word processing program which is designed for slow learners at one end of the spectrum, but needs to do professional page-layout and typesetting at the other.

In the days before the Macintosh, when computer users didn't eat quiche, dBase II was the program of choice, simply because it allowed this progression. You started off by just learning one or two commands from the manual, and you used the program to keep phone or mailing lists.

Later, you either invested six months of your life trying to learn the language and decipher Wayne Ratliffe's horrific manual, or you paid someone large sums of money to progressively construct a series of automated processing command programs.

dCeptive on dFace of It

Despite the programming complexity, dBase II presented a simple-to-use facade to the outside world. The input and output screens were easy to read and easy to use. And you could throw the gear into automatic as you switched off the lights at night, and by morning the stock and shipping records would be updated.

So dBase Mac could be either a dramatic step forward for the Macintosh, or a non-event. I know I'll use it because I guess there are a lot of other dBase programmers out there to give the program a push. Whether it will roll the Omnis 2 and 3 series, however, is anybody's guess. We'll have to wait and see. □

Interested in dBase?
Subscribers to YC receive **dLetter**, *the* independent monthly newsletter for dBase II and III users, at no extra cost. **dLetter** draws on the talents of three of the most experienced dBase users in Australia to give a wealth of information, help, hints, tips and techniques to help solve data handling problems. And it's *the* source of feedback from the people who count — the everyday users of dBase. **dLetter** — every month with *Your Computer* subscription.

IBM UNDERGROUND

BY JOHN HEPWORTH

AS I WORK with my computer from day to day, I come across all sorts of little (but still time-consuming tasks) which could be made so simple if only the right utilities were to hand.

The greatest problem most PC users have is taking data from one program and massaging it into a form which is usable by another program. With the widespread use of Lotus 1-2-3, methods of getting all forms of data into this popular program are essential.

Some software gives no options to the user when output is desired. With these programs, either the data is saved to disk in some proprietary format, or it is printed via the parallel port. None of the standard file interchange formats are available, and the program may not be able to save the output to disk in the identical format as it would be printed.

Virtual Print

VPRINT.COM (1536 bytes, 9D12D84) is a simple little co-resident program which can divert output from another program (aimed at the first parallel port) and save it in a file. It's been around for years, and is executed at the DOS prompt with the command

VPRINT filename.

This causes all output destined for the parallel port to be saved in a file named 'filename'. It is possible to toggle off the diversion with the command VPRINT /n. This toggle is case sensitive, and only a lower case 'n' will work!

I have heard VPRINT is not happy with some versions of DOS 3.x, and, in any case, the use of Shift-PrtScr can hang the system. Try the combination of your machine, your application and VPRINT on a non-critical application before staking your Magnum Opus on it. All software, commercial or public domain, should always be fully tested by every end user, on their own equipment, with their own files, before using it for a critical application.

123PREP

OK, now you have a disk file. What if this file is of a database, with one line per record and all fields in each record on the same line, with no delimiters like commas or quotes? The XFERLIST files on many Bulletin Boards are just like this. How can they be loaded into Lotus? How can they be used as the database of names and addresses needed when Wordstar and Word want to merge a form letter with a database to do a mass mailing?

Public domain software (along with that grey area of user-supported software) is a co-operative venture with many talented people writing simple and exotic programs, first for themselves, then donating them free of charge to the pool we all share.

Normally, Lotus can import such files with the File Import Text command — but each line is read in as a continuous line of text. If the only data on a line is numeric with spaces between the numbers, the File Import Numbers command can be used, and the record is separated between the numbers. Mixed text and numbers, or multiple text fields on the same line of the original file, are more of a problem.

123PREP.EXE (9674 bytes, 5-02-84) to the rescue. It reads in each line of the source file, separates that line into fields with lengths selected by the user, who also decides which fields are to be treated as numeric and which as text. The text fields are surrounded by quotes, while the numeric fields are left untouched, though a space is left between each field and the next, whether numeric or text.

Now the Lotus File Import Numbers command will import the file, and the fields will be separated into different columns within the worksheet. Other software that you propose to use may not accept simple quotes around a field as an adequate delimiter. Some word processors also require a comma when merging a form letter with a database. In this case you may have to use that word processor first on the database file created by 123-PREP, to add commas between the last quote of a field and the first quote of the next field.

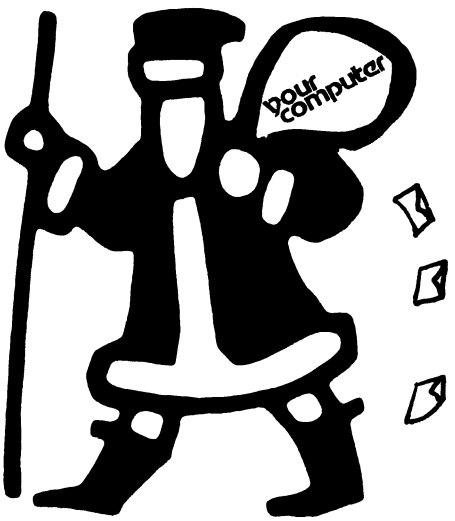
The Public Domain

Public domain software (along with that grey area of user-supported software) is a co-operative venture with many talented people writing simple and exotic programs, first for themselves, then donating them free of charge to the pool we all share. User groups then distribute them around the world at a nominal charge, based on the price of disk, postage and copying. This should cost no more than around $10 to $12 dollars per disk, and any commercial operator charging more is really exploiting us all and should be avoided.

If you have written something — let the public domain librarian of your user group have a copy, so it can be added to the worldwide collection. I would also like to hear of public domain items that are particularly good (or bad, so we can all be warned), and would love to get working copies of the good ones!

Merry X

I'd like to wish all *Your Computer* readers a Happy New Year. Thanks for all the letters you sent in 1986, and for the comments in them — keep the feedback coming. □



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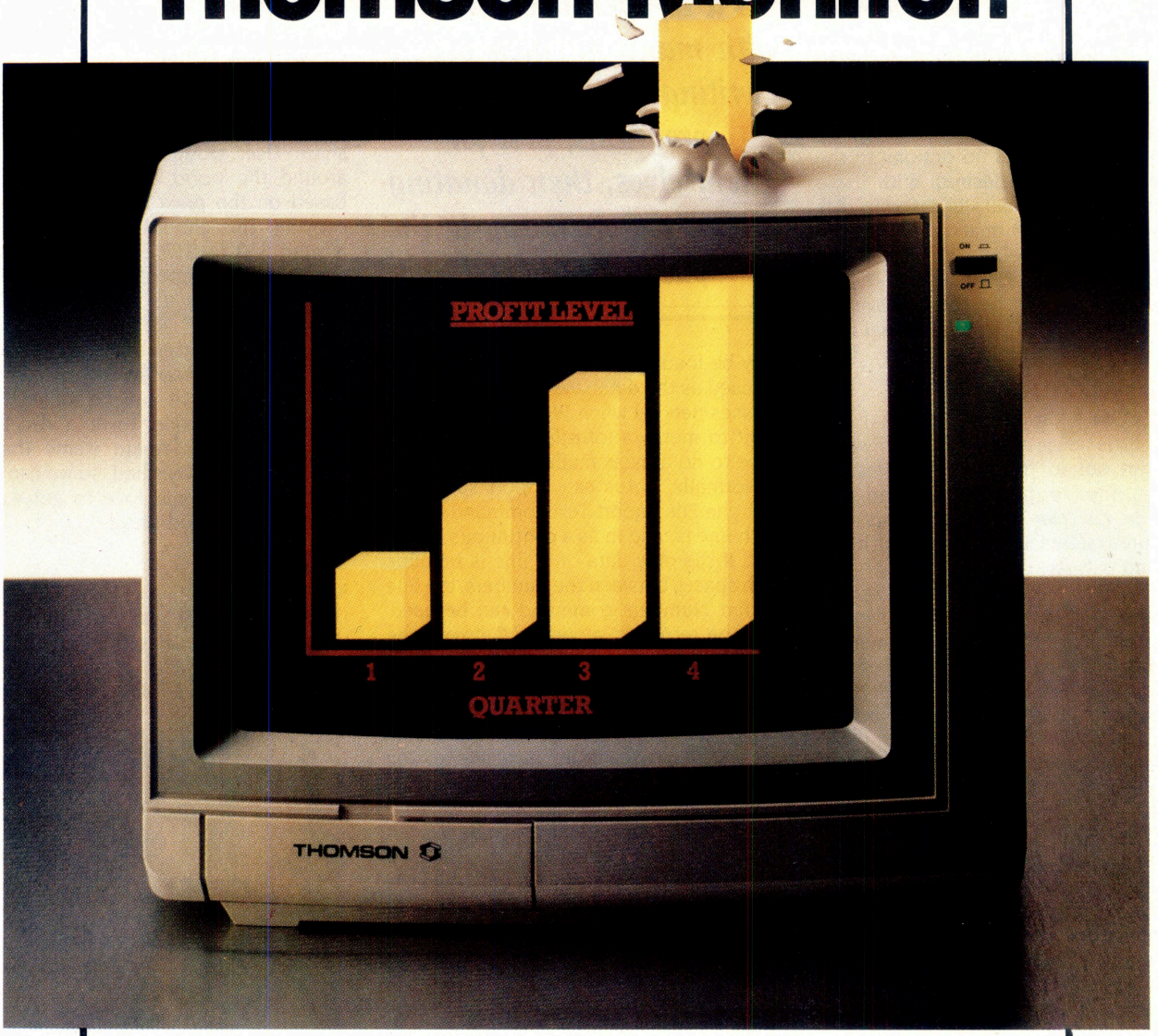

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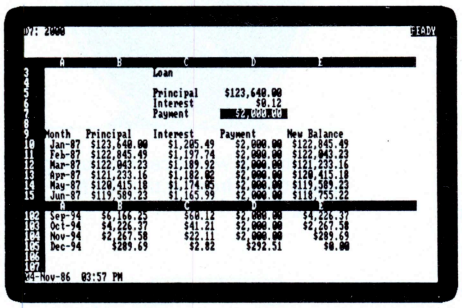
MegaFreeze

The MegaFreeze software package allows you to take a snapshot of your monitor screen in any PC application. The screen image is placed in the MegaBuffer (1.3 megabyte pixel buffer) with the same resolution as your monitor's display mode. Then with the MegaScan software, you can enhance or add text to your Mega-Freeze image before including the image in a larger document.

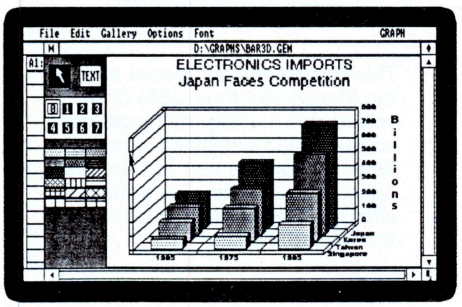
MegaFreeze is ideal for documenting software programs containing menus or option lists. The screens in your software program can be captured and used as illustrations as you proceed to document the program's features.

MegaFreeze is also great for illustrating sequences in installation or test procedures. Depending on your screen resolution, up to 76 freezes can sequentially be created and placed in the MegaBuffer.

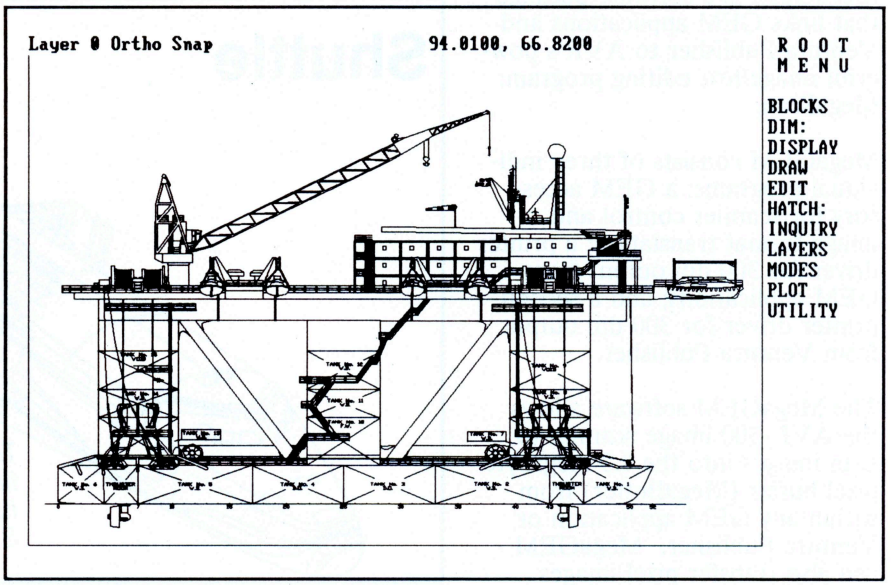
MegaFreeze images can also be used for introducing, highlighting, or describing the features of a new software product in your newsletter.



Lotus, 1-2-3 Screen



GEM Graph Screen



AutoCAD Screen Captured Using MegaFreeze and Wyse WY-700 Monitor

MegaFreeze Features

* Memory resident software program compatible with other memory resident programs. Activated by the Shift-PrtSc (Print Screen) keys.
* Installable on any IBM PC-XT, PC-AT, or compatible that has a MegaBuffer card and a MegaScan software program already installed.
* Supports the Color Graphics Adaptor (CGA) display monitor in all modes except 40 column by 25 line text mode.
* Supports the Wyse WY-700 monitor in 1280 x 400 mode and in 1280 x 800 mode.
* Display modes, double size freeze option, and inverse video option selectable from the command line.
* Up to 76 screen freezes can be placed in the MegaBuffer at one time depending on the MegaFreeze freeze size option selected and the resolution of the monitor you are using.
* Flow files are provided to combine freezes with an outer black frame to create a "screen" look. Flow files can also be used to isolate a freeze so it can be moved, edited, or saved.

Typical Applications

* Technical manuals
* Software manuals
* Advertisements
* Sales brochures
* Newsletters
* Manufacturing Documentation
* Overhead transparencies
* Data Sheets
* Reports

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This page was created using MegaScan and MegaFreeze.

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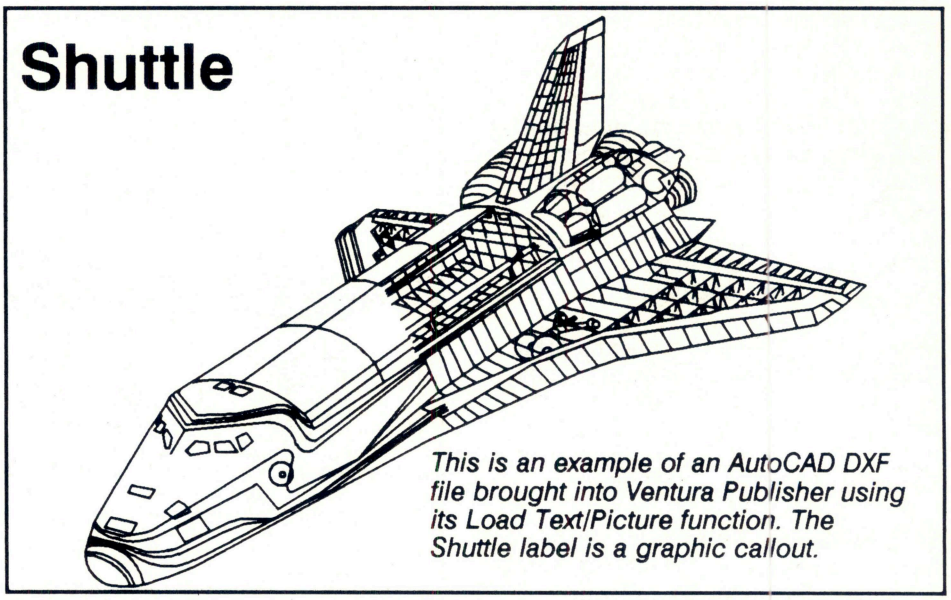
MegaGEM

MegaGEM is a software package that links GEM applications and Ventura Publisher to AVR's powerful image/text editing program: MegaScan.

MegaGEM consists of three individual programs: a GEM accessory for scanner control and image format translation; a printer driver for 300 dpi output from GEM applications; and a second printer driver for 300 dpi output from Ventura Publisher.

The MegaGEM software allows the AVR-300 image scanner to scan images into the 1.3 megabyte pixel buffer (MegaBuffer) from within any GEM application or Ventura Publisher. MegaGEM can also transfer pixel images between the MegaBuffer and GEM image files.



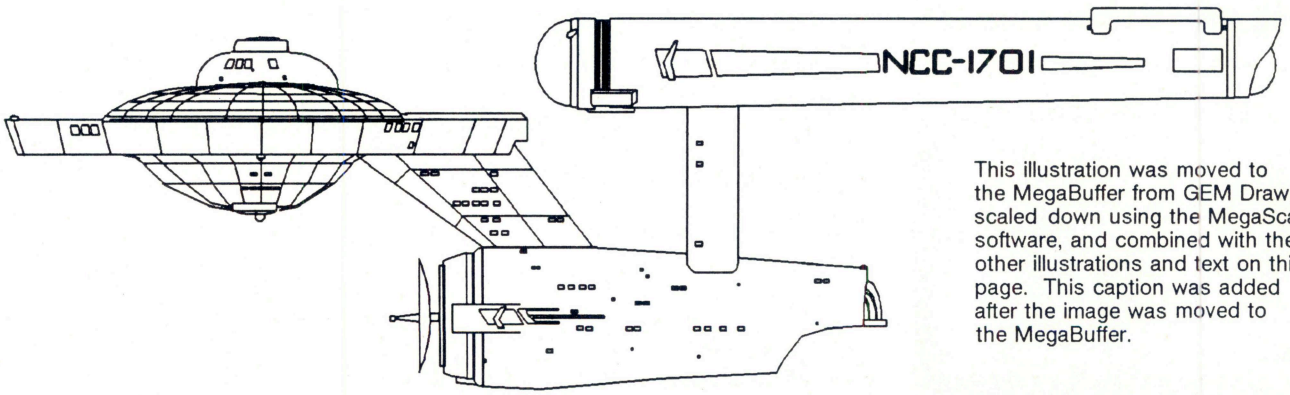
This illustration with text was moved to the MegaBuffer from Ventura Publisher to create this data sheet.

MegaGEM Features

* Operates the AVR-300 scanner from within GEM applications or Ventura Publisher.
* Prints from GEM applications and Ventura Publisher at 300 dots per inch on the AVR Laser Printer.
* Reads GEM images into the MegaBuffer where they can be edited and incorporated into larger documents.
* Transfers GEM application and Ventura Publisher formatted output into the MegaBuffer where they can be edited with the MegaScan software.
* Converts scanned or other images in the MegaBuffer into GEM image format.



This image was scanned using MegaGEM from within GEM Paint.



This illustration was moved to the MegaBuffer from GEM Draw, scaled down using the MegaScan software, and combined with the other illustrations and text on this page. This caption was added after the image was moved to the MegaBuffer.

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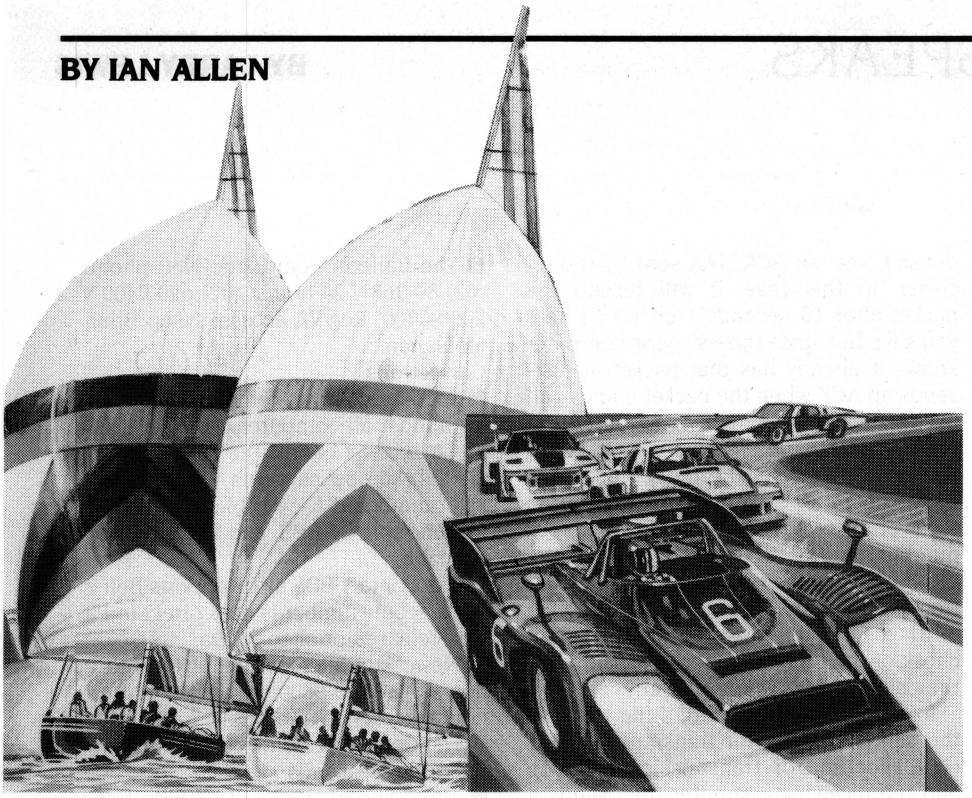
This page was created using MegaScan and MegaGEM.

BY IAN ALLEN



I REMEMBER the night we won the America's Cup. I remember it well because I was having one of my midnight-to-dawn programming sessions and just happened to have the TV on as well. I also remember the sportscasters preparing to crucify John Bertrand for losing. The poor fellow made a tactical error on the first leg — one that looked as though it would cost him the race — and boy was he going to pay. But he was lucky. He found a wind shift and became a national hero instead. Funny, isn't it, how sportsmanship only counts if you're a winner.

This year it's all on again, and you can do more than watch it on TV — you can also play the game. Commodore (appropriately) has included an America's Cup game in its C64-C Family Packs. It's a cassette game, so it's a little slow in loading, but if you are into sailing you will probably find it quite interesting. 'Arnie's America's Cup Challenge' uses a combination of five different screens and a joystick to place you in command. The joystick is used for everything from steering to sail selection. It even functions as a winch! (You hold the fire button and rotate the joystick.) You can play with one or two players and you can set various degrees of difficulty (which basically determine the extent and frequency of the wind shifts).

The game comes with a brief set of instructions, which includes a glossary of sailing terms and a description of how the game is played. The instructions are adequate for someone familiar with the C64, but there is very little information about how to load the game. Datasettes can be a bit finicky, and sometimes you may have to try a couple of times before you get a successful load. Experienced users know this, but the sort of person who buys a Family Pack is likely to be a complete computer novice — Commodore could have provided a little more help.

If you happen to have any SSG games (Reach for the Stars, Carriers at War, Europe Ablaze or Battlefront), you may be interested in the company's house magazine 'Run5'. It's full of hints and tips, and often has articles giving insight into how to make the most of the different scenarios.

The other two games in the Family Pack also follow a sporting theme. One is a cartridge game called Formula le Mans; this is a racing-car game, but it's not a new one. It's been around since the 64 was first released. Its graphics and style are not up to those of the latest in the genre, but it's still quite a playable diversion. I think it's commendable that CBM has included at least one cartridge game. Cartridges are idiot-proof, and it means new owners will easily be able to get their computer to do something.

The third game is the cassette-based 'Arnie Armchair's Cricket Game'. This is a game for two players and requires some eye/hand co-ordination. The fielding player can position his or her team and select what type of bowling attack. Once the bowler begins his run, the fielding player uses the joystick to activate one of the fieldsmen who will try to catch or return the ball. Batting is done by the other player, again with a joystick. You have a choice of about eight different strokes, ranging from a glance to a square cut. You make this selection as the bowler in motion, so you must be fast. Pressing the fire button causes your player to make the stroke. This is where the eye/hand co-ordination comes in: too soon or too late and you'll miss the ball.

The game has provision for different types of matches. You can play a limited game, a one-day game or a test match. You can also give your team members individual names. It may not be the real thing, but if you can get the hang of it you needn't worry about breaking anybody's windows.

RUN5 Magazine

If you happen to have any SSG games (Reach for the Stars, Carriers at War, Europe Ablaze or Battlefront), you may be interested in the company's house magazine *Run5*. It's full of hints and tips, and often has articles giving insight into how to make the most of the different scenarios. The Strategic Studies Group regularly publishes new scenarios, which you can create by using the game design routines, but if you can't be bothered typing in the details you can also get a disk subscription which has all the scenario info already entered. *Run5* is available from most of the stores that sell SSG products, or you can subscribe direct ($15 for four issues, or $65 for four issues and four disks). The address is The Strategic Studies Group, PO Box 261, Drummoyne 2047.

And for more on the new Commodore, refer to my review earlier in this issue — GEOS! *It's a new* C-64! □

THE PROPHET SPEAKS

BY LARRY LEWIS

THE PAMS REGISTRY is working, though many system operators are slow getting their information in — the registry system will only work if *you* support it, so get organized now!

Christensen File Transfer Protocol

Christensen (also called Modem/Xmodem) file transfer protocol has been around for quite a few years now and, like many things computerish, is veiled in mystery and misunderstood by many. So this month I am going to give you all the details you ever wanted to know about the Christensen file transfer protocol.

Data is sent in 128 byte blocks within sequentially numbered packets, which include a packet header, the data, and a checksum of the packet (excluding the checksum itself). As the receiving computer stores incoming data in memory, it performs its own checksum of the packet and then compares the computed checksum with that in the packet. A successful comparison means all the information was sent correctly, and the receiving computer acknowledges this by sending an ACK (ASCII for Acknowledge Hex 06) to the sending computer. If the comparison fails, the receiving computer tells the sender to resend the packet, by sending a NAK (ASCII for Negative Acknowledge Hex 15).

When a file transfer is initiated, there is potential for a problem to occur (and some terminal programs really mess this up): the sending computer could wait for the receiving computer to do something, and vice versa, which would obviously result in everyone going nowhere fast! What should happen is that the receiving computer sends a NAK to the sender to initiate the transfer, and if that doesn't happen the sending computer should transmit the first block after 10 seconds.

Now the sending computer will transmit the first block, which consists of a SOH (ASCII for Start of Heading, hex 01), the block number, the two's complement of the block number, and 128 bytes of data followed by the checksum — 132 bytes all up (see Figure 1).

This process continues with the next packet of information. What happens when (yes when) the receiving computer sends a NAK? Simple, the sender transmits it again, just like when someone says "beg your pardon" in conversation (see Figure 2). In the same way that information coming from the sender can be garbled, sometimes the sending computer doesn't 'see' an ACK/NAK sent by the receiver. In this case, it will resend the packet after 10 seconds ("oh no", I hear you say), but since the receiving computer knows it already has that packet, it just sends an ACK when the packet ends — all fixed!

How does the receiver know what packet it's getting? The block number is incremented for each packet sent, and the receiver also adds the SOH, the block number and the two's complement of the block number, the result of which calculation should be zero (for example 01 [SOH] + 01 + FE is 00) — so there's a double-check of the block number, in addition to the check on the whole packet.

In normal completion of a file transfer, the sending computer transmits an EOT (ASCII for End of Transmission Hex 04), and the receiving computer then sends a confirmatory ACK (see Fig 3). If the EOT is lost, the receiver will continue to wait for the next block, sending NAKs every 10 seconds, and will eventually time out (after 10 NAKs).

One thing which is often overlooked is that the receiving computer must be capable of receiving the entire packet at the full speed of the communication link, which can cause problems at high speeds.

PAMS List Updates

Special Thanks to Tony Nicholson for a copy of the Newcastle Microcomputer Club RCPM users guide, congratulations on a very professional manual!

ACT

Corrections:

- The PC Exchange RIBM now caters for all baud rates.

New South Wales

New Systems:

- Bee-Hive BBS: phone (02) 520 7237; Friday, Saturday, Sunday, Monday 0900 — 1800; sysop, Paul Pinches.
- Books BBS: phone (02) 525 5781 RING BACK; 24 hours; supports all baud rates; Reg/LVA access; sysop, Chris Ruwoldt.
- Metebeelus RBBS: phone (02) 349 2366; Monday to Friday, 1800-0900; Thursday 2200-0900; Saturday 1500 until Monday 0900; Reg/VA access; sysops, Tony Kemper and William Nitske.
- Sorcerer Users Group RIBM: phone (02) 626 8020; 24 hours; Mem/VA access; sysop, John Cepak.
- Tachyonics Fido-Net: phone (02) 438 2682; 24 hours; Reg/VA access; sysop, Richard Lenz.
- The Bulletin Board Fido-Net: phone (02) 80 3681; 24 hours; (02) 690 9400 V22 2000-0700; Reg/VA access; sysop Brian Houlahan.

Corrections:

- Arco-Tel is now Mem/LVA, and caters for almost all computer users.
- CCUA C-64 is now the Comet C-64.
- Club-80 now supports V23.
- Commboard C-64 BBS should be The Commodore 64 BBS, and V23 will now be available.
- The Contact BBS also supports Bell 212.
- Freecom Number is not correct in Pamslist releases prior to 8609a.
- Newcastle Microcomputer Club RCPM hours are 1700-0800 on weekdays, 24 hours weekends and public holidays.
- The Computer Connection is on-line 24 hours on weekends.
- The sysop of the Realtors Fido-Net is Gary Stern.

Off-line:

- Australian Connection — status unknown
- Freecom C64 BBS — status unknown

Victoria

New Systems:

- AHUBBS: phone (03) 762 1582; 24 hours; sysop, John Forbes.
- Castle Mania: phone (03) 379 5123; 0700-0000; sysop, Mike Purdy.
- Motel International: phone (03) 509 9611; 24 hours; all baud rates; sysop, Kim Gration.
- Omega BBS: phone (052) 22 1670; hours 1900-0200; sysop, Mark Gregson.
- Pacific Island: phone (03) 890 2174; 24 hours; sysop, Craig Bowen.
- Profit IBBS: phone (03) 529 8749; 24 hours; V21/22/23/22bis; sysop, Andrew Hooper.
- Public Resource #1: phone (03) 878 2918; 24 hours; Bell 103 and V22 only; sysop, D. Harvey.
- The Magic Pudding: phone (03) 428 2178; 1900-0700; sysop, Rupert Russell.
- Videotex 4000: phone (03) 329 2936; V23 Viatel.

Corrections:

- AM-NET is a multi-user remote TurboDOS system, with member access and limited visitor access.
- Abacus RCPM is V21/23 (with autochange to 75/1200 for uploading) Reg/VA. Hours are 0800-1200, 1600-2300, seven days. The sysop is Maurice Copeland.
- Down Under Software is now Fido-Net: phone (03) 429 5819; V21/22/23/22bis.

■ Micom BBS now has two telephone lines on the existing number.
■ Public Resource is now system #2.
■ Sysops of The Real Connection are Carla Miller and Andrew Moore.
■ Thunder-Net-Amiga also supports V21/22/23.

Off-line:
■ Millionaire BBS — status unknown.

South Australia

Corrections:
■ The Electronic Oracle RBBS supports V21/22/23 and V22bis on a rotary-dial number — (08) 2606222

Off-line:
■ Red Centre RCPM — status unknown.

Western Australia

New Systems:
■ The Gathering BBS: phone (09) 272 4711; 24 hours; V21/22/23; sysop, Ken Peters.

Corrections:
■ Nemo BBS now supports V21/22/23.

Off-line:
■ Mindstorm BBS — status unknown.

Queensland

A complete listing for Queensland is included due to the large number of changes to the systems in the sunshine state.
■ Acea Commodore BBS: phone (07) 341 0285; 24 hours EST.
■ Ampak PBBS/RCPM: phone (07) 263 7070; 24 hours; V21/22/23/22bis; Mem/-Public access; sysop, Brian Wendt and John Bews.
■ Bribane Experimental RCP/M (BEX): phone (07) 395 1809; 24 hours; sysop: Rik Dalley.
■ Brisbane Commodore User Group BBS: phone (07) 808 2125; 24 hours; sysop, Ray King.

```
Receiving Computer
-----/NAK/----------------------/ACK/-------------------------
     15H                          06H

Sending Computer
--------/SOH/BLK#/BLK2/DATA/CSUM/---/SOH/BLK#/BLK2/DATA/.....
         01H 01H  FEH  .... ddH      01H 02H  FDH  ....
```

Figure 1. Packet organisation and block numbering.

```
Receiving Computer
------/ACK/----------------------/NAK/--------------------------
      06H                          15H

Sending Computer
CSUM/---/SOH/BLK#/BLK2/DATA/CSUM/---/SOH/BLK#/BLK2/DATA/.....
          01H 03H  FCH  .... ddH      01H 03H  FCH  ....
```

Figure 2. Packet failing checksum› data retransmitted

```
Receiving Computer
------/ACK/---/ACK/ Back to command prompt
      06H     06H

Sending Computer
CSUM/---/EOT/---/ Back to command prompt
         04H
```

Figure 3. End-of-file sequence

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■ Brisbane Microbee User Group BBS: phone (07) 38 4833; 24 hours EST; public access; sysop, Graham Scott.
■ Cairns & District IBBS: phone (070) 51 1360; 24 hours; sysop, Neil Barker.
■ COCO Link: phone (075) 32 6370; 24 hours EST.
■ Commodore Express: phone (07) 393 5352; sysop, Craig Upton.
■ Communications Interchange: phone (07) 200 7664; sysop, Geoff Leff.
■ Competron IBBS: phone (07) 52 9498; 24 hours; sysop, David Johnson.
■ Computer Orchard: phone (07) 350 1300; sysop, Scott Pierce.
■ Educational RCPM: phone (07) 266 3369; sysop, Andrew Waddell.
■ Electric Dreams BBS: phone (07) 399 1322; sysop, Joe Altoff.
■ Futex C-64: phone (07) 283 2034; sysop, Paul Salanitri.
■ Hi-Tech CBBS: phone (07) 38 6872; 24 hours EST; sysop Clyde Smith-Stubbs.
■ Hotline: phone (07) 353 3718; 24 hours; sysop, Lionel Theunissen.
■ Info Interchange C-64: phone (07) 200 7664.
■ Kangaroo Point TAFE: phone (07) 391 3788; 24 hours; sysop, Troy O'Malley.
■ Midnight Express: phone (07) 856 4363; sysop, Lloyd Ernst.
■ MSL C-64: phone (07) 341 0285.
■ Rapple — Q: phone (07) 284 6145; V21/22/23/22bis; sysop, T. Sweetser, G. Black and V. Crosdale.
■ Telegold: phone (075) 31 6155.
■ Tomorrowland RMSD: phone (07) 394 2300; 24 hours.
■ Toowoomba Computer Centre: phone (076) 32 7542; weekdays 1800-0800, weekends 24 hours.

Where Do You Download It?

The information (and complete lists, when published) are always prepared with care, and are presented in good faith from information provided by various sources. Latest listings are always available through the following channels.

ACT — PC Exchange RIBM, (062) 58 1406.

NSW — Prophet BBS, 02) 628 7030; AED-Prophet, (02) 628 5222.

Victoria — National BBS, (03) 819 5582.

Queensland — Hi-Tech BBS, (07) 38 6872; Ampak PBBS/RCPM, (07) 263 7070.

South Australia — the Electronic Oracle, (08) 260 6222.

Western Australia — Nemo Multiple BBS, (09) 370 1855.

Tasmania — Tassie Bread Board System, (003) 26 4248.

In Teledata ,enter 'PAMS' from the command prompt.

Let Us Know

Please report any changes or new listings to: Australian PAMS Coordinator, Prophet Bulletin Board; PO Box E41, Emerton 2770; or on ACSnet as prophet@runx, on Teledata as prophet, or on the Prophet BBS (02) 628 7030.

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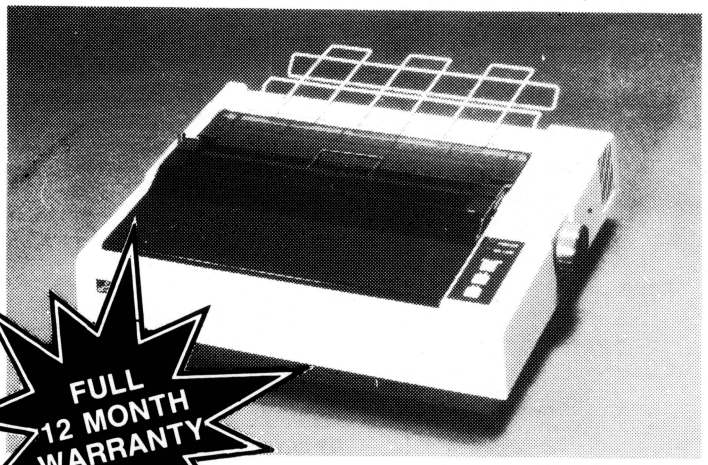

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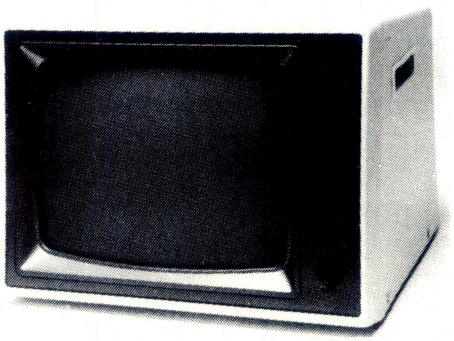

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LOTUS HOTLINE

IT'S DIFFICULT now to imagine Lotus as a small company, but it was once, with everything revolving around the genius of Mitch Kapor, who has now resigned from Lotus. What difference will this make? Probably not much; Lotus is now a big corporation and such innovative leaps as 1-2-3 are now less likely.

For example, although the 1-2-3 graphing is great for analysis and has been beefed up in Release 2, it isn't all that good for presentation graphics. Lotus chose to rectify this, not by developing something itself, but by buying out Graphic Communications, which produces Graphwriter (standalone graphics) and Freelance (to enhance 1-2-3 graphics). Both these products were already on sale in Australia, but in future they will be marketed by Lotus. Hopefully I'll be able to report on them soon.

An area of some concern has been Lotus' update policy. When Release 2 of Lotus appeared it was not greeted with cries of joy by all people; in fact many were content to stay with Release 1A. What was not immediately apparent was that as soon as Release 2 came on the market Release 1A was discontinued and you couldn't buy it any more. This was bad news for companies with a large installed base of Release 1A, who now have to upgrade at high cost or face the problems associated with using two different versions of a program. It was also bad news for those who heard about the bugs in Release 2 and were dubious about upgrading to a flawed program.

Imagineering has publicly admitted it was an error not to keep Release 1A on sale, but to Lotus we're probably small-fry, so it probably doesn't matter what Australia thinks.

Now Lotus has come out with Release 2.01, which is claimed to have fixed many of Release 2's shortcomings, particularly slow save and retrieve times. Release 2.01 is described as a "low-key maintenance release", and details should have been sent to all registered users. Again, Release 2 will be discontinued. If you are buying 1-2-3 you'd better check you are getting 2.01, because presumably copies of Release 2 are still in dealers' hands.

Imagineering's charges for upgrades to Release 2.01 are:

Release 1A bought before 1.8.85: $250
Release 1A bought after 1.8.85: about $55
Release 2 – about $55

Now that the government is levying a 20 per cent sales tax on software, the figures quoted may rise by that percentage, but I understand the current prices will remain until the end of the year.

An area of some concern has been Lotus' update policy. When Release 2 of Lotus appeared it was not greeted with cries of joy by all people; in fact many were content to stay with Release 1A. What was not immediately apparent was that as soon as Release 2 came on the market, Release 1A was discontinued and you couldn't buy it any more.

In the case of any upgrade, we've been told the major cost is that of freighting the software from the United States. This can be quite high because of the way some companies are releasing products with bulky, heavy documentation. I can sympathise with Imagineering when it says it must pass this cost on to the consumer; what I don't see is why the consumer should have to pay *anything* to 'upgrade' from Release 2 to 2.01 just because Lotus couldn't get it right the first time. Why should we have to pay for their mistakes?

Other news from Lotus is that it does not intend to offer site licensing, but it will supply un-copy-protected copies to "some" corporations. One criterion is Lotus' perception of the corporation's honesty, but another is size. Lotus' definition of a "large" corporation might include BHP and the Australian government, but few others.

A New Local Product

Recognising that the printer strings used to send spreadsheets to the HP laser printer are long, complicated and difficult to type, Scott Marshall has written a program that converts plain-English commands into those required by the printer. The program also solves the problem of some printer set-up codes being too long to fit in the space available. Scott has put the program into the public domain and will sell copies on disk at $10 each. I haven't tried it yet but it sounds good. To order, contact the Sydney Lotus Users Group (GPO Box 5010, Sydney 2001; phone (02) 290 3655).

Commands in 1-2-3

In September's *Hotline* we went through all the /Worksheet commands in Lotus 1-2-3 Release 2. This time we'll go through some more commands, starting with the /Range commands.

The **/Range** commands work with a range of cells, from one cell to the whole worksheet. Most of these commands have their counterpart in the **/Worksheet** commands, which affect the whole worksheet. The **/Range** commands are: Format, Name, Unprotect, Transpose, Label, Justify, Input, Erase, Protect and Value.

/Range Format is similar to **/Worksheet Global Format**. The choices are: Fixed, General, Time, Scientific, +/-, Text, Currency, Percent, Hidden, , (comma), Date and Reset.

As most of these were described in the September column under **/Worksheet Global Format**, I won't repeat what I said there. The only additional command is **/Range Format Reset**, which restores the default format for the range you specify. However I find I omitted one ol.

/Range Name Table lists all existing range names and addresses alphabetically. When using this command you have to specify the top left cell of the range where you want the list to appear. Use an empty part of the worksheet, because the table will overwrite any data in the range.

/Range Justify — when you type a label that is too wide to fit in a cell, the label is left-aligned and it will spread into any blank cells on the right (Lotus refers to this as a "long label"). **/Range Justify** allows you to specify the width of the lines in a 'paragraph' (a single column of consecutive labels terminated with a number, a formula, or a blank cell). Note this is not 'right-justified'; the right margin is ragged.

/Range Protect prevents a cell from being changed *if* the cell is protected *and* protection is on (enabled). You use **/Range Protect** if you are creating a worksheet for someone else to use and you want to make sure they don't change or delete some parts of the worksheet.

In a new worksheet, all cells are protected, but protection is not enabled. It can be

enabled by **/Worksheet Global Protection Enable**. If you do enable protection, you cannot change the contents of *any* cell unless you use **/Range Unprotect** to unprotect a range of cells.

/Range Input takes the concept of cell protection one step further. When it is in operation — usually within a macro — the user is prevented from moving the cell pointer to protected cells (as a matter of interest, this is the only time you can type cell entries in the middle of a 1-2-3 command).

/Range Value is used when you want to copy the values of formulae, not the formulae themselves, to another part of the worksheet. This command will overwrite any cells that contain entries.

/Range Transpose changes rows to columns or columns to rows.

The **/Copy** command creates exact copies of a range in another part of the worksheet. There are three types of cell addresses: relative, absolute, and mixed (part relative, part absolute). The differences between relative and absolute addresses need explaining.

In the spreadsheet in Figure 1, the formula for cell B7 is @SUM(B3..B5). Now let us add another column (see Figure 2).

We know the formula we need in cell C7 is similar to the one in B7; in fact it will be the same if we change B to C. When we tell 1-2-3 we want the formula in B7 to be @SUM(B3..B5), it doesn't look at the address of each cell (B3, B4, B5); instead it says "add the cell four rows up to the cell three rows up to the cell two rows up". That is precisely what we want to do in C7. If we 'copy' the formula from B7 to C7, the copy carries the 'meaning' of the formula, not its address. Thus, in the copied formula, the 'relative' addresses are shown, and the formula appears as @SUM(C3..C5).

In the spreadsheet in Figure 3 we are assuming that 12 per cent of all expenses will be regarded as travel costs. So the formula for E3 is 12*15.9/100, which we'll enter as +D7*C3/100. But if we 'copy' this formula to E4, we'll get +D8*C4/100, which isn't what we want. We want to keep D7 constant — in other words we want to keep its address 'absolute'. We do this by putting $ in front of the absolute address — the formula in E3 then becomes +$D$7*C3/100. When you 'copy' this to E4 it becomes +$D$7*C4/100. This isn't as complicated as it may appear at first glance!

In using **/Copy** you simply indicate the range to copy 'from' and then the range to copy 'to', although you need only specify the upper-left corner of the copy to. Don't overlap the 'from' and 'to' ranges.

/Move works in a similar fashion to **/Copy**, the only difference being that after a Move the data moved exists only in the 'to' range; in a Copy it exists both in the 'from' and 'to' ranges.

The next group, the **/File** commands, are used every time you enter or exit 1-2-3. You use them to save your files on disk so you can subsequently retrieve them.

The **/File** commands are: Retrieve, Xtract, Import, Save, Erase Directory, Combine and List.

Filenames in 1-2-3 follow the same rules as in DOS: they can be up to eight characters, which can be any combination of letters and numbers, but not spaces. Lower-case letters are converted into upper case. Some other punctuation symbols (such as the underscore) are acceptable, but unless you know exactly what they are it is wise to stay clear of them. Don't use the DOS-reserved names AUX, CON COM1, COM2, LPT1, or PRN. Don't use a filename extension, because 1-2-3 adds one itself: .WK1 for worksheet files, .PIC for graph files, and .PRN for print files.

/File Retrieve first erases any worksheet displayed on the screen (the 'current' worksheet), and then retrieves the worksheet you asked for from disk — unless it's password protected, in which case you will be prompted "Enter password".

/File Save saves the current worksheet to disk. Unless you specify otherwise it will assume you want to save it to the same file you retrieved. If the worksheet has been changed, you are prompted to see if you want to replace the existing file. This can be a trap, as it is quite easy to reply 'Yes' automatically and overwrite your worksheet with a blank one.

/File Combine incorporates all or part of a worksheet into the current worksheet. Before issuing this command, you have to place the cursor in the upper-left corner of the worksheet being combined. If you are combining a lot of files you are less likely ▷

Figure 1.

A	B	C	D	E	F
1	STATE	INCOME			
2					
3	NSW	27.2			
4	VIC	24.6			
5	QLD	15.9			
6					
7	TOTAL	67.7			

Figure 2.

A	B	C	D	E	F
1	STATE	INCOME	EXPENSES		
2					
3	NSW	27.2	15.9		
4	VIC	24.6	11.2		
5	QLD	15.9	10.8		
6					
7	TOTAL	67.7			

Figure 3.

A	B	C	D	E	F
1	STATE	INCOME	EXPENSES	TRAVEL	TRAVEL
2				%	COSTS
3	NSW	27.2	15.9		
4	VIC	24.6	11.2		
5	QLD	15.9	10.8		
6					
7	TOTAL	67.7	37.9	12	

to make a mistake if each one has cell A1 as its corner.

Your first choice is Copy, Add or Subtract. Copy simply replaces any entries in the current worksheet with the incoming values. Add adds numeric values to the numeric values in the worksheet, but if an incoming value would overlay a label or a formula no change is made. Subtract works in the same way as Add, except the numeric values are subtracted instead of being added (pretty logical, huh?).

Your other choice is between Entire-File and Named/Specified-Range. Entire-File is obvious enough. Named/Specified-Range lets you use a named range or one specified by its co-ordinates.

/File Combine works only with 1-2-3 files; to bring in files created by other programs you use **/File Import**.

/File Xtract stores part of a worksheet in a file. You have to choose between Formulas and Values. Formulas saves the formulas themselves, while Values saves their current values. When you carry out the command, 1-2-3 adjusts cell addresses in formulae. 'Relative' addresses (refer to the Copy command above) retain their relative meaning: "the value of the cell three rows to the left and four rows up". 'Absolute' addresses are adjusted to reflect the difference between cell A1 and the upper left corner of the Xtract range.

/File Erase deletes a file or files from your disk. You first choose the type of file from Worksheet, Print, Graph, or Other. The first three have had a filename extension added by 1-2-3, so you need to type the extension only if you select Other. You can use the DOS wildcard characters: ? matches any single character and * matches all remaining characters.

/File List displays a list of the filenames in the current directory. As with **/File Erase**, you choose the type of file: Worksheet, Print, Graph or Other. As well as listing the files, the display shows the details of the file highlighted: date, time, and size in bytes. 'Other' isn't quite the right description; this choice actually displays *all* files. The usually accurate Help screens go wrong here; this command doesn't list available storage space, and you can't press any key to clear the screen — Enter is a safe choice.

/File Import incorporates the entries stored in a print file (.PRN) of a worksheet. You may have to rename files created by Other in order for them to have the .PRN extension. You need to have a standard ASCII file; most word processors that normally don't produce such files (notably Wordstar) have an option to allow you to work with ASCII files. You choose whether you want the file to be text or numbers. With text you get a single column of left-aligned labels. To convert a column of imported labels into several columns of labels and numbers, use /Data Parse.

/File Directory allows you to change the current directory. This isn't a permanent change; to change permanently use **/Worksheet Global Default Update**.

That concludes the File commands. Next time: the Print commands. □

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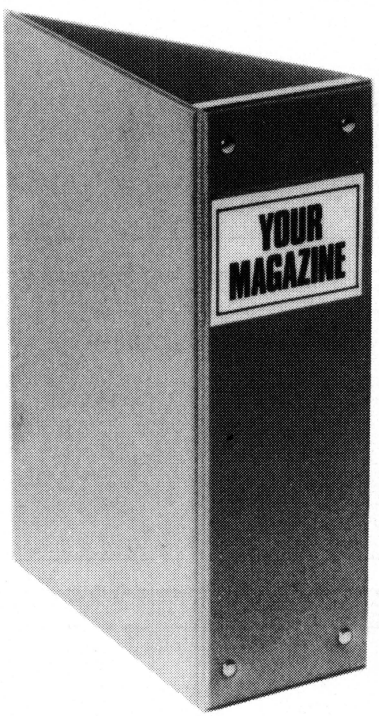

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The Origins of the Apple Species

ONE OF THE MAJOR changes in microcomputing in the past few years has been the development of evolutionary pathways. Until quite recently we had development-by-discontinuity. A company would produce a machine based around a certain chip, then within a year or two, they'd be bringing out a "newer, faster, more powerful" machine based around something entirely different.

Sure, they could transfer their expertise and experience, but the new design inevitably meant a shortage of software, newer and more exciting bugs in the operating systems and untested and unwanted mechanical design features. These have been a fact of life for computer users.

That now seems to have changed, partly, I suspect, because the industry has shaken down into only a couple of systems that matter — the IBM and compatible lines, the Macintosh, and the Apple II. Now no one really cares much if something newer, faster and more powerful comes along — as it has recently with both Commodore and Atari machines. The value of evolution over revolution is apparent to all.

This seems to have come about mainly because the chipmakers are concentrating their efforts in this direction. We are getting families of chips, with each generation preserving compatibility with the last, while each takes the design into new areas. IBM has had a design path through the 8086, 80286, and 80836 chips, and the Mac has done the same with the 68000 migrating to the 68020.

Apple's new II GS, when you think about it, has the longest evolutionary path of all microcomputers — although it is nowhere near as long as some of the mainframes. We are now at the stage of meeting Apple hackers who weren't even born when the first Apple rolled out of that historic, southern California garage.

And although Apple has never been keen to emphasise the fact, we had a number of obvious and subtle changes to the inside workings of the II series over the years, but none more than the jump to the 65816 chip of the II GS.

It remains to be seen, of course, exactly how compatible the new machine is with the old software. We are now too careworn and cynical to accept without comment the claim that something is 99 per cent compatible. Does it mean that only one program in every 100 won't work? Or does it mean that one line in every 100 lines of code crashes? The distinction is rather important!

We are now at the stage of meeting Apple hackers who weren't even born when the first Apple rolled out of that historic garage.

Raising the Standard

Also arising out of the relative stability of these evolutionary pathways is a way of dealing, to a degree, with the old problems of standards. Apple, to its cost, took a long time to discover that IBM *did* control the business marketplace. But fortunately, John Scully, coming from outside the company to manage it, saw the obvious and accepted the inevitability of IBM domination — in the near-term, anyway.

The GS didn't arrive with any magic black box or plug-in board that enables it to run IBM software, although the rumours have been flying thick and fast over the past couple of months. I imagine it's only a matter of time.

Both software and hardware developments that destroy the old ogre of standards incompatibility can't be too far away now. The II GS was released with a new Lotus look-alike program, called VIP, which looks and runs like a Macintosh program, and can port data from IBM's Lotus 1-2-3, Macintosh's Excel, and the old Apple IIe's Appleworks. That's not bad for a new program on a brand new machine.

The other value of evolutionary pathways is in providing designers with time and experience to think about, and work out, their interfaces. I am thinking here mainly of the interface between me and the machine.

Appleworks is a good example of the effects of evolutionary change. There's nothing new, original, or unusual about the program, except that it does everything it sets out to do, extremely well. It's a no-fuss, no-nonsense type of integrated program, and once you've used it for a while you forget it's there.

A few years back we had quite bitter controversies over whether word processing programs should be command-key driven, or run under menu-selection. I wouldn't have used a menu-based word processing program for the proverbial 'million-quid' at the time — they were all too slow and tedious.

Now, with intelligent design, a balanced reliance on menus, and consistently-used command keys, Appleworks represents, to me anyway, almost a perfect balance. All I now want is for Lisner to modularise it, so I can make up a program disk to my own needs.

What would happen if (when?) Appleworks were translated to a Macintosh? We'll probably find out from experience with the mouse-driven II GS. Will anything be gained by making the menus drop from the sky on roller blinds? Will the mouse be quicker and simpler than the cursor keys? I hesitate to record an opinion — I've been wrong too often in the past.

I do believe, however, that Macintosh software has recently shown the need to come back from an entire mouse-and-roller-blind approach — in word processing software at least.

It's interesting that the 'mouse *vs* non-mouse' argument took over where the 'menu *vs* non-menu' controversy left off.

Room to Choose

When I look around my office at the various reporters hammering away on Macs, it is noticeable how many of them choose to use command-key sequences rather than the mouse. But, at least with the new Macs they have a choice. By the same token, I'll bet that almost all of our writers started off using the mouse — and this is probably the most important point.

We all tend to get carried away by the flashiness of new advanced features in hardware and software, but really what we want is simple, direct, functional programs that are intuitive and consistent in use. They need to take into account the needs of novices and experts, constant and occasional users, hackers and computer-phobes.

This might sound like a tall order, but, after all, the computer is supposed to be the 'universal machine', so it should be chameleon-like, both in its ability to change to suit the circumstances, and in the sense that it merges into the furniture. When you work with a computer, after a very short period you should no longer really be aware of its presence.

The II GS looks like it might be such a machine, and it's certainly got the software. □

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MegaFax enables users of PAGEmaster products to both send a graphics file to remote facsimile machines, and to receive fax transmissions on their PC's for editing or for printing on the system's laser printer. MegaFax serves as an image transfer utility between PAGEmaster 300 dpi graphic images and Group III fax file 200 dpi images. Combined with AVR's MegaScan Image/Text Editing software and high quality HP LaserJet compatible fonts, facsimile images of unprecedented clarity and content can be quickly composed and sent worldwide.

AVR uses GammaLink's fax modem board and software as the PC to phone line interface. By using the GammaFax high-speed PC-to-PC file transfer capability, PAGEmaster users have the option of avoiding the 200 dpi resolution of Group III fax machines and transfer 300 dpi images directly between similarly equipped PC workstations at rates up to 9600 bits per second.



MegaFax Features

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*PC-to-PC communication at 9600 baud
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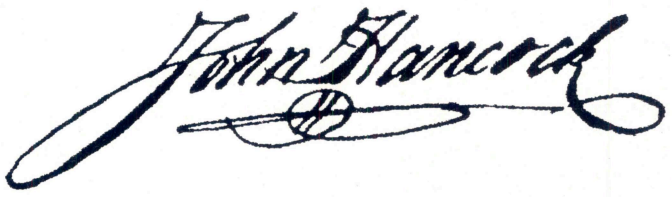



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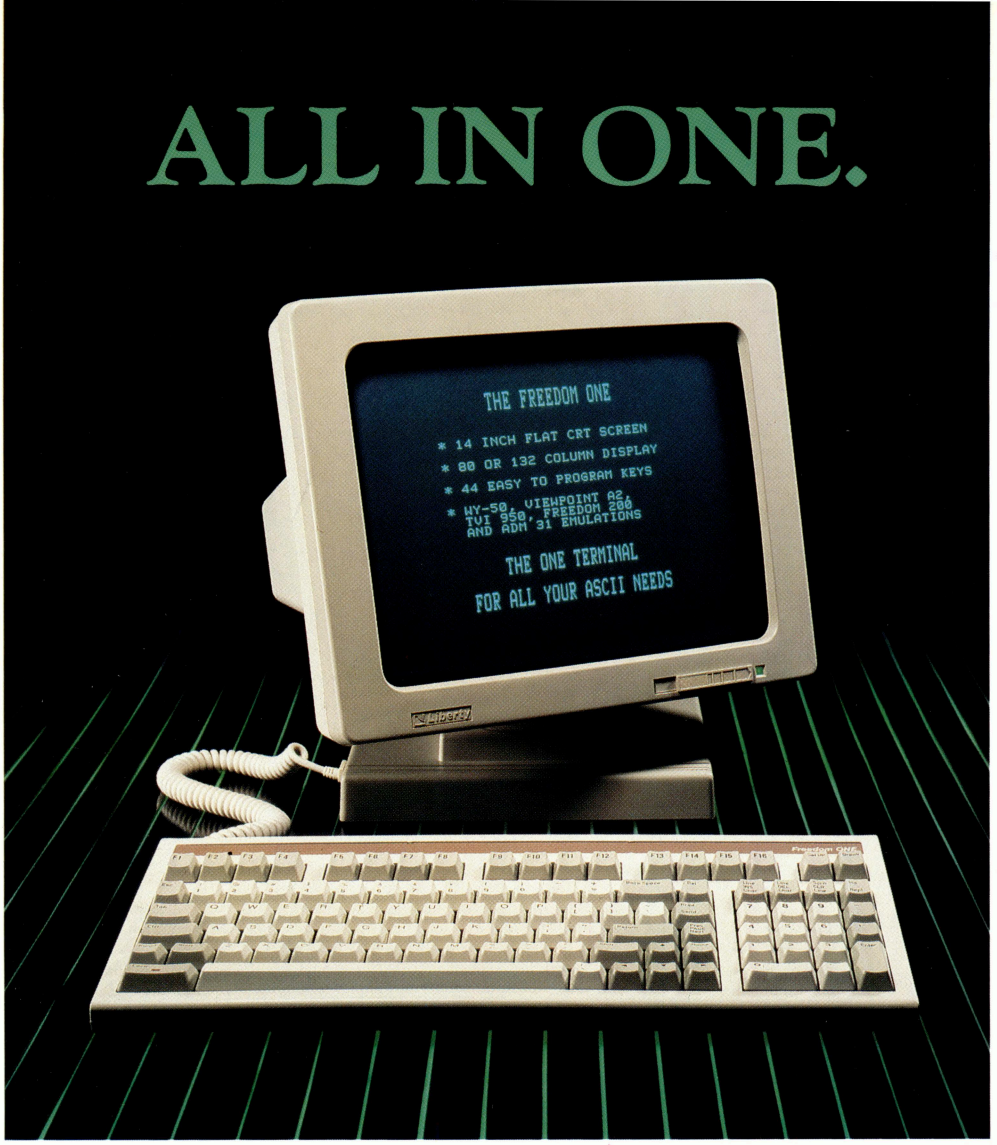

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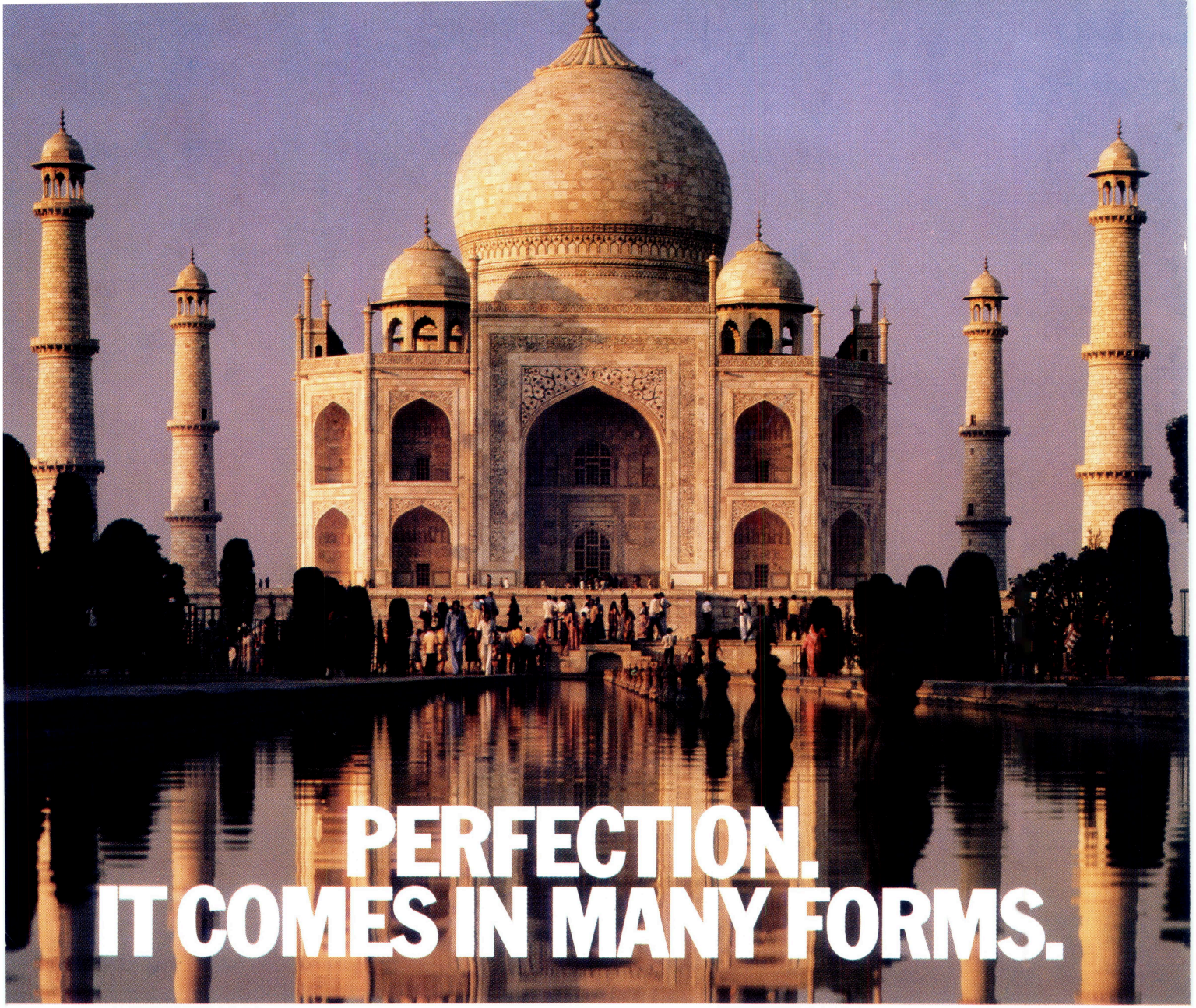

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